Hochschule Offenburg
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ENGLISH LANGUAGE MODULE HANDBOOK

Hochschule Offenburg
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Courses taught in English

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1 General Information and Provider of Courses

B+W	**Department of Business and Industrial Engineering**
EMI	**Department of Electrical Engineering, Medical Engineering and Computer Science**
M+I	**Department of Media**
M+V	**Department of Mechanical and Process Engineering**
SPZ	**Language Center**

Students studying for a **Bachelor degree** can usually enroll on **Master degree** courses, provided that they fulfill the requirements. Permission from the department to enroll on Master degree courses is required.

Some Master degree courses (e.g. CME/RED/MPE and others) have limited spaces for students. Please check beforehand to see if a space is available for you.

The modules **Intercultural Leadership** and **Analytics Coaching** have limited spaces and we try to reserve spaces for incoming students, subject to availability. We cannot promise that we can accommodate all registrations and advise you to check beforehand to see if a space is available for you.

When filling out a **learning agreement**, please enter the module ID, for example “BW-21/ B+W0159”. If the space is not sufficient for the entire ID, please enter the first part (“BW-21”) The second part is optional. Some modules list more than one of these IDs, in which case you can use any of them (indicated by the word “any” underneath the module ID. This happens if different degree courses share the same module, for example General Business Administration is a core module for several degree courses. BW-01/ B+W0101, LH-01/ B+W0101 and WI-01/ B+W0101 are three codes for the same module and can be used interchangeably.

Some modules are split into part 1 and 2 or have a separate lab. In this case, you should either use the module offered in the respective term (e.g. Animation 1 in the spring term) or put both codes on separate lines of the learning agreement (e.g. Operating Systems and lab, AI-07/ EMI110 and AI-07/EMI111).

For all courses offered by the language center please use “SPZ” as module ID.

2 Bachelor Courses

2.1 Department of Business and Industrial Engineering

Course List

Autumn Term	Spring Term	Course Name	Course Type	Credits	Exam Type
x		Analytics Coaching	Seminar	3	Project Work
x	x	Economics	Seminar	3	Term Paper
x	x	General Business Administration	Lecture	5	Written Exam
from WS 24/25	x	Human Resource Management and Organization	Lecture	5	Written Exam and Project Work
x	x	Intercultural Leadership	Seminar	3	Project Work
x	x	International Business Project[1]	Seminar	5	Project Work
x	x	Managing Digital Work	Seminar	3	Project Work
x	x	Social and Intercultural Competences	Seminar	3	Project Work
x		Social Psychology	Lecture	5	Written Exam
	x	Software Implementation Project	Project	6	Project work
	x	Voice Application Strategy and Prototyping	Seminar	3	Project Work

[1] This module has been renamed from Interdisciplinary Project Seminar.

Course Descriptions

Analytics Coaching	
Module ID: **(any)**	BW-31/ B+W0040W LH-28/ B+W0040W WI-26/ B+W0040W
Level:	Bachelor
Course Type:	Seminar
Semester Hours per Week:	2
Credits:	3
Host Semester:	BW 7 / LH 7 / WI 7
Examination:	Project Work
Location:	Campus Gengenbach

Lecturer(s):

Prof. Dr. Mathias Bärtl

Prerequisites:

Successful completion of Statistics foundation course

Objectives and Competences:

Participants will be able to plan, prepare and execute advanced statistical analyses, and to evaluate their results, in order to gain relevant knowledge from business data and effectively inform both daily operations and strategic planning.

Contents:

- Advanced analytical methods (e.g. ANOVA, x^2-Testing, Clustering, Decision Trees)
- Performance of advanced statistical analyses
- Use cases of business data, and their exploration aided by analytics software and a structured analysis process model

Literature and Downloads:

- Kahraman, C., Kabak, Ö.: Fuzzy Statistical Decision-Making; Springer International Publishing, 2016.
- Mertens, W., Pugliese, A., Recker, J.: Quantitative Data Analysis; Springer International Publishing, 2017.
- Moore, D.S., McCabe, G.P., Craig, B.A.: Introduction to the Practice of Statistics; Freeman and Co., NY 2009.
- Lane, D.M.: Online Statistics Educations; http://onlinestatbook.com.

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Economics	
Module ID	BW-21/ B+W0159
Level	Bachelor
Course Type	Seminar
Hours per Week	2
Credits	3
Host Semester	BW 6
Examination	Term Paper
Location	Campus Gengenbach

Lecturer(s):

Prof. Dr. Philipp Eudelle

Prerequisites:

None

Objectives and Competences:

- The students will gain a knowledge about analyzing current economic policy issues
- The students will gain a knowledge about various economic recommendations for action

Contents:

- Analytical basics for individual decision -making problems exemplified by market situations and current economic topics
- Analytical solutions for individual decision -making problems simplified by market situations and current economic topics

Literature and Downloads:

Provided in class

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General Business Administration	
Module ID (any)	BW-01/ B+W0101 LH-01/ B+W0101 WI-01/ B+W0101
Level	Bachelor
Course Type	Lecture
Hours per Week	4
Credits	5
Host Semester	BW 1 / LH 1 / WI 1
Examination	Written Exam
Location	Campus Gengenbach

Lecturer(s):

Prof. Dr. Andreas Klasen

Prerequisites:

None

Objectives and Competences:

The purpose of this course is to provide a comprehensive overview of key elements of the business organization and to competing theories and models of the firm. It will provide a critical perspective on the main functional areas of business and management including strategy and decision making, logistics and production, marketing and sales, as well as accounting and finance. The course aims to build a foundation of knowledge on the different theoretical approaches to management. On completion of the course, the student will be able to understand the evolution of the business organization and management thought, identifying the interconnections between developments in these areas, discuss and compare different models and approaches, and evaluate the significance of contemporary issues in business.

Contents:

- Understanding the business organization
- Strategy and decision making
- Supply chain, logistics and production
- Marketing and sales
- Accounting
- Finance and investment

Literature and Downloads:

- Cavusgil, S.T., Knight, G. & Riesenberger, J. (2017) International Business. Harlow, Pearson.
- Deresky, H. (2017) International Management. Harlow, Pearson.
- Morschett, D., Schramm-Klein, H. & Zentes, J. (2015) Strategic International Management. Wiesbaden, Springer Gabler.
- Nickels, W.G., McHugh, J.M. & McHugh, S.M. (2016) Understanding Business. New York, McGrawHill.

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Human Resource Management and Organization	
Module ID	WP-18/ B+W0387
Level	Bachelor
Course Type	Lecture/Exercise
Hours per Week	4
Credits	5
Host Semester	WP4
Examination	Written Exam (90 minutes) + ungraded PA
Location	Campus Gengenbach

Lecturer(s):

Prof. Dr. Julia Röderer

Prerequisites:

General Business Knowledge

Objectives and Competences:

Students are familiar with the human resources and organizational tasks in the company. They understand the relevance of these two areas of responsibility for achieving corporate goals and can apply business management design considerations to human resources and organizational issues. In doing so, they take into account, that the selected organization also has implications for personnel management decisions or that the organization must be adapted in the event of a personnel-related bottleneck (in particular at the job level). Against this background, they are able to assess the success of alternative personnel management and organizational measures and to make appropriate decisions.

Contents:

Selection and evaluation of personnel

- Preparation of personnel deployment
- Leadership and cooperation
- Motivation of employees
- Forms of personnel development
- Management in case of crisis
- Introduction based on a practical example
- Basic organizational terms
- Organizational levers
- Design of the organization

Literature and Downloads:

- Burkhardt, A., GRoomann, M., & Becker, R., (2018), Commitmentsenkt die Burnoutgefahr. In: Personalführung, 51. Jg., S. 56-60. (Paper)
- Berthel, J., & Becker, F.G. (2017), Personal-Management, München, Schäffer-Poeschel.
- GRoomann, M., et al., (2017), Entscheidung über Maßnahmen zur Senkung des Krankenstands. In: Zeitschrift Führung + Organisation,86. Jg., S. 298-305. (Paper)
- GRoomann, M., Burkhardt, A., & Venohr, D. (2016), So unterstützen Maßnahmen zur Arbeitszufriedenheit die Kundenzufriedenheit. In: Personal Quarterly, 68. Jg., S. 26-31. (Paper)
- Frese, E., GRoomann, M., & Theuvsen, L. (2019), Grundlagen der Organisation. Wiesbaden, Springer Gabler.
- GRoomann, M., Grundei, J., (2016), Lohnt sich eine Hierarchieabflachung?, In: Board - Zeitschrift für Aufsichtsräte in Deutschland, 2. Jg., S. 161-164. (Paper)

- Galbraith,J.R., (2013), Designing Organizations, San Francisco, Jossey-Bass.
- Ebers, M., Maurer, I., & GRoomann, M., (2011), Organisation. In: W. Busse von Colbe u.a. (Hrsg.), Betriebswirtschaft für Führungskräfte.Stuttgart, S. 170-205, Schäffer-Poeschel.
- Ringlstetter, M., (2008), Humanressourcen-Management, München, Oldenbourg.

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Intercultural Leadership	
Module ID (any)	BW-31/ B+W0043W LH-28/ B+W0043W WI-26/ B+W0043W
Level	Bachelor
Course Type	Seminar
Hours per Week	2
Credits	3
Host Semester	BW 7 / LH 7 / WI 7
Examination	Project Work
Location	Campus Gengenbach

Lecturer(s):

Mr. Siefert (Guest Lecturer)

Prerequisites:

Basic understanding of corporate structures and communication

Objectives and Competences:

- Having knowledge and a keen sense of leadership situations
- Finding appropriate ways of leadership
- Exercising a successful performance management system

Contents:

This course provides knowledge about the influence of leadership behavior on different corporate situations. The course establishes an understanding of how leadership behavior exerts influence on performance in regards to an international company's cultural diversity and communication.

- First part:
  - Definition and objectives of leadership management
  - Different leading concepts and leading styles
  - Changes in leadership management models
  - Influence of different cultural backgrounds on companies and corporate culture
  - Influence of a leader's personality and communication skills on performance in different situations
  - Communication dynamics between manager and staff
- Second part:
  - Different approaches of leadership management in different situations
  - Modelling a performance management system
- Workshop:
  - Analyzing leadership management in different corporate situations
  - Designing performance measures in leadership management
  - Developing a performance management system

Literature and Downloads:

Provided in class

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International Business Project	
Module ID	BW-23/ B+W0162
Level	Bachelor
Course Type	Seminar
Hours per Week	4
Credits	5
Host Semester	BW6
Examination	Project Work
Location	Campus Gengenbach

Lecturer(s): Prof Dr Klasen

Prerequisites:

Objectives and Competences:

Contents:

- Methods and processes of initiating, founding and implementing research-based learning in an interdisciplinary context.
- Theoretical approaches and practical phenomena in economics, business administration, law, sociology and political science
- Significance of projects for action in internationally active business enterprises as well as standard instruments for strategy development
- Methods for planning and implementing a project such as requirements analysis, business case and structural planning
- Calculation and interpretation of progress indicators and trend statements on the basis of actual and plan data as well as forms of reporting
- Methods of evaluating an interdisciplinary project in an international context

Literature and Downloads:

The final and updated literature list will be given to students at the start of the term.

- Weidinger, Christina/Fischler, Franz/Schmidpeter, René, Sustainable Entrepreneurship, Heidelberg 2014.
- Manktelow, Aidan, Guide to Emerging Markets, 3. Aufl., London 2014.
- August, R., Mayer, D., and Bixby, M., International Business Law, Harlow 2013.
- Cavusgil, Tamer, Doing Business in Emerging Markets, London 2012.
- Grath, Anders, The Handbook of International Trade and Finance, 2. Aufl., London 2012.
- Hill, Charles, International Business, New York 2011.
- Pless, Nicola/Maak, Thomas, Responsible Leadership, Dordrecht 2011.
- Hofstede, Geert/Hofstede, Gert Jan/Minkov, Michael, Cultures and Organizations, 3. Aufl., New York 2010.
- Holtbrügge, Dirk/Welge, Martin, Internationales Management, Stuttgart 2010.
- Backhaus, Klaus/Voeth, Markus, Internationales Marketing, Stuttgart 2010.
- Tietje, C., Internationales Wirtschaftsrecht, Berlin, 2009.
- Sperber, Herbert/Sprink, Joachim, Internationale Wirtschaft und Finanzen, München 2007.

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Managing Digital Work	
Module ID:	WP-22/ B+W0393
Level:	Bachelor
Course Type:	Lecture
Semester Hours per Week:	2 Every two weeks; beginning on October 7th, 2022; afternoon
Credits:	3 Work load: 30 h presence / 60 h homework/ project = overall 90 hours
Host Semester:	WP4
Examination:	75% homework/ project, 25% presentation
Location:	Campus Gengenbach

Lecturer(s): Dr. Gülden Özbek-Potthoff

Prerequisites:

Objectives and Competences:

Professional competencies
Students…

- can describe actual trends of digital transformation and the change of work systems
- can present several kinds of change in companies
- can explain the meaning of selected psychological theories for the digital/ agile change

Methodological and social competencies
Students…

- can use insights of change management theories and methods in management practice
- can analyze, visualize, and discuss the consequences of digital transformation as well as possible challenges of implementation problems, which can occur due to workforce resistance

Contents:
The module gives an overview of digitization and the impacts of it on companies; the different kinds of change in companies and their impact on leader- and employee-relation; acceptance of technologies by individuals and companies; and tools to design the change influenced by information technology:

- Digitization and the change of working environment
- Type of work systems (e.g., Work System Theory)
- Change management theories and concepts
- Basic psychological theories & leadership theories
- Adoption and usage of digital innovation

Resistance to digital innovation

Literature and Downloads:

- Papsdorf, C. (2019), Digitale Arbeit: Eine soziologische Einführung, Camps, Frankfurt am Main.
- Wörwag, S. & Cloots, A. (2020) (Hrsg.), Human Digital Work – Eine Utopie?, Springer Gable, Wiesbaden.
- Welpe, I., Brosi, P., & Schwarzmüller, T., (2020), Digital Work Design: Die Big Five für Arbeit, Führung und Organisation im digitalen Zeitalter, Campus Verlag.

Other literature will be discussed in lecture

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Social and Intercultural Competences	
Module ID:	WP-06/ B+W0106
Level:	Bachelor
Course Type:	Seminar
Semester Hours per Week:	2
Credits:	3
Host Semester:	WP1
Examination:	Project Work
Location:	Campus Gengenbach

Lecturer(s): Dr. Stephanie Simon

Prerequisites:

Objectives and Competences:

The purpose of this seminar is to develop and improve students' social competence and to sensitize them to diversity in general and to cultural differences in particular. This enables them to reflect their own cultural identities and to interact respectfully and successfully with persons of different cultural backgrounds. Teaching methods include lecture-style presentations, group exercises, and self-reflection in order to encourage personal, in-depth dealing with the concepts of the seminar.

Contents:

- What's in the term "competence"?
- Social, emotional and behavioral skills
- Diversity (categories of diversity, theoretical models)
- Culture (possible meanings of the term, cultural dimensions and values, theoretical models)
- Intercultural competence
- Diversity-conscious communication
- Practical considerations, e.g. preparation for potential travels and stays abroad

Literature and Downloads:

Provided in class

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Social Psychology	
Module ID	WP-04/ B+W0377
Level	Bachelor
Course Type	Lecture
Hours per Week	4
Credits	5
Host Semester	WP1
Examination	Written Exam
Location	Campus Gengenbach

Lecturer(s):

Dr. Stephanie Simon

Prerequisites:

Objectives and Competences:

Contents:

- Basic understanding of social psychology and research methods
- Social identity, social groups, and group dynamics
- Group performance and leadership
- Social perception and attribution
- Intergroup relations, stereotypes, and prejudice
- Social influence
- Attitudes and attitude change
- Aggression and violence
- Prosocial behavior and fairness

Literature and Downloads:

- Fischer, P., Jander, K. & Krueger, J. (2018) Sozialpsychologie für Bachelor, Heidelberg, Springer.
- Jonas, K., Stroebe, W. et al. (2014), Sozialpsychologie, Heidelberg, Springer.
- Kessler, T. & Fritsche, I. (2017), Sozialpsychologie, Heidelberg, Springer.
- Garms-Homolova, V., (2020), Sozialpsychologie der Einstellungen und Urteilsbildung, Wiesbaden, Springer.

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Software Implementation Project	
Module ID	WIN-26/ B+W0617
Level	Bachelor
Course Type	Lecture
Hours per Week	4
Credits	6
Host Semester	WIN6
Examination	Project presentation and project documentation
Location	Campus Gengenbach

Lecturer(s): Prof. Dr. Tobias Hagen

Prerequisites: IT affinity, basic understanding in either software development, web development or databases

Objectives and Competences:

- Gain experience with software development in a team
- Apply project management techniques
- Further improve various technical skills (depending on the type of project)

Contents:

The students implement (parts of) a software system in small teams of 3-5. The topics vary from year to year. Tasks may include modelling, design, programming, and configuration of software components. A special focus is put on the integration of different components like ERP system, web application, and mobile devices.
The students work in teams where they use and apply typical project management concepts. All phases of a project are covered.

Literature and Downloads:

Depends on the project

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Voice Application Strategy and Prototyping	
Module ID	BW-31/ B+W0061W LH-28/ B+W0061W WI-26/ B+W0061W
Level	Bachelor
Course Type	Seminar
Hours per Week	2
Credits	3
Host Semester	BW 7 / LH 7 / WI 7
Examination	Project Work
Location	Campus Gengenbach

Lecturer(s): Mrs. Annebeth Demaeght

Prerequisites:

None

Objectives and Competences:

By the end of the workshop students

- have comprehensive knowledge of the effects and applications of voice user interfaces in digital communication and marketing management
- are familiar with conversational interfaces, voice personas, dialog trees, voice UX, conversational analytics and their strategic use in customer experience management
- understand how to use voice user interfaces along the customer journey
- have basic knowledge of voice assistant technologies, e.g. functionalities and technological setup
- can develop project ideas and simple prototypes

Contents:

Voice assistants like Alexa and Google Assistant offer a new marketing channel for brands, products and services. This workshop provides students with a basic understanding of how voice interaction works. It covers the fields of conceptualizing, designing and prototyping dialogs for voice applications.

The central focus is set upon:

- Strategies for voice user interfaces
- Conversational design
- Use cases
- Voice UX and UX-testing
- Voice interactions prototyping (e. g. with voiceflowProject kick-off meeting)

Literature and Downloads:

Slides of the course will be available in moodle. Additional Literature Recommendations:

- Kahle, T.; Meißner, D. (2020): All About Voice. Konzeption, Design und Vermarktung von Anwendungen für digitale Sprachassistenten. Freiburg: Haufe.
- Kreutzer, R. T. und Seyed Vousoghi, D. (2020): Voice-Marketing. Der Siegeszug der digitalen Sprachassistenten. Wiesbaden: Springer Gabler.
- Pearl, C. (2016): Designing Voice User Interfaces. Principles of Conversational Experiences. Sebastopol, CA: O'Reilly Media.
- Further literature will be provided during the course.

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2.2 Department of Electrical Engineering, Medical Engineering and Computer Science

Course List

Autumn Term	Spring Term	Course Name	Course Type	Credits	Exam Type
	x	Operating Systems	Lecture	2	Written Exam
	x	Operating Systems Lab	Lab	3	Lab Work
	x	Software Defined Radio	Lecture	2	Lab Work

Operating Systems + Lab	
Module ID	AI-07/ EMI110 and AI-07/EMI111
Level	Bachelor
Course Type	Lecture and Lab
Hours per Week	2 and 2
Credits	2 and 3
Host Semester	AI 2
Examination	Written Exam and Lab Work
Location	Campus Offenburg

Lecturer(s):

Prof. Dr. Tobias Lauer

Prerequisites:

Procedural Programming

Objectives and Competences:

- Students learn to understand the role of the operating system as part of a system architecture. You know the basic terms, components and functions of an operating system
- Students become familiar with operating system problems and learn how to use solutions
- Through practical exercises the students are able to develop an application using operating system interfaces
- Students can use tools and utilities at the operating system level in a practical way

Contents:

- Architecture of computers and operating systems
- Principles and operating modes of operating systems forming the interfaces between hardware and software
- Synchronisation of processes and threads
- Memory, E/A, and file management
- Selected operating systems: Windows and Linux
- Optional lab: Windows und Linux

Literature and Downloads:

Provided in class

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Software Defined Radio	
Module ID	EI-37/ EMI865
Level	Bachelor
Course Type	Lab
Hours per Week	2
Credits	2
Host Semester	
Examination	Lab Work
Location	Campus Offenburg

Lecturer(s):

Prof. Dr. Pfletschinger

Prerequisites:

- Basic knowledge of mathematics for engineers, in particular complex numbers
- Basic knowledge of communications engineering and signal theory

Objectives and Competences:

Upon successful completion of this module, the student will be able to:

- understand the functions and the relationship of the main building blocks of a modern receiver including RF processing, modulation, demodulation and digital baseband processing
- implement a basic simulation chain of a digital communication system
- implement a software defined receiver in Matlab

Contents:

In this course, students will implement a working digital communication system. The project includes the following steps:

- Basics of analog and digital communication
- Simulation of communication systems
- Software installation and operation of SDR module
- Spectral analysis of received signals
- Modulation and demodulation
- Synchronization at receiver side
- Data transmission and detection

Literature and Downloads:

- B. Stewart, K. Barlee, D. Atkinson, L. Crockett, Software Defined Radio using Matlab and Simulink and the RTL-SDR. www.desktopsdr.com, 2015.
- T. F. Collins, R. Getz, D. Pu, A. M. Wyglinski, Software-Defined Radio for Engineers. Artech House, 2018.
- M. Rice, Digital Communications: A Discrete-Time Approach, Pearson, 2009.

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2.3 Department of Media

Course List

Autumn Term	Spring Term	Course Name	Course Type	Credits	Exam Type
	x	Animation 1	Seminar	4	Project Work
x		Animation 2	Seminar	4	Project Work
	x	Film 1	Seminar	4	Project Work
x		Film 2	Seminar	4	Project Work
	x	Security of Web Applications	Lecture	2,5	Written Exam
	x	Security of Web Applications Lab	Lecture	2,5	Lab Work
	x	Software Engineering	Lecture	3	Written Exam
	x	Software Engineering Lab	Lab	2	Lab Work

Course Descriptions

Animation 1 and 2	
Module ID	Animation 1: mgp-26/ M+I261n Animation 2: mgp-26/ M+I262n
Level	Bachelor
Course Type	Hands-on Seminar with Team Work in Studios and Labs
Hours per Week	4
Credits	8
Host Semester	
Examination	Project Work
Location	Campus Offenburg

Lecturer(s):

Prof. Götz Gruner

Prerequisites:

Basic design-oriented courses

Objectives and Competences:

Ability to develop and produce a media production, in this case animation, VFX and media art.

Contents:

- Screenplay, storyboard, conception of installations and performances
- Production of an animated film or a media art project

Literature and Downloads:

Provided in class

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Film 1 and 2	
Module ID	Film 1: mgp-22/ M+I259n Film 2: mgp-22/ M+I260n
Level	Bachelor
Course Type	Hands-on Seminar with Team Work in Studios and Labs
Hours per Week	4
Credits	8
Host Semester	
Examination	Project Work
Location	Campus Offenburg

Lecturer(s):

Prof. Dr. Heiner Behring

Prerequisites:

Basic design - oriented courses

Objectives and Competences:

Ability to develop and produce a media production, in this case a short movie.

Contents:

- Production of a short movie (in team of max 4 students)
- Development and writing of a screenplay
- Arranging and preparation of a media production
- Shooting and post production

Literature and Downloads:

Provided in class

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Security of Web Applications and Lab	
Module ID	UNITS- 30/ M+I274 UNITS-30/ M+I280
Level	Bachelor
Course Type	Lecture and Lab
Hours per Week	2.5 and 2.5
Credits	2.5 and 2.5
Host Semester	UNITS 4
Examination	Written Exam and Lab Work
Location	Campus Offenburg

Lecturer(s):

Prof. Dr. Dirk Westhoff

Prerequisites:

Familiarity with a procedural programming language and to understand Internet and World Wide Web technologies.

Objectives and Competences:

- To understand fundamental web-application attacks and to apply recommended countermeasures against such web-application attacks
- To be familiar with generic configuration means to harden a Web-Server

Contents:

- Client-Server architectures e.g. three tier architecture
- Fundamental attacks on Web-applications and Defacements
- Mobile code and security concepts of ActiveX, Java and PHP
- DoS resp. DDoS-attacks, Websecurity-Scanner
- Countermeasures against Webapplication attacks
- Basic security requirements for cloud security

Literature and Downloads:

Provided in class

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Software Engineering and Lab	
Module ID	UNITS-30/ M+I122 and M+I123
Level	Bachelor
Course Type	Lecture and Lab
Hours per Week	2 and 1
Credits	3 and 2
Host Semester	UNITS 2
Examination	Written Exam and Lab Work
Location	Campus Offenburg

Lecturer(s):

Prof. Dr. Andreas Schaad

Prerequisites:

Familiarity with a procedural programming language and to understand Internet and World Wide Web technologies

Objectives and Competences:

TBD

Contents:

- Lecture 1: Basic History of the Software Engineering Discipline
- Lecture 2: Requirements Engineering
- Lecture 3/4: UML-based Design
- Lecture 5: Coding – Best Practices
- Lecture 6: Testing Software
- Lecture 7: Different Development Approaches
- Lecture 8: Motivating a secure Development Lifecycle
- Lecture 9: Secure Programming
- Lecture 10: Static Code Analysis
- Lecture 11: CVSS-based Vulnerability Analysis
- Lecture 12: Selected reading of very recent (and very old „test of time") papers

Literature and Downloads:

- Sommerville, I. „Software Engineering (10th Edition)"
- Martin, R. „Clean Code"
- Martin, R. „Clean Architecture"
- Brooks, F. „The Mythical Man-Month: Essays on Software Engineering"
- Fowler, M. „UML Distilled"
- https://mi-learning.mi.hs-offenburg.de/SWE/ (in German)
- Any material mentioned in the lecture (e.g. Online Secure Coding Guidelines for C/C++)

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2.4 Department of Mechanical and Process Engineering

Course List

Autumn Term	Spring Term	Course Name	Course Type	Credits	Exam Type
	x	Basics CAD	Lab	3	Lab Work
	x	Fluid Mechanics	Lecture	5	Written Exam
	x	Innovative Design and Inventive Problem-Solving	Seminar	2	Presentation
x		Materials Engineering Lab	Lab	3	Lab Work
	x	Thermodynamics II - Engines and Machines with Lab	Lecture + Lab	5	Written Exam + Lab Work
	x	Heat Transfer and Lab	Lecture + Lab	6	Oral Exam
	x	System Dynamics and Control	Lecture + Lab	7	Written Exam

Basic Computer Aided Design (CAD)	
Module ID	MA-06/ M+V823
Level	Bachelor
Course Type	Lab
Hours per Week	2
Credits	3
Host Semester	MA2
Examination	Lab Work
Location	Campus Offenburg

Lecturer(s): Prof. Dr. Christian Wetzel

Prerequisites:

- Interest in interdisciplinary work
- Basic knowledge in designing and dimensioning simple machine elements in accordance with stress, production and material requirements

Objectives and Competences:

- Ability to use a common CAD program, have an overview of the areas of use of CAD systems, and to understand the importance of CAD systems for product design and the flow of business information
- Acquisition of basic knowledge of general methods and working techniques for 3D modelling and design of components, assemblies, definition of standard parts and the derivation of production drawings with 3D CAD systems
- Capability to independently model and visualize simple components and assemblies with a CAD system and to generate technical drawings from them

Contents:

- Introduction to working with 3D-CAD systems and system basics: function structure and structure of CAD systems, user interface, view manager, model information
- Basic construction elements and model references: coordinate systems, reference planes and axes
- Sketching and sketching methodology: creation, dimensioning and conditions of sketches
- Modelling and machining of components: profile and rotating bodies, drawn parts, composite bodies, rounding and chamfers, bores and threads, ribs, pattern creation, copying, mirroring and moving of construction elements, surface modelling, model adjustments, use of standard part libraries
- Assembly modelling: installation, replacement and adaptation of components, design of assembly structure, skeleton models, assembly information
- Drawing derivation from the 3D model: drawing settings, derivation of assembly drawings and individual part drawings in accordance with standards, generation of model views, dimensioning, deviations in shape and position, surface details, fits, creation of parts lists

Literature and Downloads:

- Sham Tickoo: PTC Creo Parametric 4.0 for Designers, CADCIM Technologies; e-book, 4th ed. 2017.
- Köhler P (ed.): Pro/ENGINEER Praktikum. Einführende und fortgeschrittene Arbeitstechniken der parametrischen 3D-Konstruktion mit Wildfire 5.0. 5. Auflage, Wiesbaden: Vieweg + Teubner Verlag, 2010.
- Wyndorps P.: 3D-Konstruktion mit Pro/ENGINEER Wildfire 5.0. 5. Auflage, Europa-Lehrmittel Verlag, 2010.
- Hoischen H.: Technisches Zeichnen. 32. Auflage, Berlin: Cornelsen-Verlag, 2009

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Fluid Mechanics	
Module ID	BT-15/ M+V819
Level	Bachelor
Course Type	Lecture
Hours per Week	4
Credits	5
Host Semester	BT4
Examination	Written Exam
Location	Campus Offenburg

+++ Please note that the teaching of for this course is condensed and takes place in the first half of the term, including some classes on Saturdays. +++

Lecturer(s):

Prof. Dr.-Ing. Andreas Schneider

Prerequisites:

Physics, technical mechanics I (statics)

Objectives and Competences:

Flowing gases and liquids constitute the basis of countless processes in energy technology, chemical and biotechnological processes, in the raw material, food, pharmaceutical and many other industries. Fluid mechanics deals with the states and motion of fluids, i.e. compressible gases and (almost) incompressible liquids, due to the forces acting on them, e.g. weight, centrifugal, pressure and frictional forces.

Understanding the principles of fluid mechanics is therefore essential for many engineers. The students are enabled to use this knowledge in the design of apparatuses and the planning of processes. In addition, there are general approaches in the engineering sciences, illustrated by special fluid mechanics tasks, such as the importance of and working with dimensionless key figures, and responsible working in groups.

Contents:

- Basics: Density and viscosity of fluids, definition of fluids vs solids, fluid statics, capillary effects
- Fluid kinematics: streamlines, continuity equation, flow potential
- Flow of ideal liquids: Navier-Stokes-, Euler-, and Bernoulli equations, vortices, momentum balance
- Fluid kinetics: Similarity laws, Reynolds number, laminar and turbulent flow, boundary layer theory
- Real liquid flow, hydraulic losses
- Introduction to gas dynamics: conservation of mass, Euler equation, Laval nozzle, sonic speed

Literature and Downloads:

- Course handout and exercises, downloads from Moodle.
- Çengel, Y.A. and Cimbala, J.M.: Fluid mechanics - Fundamentals and Applications, McGraw Hill, 4th ed. 2018,
- ISBN 978-1-259-69653-4 (university library)
- Kundu, P.K., Cohen, I.M., Dowling, D.R.: Fluid Mechanics, 5th ed. 2012, Elsevier, ISBN 978-0-12-382100-3,
- (university library)
- Elger, D.F, Williams, B.C., Crowe, C.T. and Roberson J.A.: Engineering Fluid Mechanics (international student
- version), 10th ed. 2014, John Wiley, (university library)

- Schobeiri, M.T.: Applied Fluid Mechanics for Engineers, 1st ed. 2014, MacGraw Hill, ISBN 978-0071800044,
- (university library)
- Song, H.: Engineering Fluid Mechanics, Springer 2018, ISBN 978-981-13-0173-5 (e-book, access via university network)
- Darby, R and Chhabra, R.P.: Chemical engineering fluid mechanics, CRC Press 2017 (e-book, access via university network)

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Innovative Design and Inventive Problem Solving	
Module ID	MA-29/ M+V712
Level	Bachelor
Course Type	Seminar, exercises, semester thesis in teamwork
Hours per Week	2
Credits	2
Host Semester	
Examination	Presentation of the semester thesis / with individual grading
Location	Campus Offenburg

Lecturer(s): Prof. Dr. Pavel Livotov

Contents:

Learning method: seminar, exercises, semester thesis in teamwork
Examination: presentation of the semester thesis / with individual grading

Summary
The universal Advanced Innovation Design Approach (AIDA) taught in the course, is based on the Theory of Inventive Problem Solving (TRIZ) and allows to enhance the productivity and efficiency of idea generation. Through numerous examples and exercises, the course participants will learn to solve inventive problems systematically. In a semester thesis, the students are given an opportunity to apply the gained skills for a problem of their choice in a teamwork.

Course content:
1. Introduction to the Advanced Innovation Design Approach: identification of business opportunities and market needs, formulation and ranking of inventive problems, idea generation, new concept development and optimization.
2. Introduction to the TRIZ methodology of inventive problem solving: basic principles and main inventive methods.
3. Enhancement of personal creativity. Systematic contradiction-oriented way of thinking. Talented thinking with the System Operator (Multi-Screen Analysis). Rapid CrossIndustry Innovation tool.
4. New product development and problem solving with help of contradiction analysis and TRIZ inventive principles and technological effects.
5. Solving of difficult problems. Short form of inventive algorithm ARIZ, identification of physical contradictions and their resolving with separation principles.
6. Anticipatory failure identification: analysis of failures which happen for no apparent reason; prediction of potential failure scenarios for new products or processes.
7. Prediction of future technical product features with evolution patterns of technical systems.

Literature and Downloads:

Livotov, P., TRIZ Innovation Technology. Product Development and Inventive Problem Solving. Handbook, TriS Europe, Berlin, 2013
VDI Standard 4521 (2016), Inventive problem Solving with TRIZ. Fundamentals, terms and definitions, Beuth publishers, Duesseldorf, Germany, 2016-2019

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Materials Engineering Lab	
Module ID:	MA-16/ M+V703
Level:	Bachelor
Course Type:	Lab
Semester Hours per Week:	3
Credits:	3
Host Semester:	MA 3
Examination:	Lab Work
Location:	Campus Offenburg

Lecturer(s):

Prof. Dr. Dipl.-Ing. Dietmar Kohler

Prerequisites:

Theoretical knowledge in materials science and in welding techniques.

Objectives of the course:

The students are capable of critically assessing and applying the individual welding and thermal cutting processes, taking into account the design and material specifications.

Contents:

Possible topics in seminar:

- Comparison of plastic and metal materials
- Classification of polymers
- Assembly of polymers: structure and behavior
- Manufacturing polymers: Methods and properties
- Plastic materials: Influence of intermolecular physical bondings; effect of additives
- Mechanical and thermal behavior, heat resistant polymers
- Properties and special processing methods of selected plastic materials

Laboratory tests:

- Identification of thermoplastic materials
- Measurement of tensile strength
- Measurement of melting flow Index
- Measurement of impact resistance

Literature and Downloads:

Lab test instructions

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Thermodynamics 2 – Engines and Machines with Lab	
Module ID	MA-23/ M+V826
Level	Bachelor
Course Type	Lecture and Lab
Hours per Week	4
Credits	5
Host Semester	MA6
Examination	Written Exam and Lab Work
Location	Campus Offenburg

Lecturer(s):

Prof. Dr. Treffinger

Prerequisites:

- Higher mathematics and physics
- It is recommended to also attend the associated course “Thermodynamics I - Technical Thermodynamics”

Objectives of the Course:

The students know the classification of engines and machines and are able to choose a machine suitable for a specific task with emphasis on energy efficiency.

Contents:

- Classification of Engines and Machines
- Energy Balances
- Basics of Fluid Machines: Classification and structure, Euler hydrostatical law, scaling of fluid machines
- Hydraulic Fluid Machines: System / plant integration, types of impellers of e.g. a water turbine, design and control of Kaplan, Francis, and Pelton turbine, dimensionless identifiers and Cordier diagram, centrifugal pumps
- Thermal Turbomachinery: Classification, steam turbine as an example for a multistage turbine, gas turbine
- Displacement Machines: Basics, example of a reprocating piston compressor
- Combustion Engines: Thermodynamics of combustion engines, selected aspects

Literature and Downloads:

- Carravetta, A., Derakhshan Houreh, S., Ramos, H.M.: Pumps as Turbines - Fundamentals and Applications, Springer, 2018, ISBN 978-3-319-67507-7 (e-book, access via university network).
- Brennen, C.E.: Hydrodynamics of pumps, Cambridge University Press, 2011, (e-book, access via university network).

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Heat Transfer with lab	
Module and Course ID:	ALABAMA/ M+V437 English class in the context of cooperation with Alabama; exchange students from other universities are welcome to join!
Level:	Bachelor
Course Type:	Lecture and lab
Semester Hours per Week:	4 SWS (If only a very few students enroll in this course, it will be offered as a self-study course with a contact time of 2 SWS)!
Credits:	6 ECTS
Host Semester:	Summer term
Examination:	Oral exam
Location:	Campus Offenburg

Lecturer(s): Peter Treffinger/Jörg Ettrich/Andreas Schneider

Requirements: Basics of Fluid Dynamics and Thermodynamics

Objectives and Competences:

- The students know the heat transfer mechanisms heat conduction, convective heat transport and heat transfer by radiation.
- They can estimate heat transfer coefficients for heat transfer problems with simple boundary conditions.
- They know concepts of similarity relations and the associated dimensionless numbers in the context of heat transfer.
- They are familiar with the design and operation of heat exchangers.
- They are able to calculate and design heat exchangers for simple problems.

Contents:

- Introduction
- Heat transfer by conduction
- Convective heat transfer
- Heat exchanger
- Heat transfer by radiation

Literature and Downloads:

- von Boeckh, P. & Wetzel, T. Heat Transfer: Basics and Practice Springer, 2012 (available as e-bool via the library of HS Offenburg)
- The German standard to heat transfer in English: Gesellschaft, VDI: VDI Heat Atlas. Berlin Heidelberg: Springer Science & Business Media, 2010. (available as e-bool via the library of HS Offenburg)
- Thermal Energy Storages: Bauer, T.; Steinmann, W.-D.; Laing, D. & Tamme, R.: Thermal Energy Storage and Systems. Annual Review of Heat Transfer, Begell House, 2012, 15, 131-177 https://www.researchgate.net/publication/328032045_Review_on_heat_transfer_analysis_in_thermal_energy_storage_using_latent_heat_storage_systems_and_phase_change_materials

Module Description VT (Verfahrenstechnik) Process Engineering
Department of Mechanical and Process Engineering
Module **Heat Transfer**

Responsible		*tbd*	
Program:	Process Engineering	Degree:	Bachelor
ECTS:	6	Workload (h):	180
Recommended Semester:	4	Contact Time (h):	*60*
Module Duration (Semester):	1	Self-study Time/ Teamwork (h):	*120*
Teaching Method:	Lecture / Lab	Hours per Week (45 min):	4
Availability:	*Summer*	Group Size:	-
Usability:	Bachelor Process/Mechanical Engineering, Second Study Section		
Recommended Qualifications	*Basics of Fluid Dynamics and Thermodynamics*		
Competences	*Heat and Mass Transfer is an important basis to describe and to dimension processes.* *The students have to deal with similarity relations and non-dimensional properties in many ways.* *They know the basics of heat conduction and are able to describe the temperature distribution and to dimension a simple heat exchanger.* *An application-oriented laboratory experiment illustrates the theory.* *They also deal with the basics of Radiation and Convection.* *The students know the basics of mass transfer, phase changes and phase equilibrium.* *They can deal with drying processes and Adsorption and are able to discuss energetic optimization of those.*		
Records and Scores	*Written Test, 90 min.*		

Course Description
M+V437 **Heat and Mass Transport** (Lecture/Lab) , 4.0
Literature:

- *Skript zur Vorlesung*
- *H.D. Baehr und K. Stephan, Wärme- und Stoffübertragung, Springer Verlag Berlin-Heidelberg (2008)*
- *Verein deutscher Ingenieure (Hrsg.), VDI Wärmeatlas, 10. Auflage (2006)*

List of Contents:

- A. Introduction and Basics:
  Heat and Mass Transport in energy technology
  Conservation Equations
  Mathematical Tools
  Non-dimensional Properties
- B. Heat Transfer:
  Conservation Equations for Energy and Temperature
  Heat Conduction
  Convection
  Radiation
  Heat Sources
- C: Mass Transfer
  Diffusion
  Convection
- D. Heat and Mass Transfer:
  Convective Heat Transport
  Heat Transition
- E. Single Phase Heat Exchanger
  Flow Types
  Operating Characteristics
  Heat Exchanger Efficiency
  Number of Transfer Units
  Log-Mean Temperature Difference
  Experimental Setup / Hands-On
- F. Heat Exchanger with Phase Transition
  Characteristics of Phase Transition
  Melting and Solidification
  Condensation and Evaporation
  Boiling
  Experimental Setup / Hands-On
- G. Examples and Outlook

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System Dynamics and Control	
Module and Course ID:	ALABAMA/ M+V828 English class in context of cooperation with Alabama; exchange students from other universities are welcome to join!
Level:	Bachelor
Course Type:	Lecture and lab
Semester Hours per Week:	5 SWS (If only a very few students enroll in this course, it will be offered as a self-study course with a contact time of 2 SWS)!
Credits:	7 ECTS
Host Semester:	Summer term
Examination:	K90 (written exam of 90 minutes duration)
Location:	Campus Offenburg

Lecturer(s): Rainer Gasper

Requirements: Basics of Mathematics, Electrical Engineering, Physics, Mechanics, Fluid Dynamics, Thermodynamics and Machine Elements/Design

Objectives and Competences:

- The students are able to analyse complex systems in Mechanical Engineering and split them into subsystems exchanging signals.
  They understand a signal as a physical quantity e.g. displacement, force or temperature.
- They are able to describe simple linear systems
- mathematically and analyse simple systems analytically.
- The students have the abstraction capability to estimate the behaviour of non-linear systems and to simulate and analyse them numerically.
- They know simple controls and are able to adjust the parameters of those. They recognize critical systems regarding stability and can apply measures to improve stability.
- The students can familiarise with common measurement methods and can determine their usability.

Contents:

- Definition and Typical Tasks
- System / Signal / Transfer Function
- Complex Numbers / Bode Plot / Root Locus
- Laplace Transformation
- Frequency Response / Illustration of combined Systems
- Important Transfer Functions
- Symbols in EMSR Technology
- Synthesis of Control Circles
- Analytic and Empirical Design Rules
- Stability of Systems

Literature and Downloads:

- Regelungstechnik für Ingenieure, M. Reuter (Vieweg, 2000)
- der Vorlesung verteilte Umdrucke, (2000)

Module Description MA (Maschinenbau) Mechanical Engineering
Department of Mechanical and Process Engineering
Module **System Dynamics and Control**

Responsible		*Prof. Dr.-Ing. Ulrich Hochberg*	
Program:	Mechanical Engineering	Degree:	Bachelor
ECTS:	7	Workload (h):	210
Recommended Semester:	6	Contact Time (h):	*75*
Module Duration (Semester):	1	Self-study Time/ Teamwork (h):	*135*
Teaching Method:	Lecture / Lab	Hours per Week (45 min):	5
Availability:	*Winter and Summer*	Group Size:	-
Usability:	Bachelor Mechanical Engineering, Second Study Section		
Recommended Qualifications	*Basics of Mathematics, Electrical Engineering, Physics, Mechanics, Fluid Dynamics, Thermodynamics and Machine Elements/Design*		
Competences	*The students are able to analyse complex systems in Mechanical Engineering and split them into subsystems exchanging signals. They understand a signal as a physical quantity e.g. displacement, force or temperature. They are able to describe simple linear systems mathematically and analyse simple systems analytically. The students have the abstraction capability to estimate the behaviour of non-linear systems and to simulate and analyse them numerically. They know simple controls and are able to adjust the parameters of those. They recognize critical systems regarding stability and can apply measures to improve stability. The students can familiarise with common measurement methods and can determine their usability.*		
Records and Scores	*Written Test, 90 min.*		

Course Description
M+V828 **Measurement and Control with Lab** (Lecture/Lab) , 5.0
Literature:

- *Regelungstechnik für Ingenieure, M. Reuter (Vieweg, 2000)*
- *In der Vorlesung verteilte Umdrucke, (2000)*

List of Contents:

- *Definition and Typical Tasks*
- *System / Signal / Transfer Function*

- *Laplace Transformation*
- *Frequency Response / Illustration of combined Systems*
- *Important Transfer Functions*
- *Symbols in EMSR Technology*
- *Synthesis of Control Circles*
- *Analytic and Empirical Design Rules*
- *Stability of Systems*

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3 Master Courses

3.1 Faculty Business and Industrial Engineering

Course List

Autumn Term	Spring Term	Course Name	Course Type	Credits	Exam Type
	x	Business Analytics	Seminar	3	Project Work
x		Decision Analysis	Lecture	3	Written Exam
	x	Digital Pricing Strategies	Seminar	3	Project Work
x	x	Economic Policy	Seminar	6	Term Paper
	x	Global Business Project	Seminar	3	Project Work
x		International Economic Law	Lecture	2,5	Written Exam
	x	International Finance Management	Lecture	3	Written Exam
	x	Leadership - Leading People and Organizations	Seminar	3	Project Work
x		Strategic Information Management and Decision Making	Seminar	3	Written Exam
	x	Strategic International Marketing	Seminar	3	Project Work
	x	Technical Logistics Seminar	Seminar	6	Project Work

Business Analytics	
Module ID	IBC-08-02
Level	Master
Course Type	Seminar
Hours per Week	3
Credits	3
Host Semester	IBC
Examination	Project Work
Module	IBC-08 Business Information Systems
Location	Gengenbach

+++ Please do not confuse this module, Business Analytics, with the module "Business Intelligence", which is also held by Prof. Dr. Hagen, but in German language.+++

Lecturer(s):

Prof. Dr. Hagen

Prerequisites:

Basic knowledge in MS Excel

Objectives of the Course:

Students will understand the value of Business Analytics and data related techniques. Students can make practical use of business intelligence tools in their professional life as a consultant.

Contents:

The course covers theory and practice of business analytics:

- Chapter I:
  Introduction to Data Warehouse Systems and Business Intelligence, Architecture and components of DW-systems, data modelling in DW-systems, Online Analytical processing, dashboards.
- Chapter II:
  Implementation of a case study in the DW- system SAP BWä. Students use BI tools to analyse sales data, they create analytical reports and implement a dashboard for sales analytics.
- Chapter III:
  Introduction to Big Data, Data Science and Data Mining.

Literature and Downloads:

- Instructor provides case study material.
- Sabherwal, R., Becerra-Fernandez I. Business Intelligence: Practices, Technologies, & Management, 2011.
- Provost, F., Fawcett, T.: Data Science for Business, O'Reilly 2013.

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Decision Analysis	
Module ID	BWM-02/ B+W1153
Level	Master
Course Type	Lecture
Hours per Week	2
Credits	3
Host Semester	BWM
Examination	Written Exam
Location	Gengenbach

Lecturer(s):

Prof. Dr. Graumann

Prerequisites:

Basic knowledge of business administration

Objectives of the Course:

By the end of the course, the students will have understood the concept of procedural rationality. They should be able to pass consciously through the phases of a decision making process while making use of the methodological recommendations of decision analysis.

Contents:

Everybody makes numerous decisions each and every day. Many of them are of minor importance, but some decisions require serious consideration. The course will teach students how to tackle thesedecisions. The concept is called Rational Decision Making. It is based on a model of a decision making process with seven phases. The course will highlight each and every phase and will then proceed with case studies. Thus, students will have the opportunity to apply their new knowledge to cases of practical decision making.

Literature and Downloads:

- Eisenführ, F. / Weber, M. / Langer, Th.: Rational Decision Making, Berlin et al. 2010.
- Edwards, W. / Miles Jr., R.F. / von Winterfeld, D. (Edts.): Advances in Decision Analysis. Cambridge et al. 2007.
- Keeney, R.L.: Value-Focused Thinking. Cambridge et al. 1996.

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Digital Pricing Strategies	
Module ID	BWM-05/ B+W1148W
Level	Master
Course Type	Seminar
Hours per Week	2
Credits	3
Host Semester	BWM
Examination	Project Work
Location	Gengenbach

Lecturer(s):

Mr. Max Bonn (Guest Lecturer)

Prerequisites:

Marketing, General Business Administration

Objectives of the Course:

- Understanding the importance of pricing and how it effects sales and profitability?
- Understanding the components of a pricing framework and how it can be applied to real business situations.
- Understanding the impact of digitalization on pricing and what additional considerations are needed when pricing in a digital context (digital products and digitalsales channels)
- Being able to design a digital pricing concept for a given case.

Contents:

Pricing Essentials:

- Why is Pricing such an important component in the marketing mix and how does it affect sales and profitability
- What are the main components of a comprehensive pricing framework?
- Price Strategy: How to design a pricing strategy that helps to achieve the strategic objectives of the overarching business strategy?
- Price Setting: How can we align the priceto the value of the product?
- Price Differentiation & Dynamic Pricing: How can we optimize our yield by charging different prices for the same product?▪Price Getting: How can we consider the value of the customer?
- Pricing Psychology: How can we utilize psychological effects to optimize profit and sales?
- Pricing Enablers: What are the technical and organizational requirements to anchor and execute a pricing strategy?

Pricing in the digital world:

- The effects of digitalization on pricing?
- Pricing strategies for digital sales channels
- Pricing strategies for digital products
- The Revenue Models as a part of a digital business Model

Literature and Downloads:

- Tien Tzudo: Subscribed.
- Hermann Simon & Martin Fassnacht: Price Management.

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Economic Policy	
Module ID	BWM-06/ B+W1007W
Level	Master
Course Type	Seminar
Hours per Week	4
Credits	6
Host Semester	BWM
Examination	Term Paper
Location	Gengenbach

Lecturer(s):

Prof. Dr. Eudelle

Prerequisites:

None

Objectives of the Course:

The students will gain an understanding about the impact of governmental economic protection.

Contents:

Exemplarily some current topics:

- Definition of economic policies, Interventions of the state in economic affairs
- Objectives of economic affairs: stability objective, growth objective, structural objective, allocation objective
- Current issues of economic policies: good balance of governmental intervention, benefit and limits of growth

Literature and Downloads:

Provided in class

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Global Business Project	
Module ID	BWM-04/ B+W1157
Level	Master
Course Type	Seminar
Hours per Week	2.0
Credits	3 Credits
Host Semester	BWM
Examination	Project Work
Location	Gengenbach

Lecturer(s):

Prof. Dr. Klasen

Prerequisites:

None

Objectives of the Course:

As part of a project work, students demonstrate their abilities to analyse challenges for companies in the global economy. This includes an understanding of the importance of globalisation as well as differences between industrialised and developing countries. Students learn to analyse competitors and to position companies in a competitive environment. They also develop international marketing entry strategies, e.g. by means of export or foreign direct investment. They are familiar with structures and organisation of international companies, as well as methods for the implementation of decision-making processes regarding R&D, production and marketing. Students have mastered basic models for solving problems in human resource development and leadership in an international context. In addition to methodical skills, the project work also strengthens students' social skills.

Contents:

Exemplarily some current topics:

- Definition of economic policies, Interventions of the state in economic affairs
- Objectives of economic affairs: stability objective, growth objective, structural objective, allocation objective
- Current issues of economic policies: good balance of governmental intervention, benefit and limits of growth

Literature and Downloads:

- Cavusgil, S.T., Ghauri, P.N. and Akcal, A.A.(2012) Doing Business in Emerging Markets. London: Sage.
- Hill, C.W.L. (2014) International Business. Maidenhead: McGraw.
- Holtbrügge, D. and Welge, M. (2010) Internationales Management. Stuttgart: Schäffer-Poeschel.
- Klasen, A. and Bannert, F. (2015) The Future of Foreign Trade Support. Durham: Global Policy and Wiley.

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Global Business Project	
Module ID	BWM-04/ B+W1157
Level	Master
Course Type	Seminar
Hours per Week	2.0
Credits	3 Credits
Host Semester	BWM
Examination	Project Work
Location	Gengenbach

Lecturer(s):

Prof. Dr. Klasen

Prerequisites:

None

Objectives of the Course:

As part of a project work, students demonstrate their abilities to analyse challenges for companies in the global economy. This includes an understanding of the importance of globalisation as well as differences between industrialised and developing countries. Students learn to analyse competitors and to position companies in a competitive environment. They also develop international marketing entry strategies, e.g. by means of export or foreign direct investment. They are familiar with structures and organisation of international companies, as well as methods for the implementation of decision-making processes regarding R&D, production and marketing. Students have mastered basic models for solving problems in human resource development and leadership in an international context. In addition to methodical skills, the project work also strengthens students' social skills.

Contents:

Exemplarily some current topics:

- Definition of economic policies, Interventions of the state in economic affairs
- Objectives of economic affairs: stability objective, growth objective, structural objective, allocation objective
- Current issues of economic policies: good balance of governmental intervention, benefit and limits of growth

Literature and Downloads:

- Cavusgil, S.T., Ghauri, P.N. and Akcal, A.A.(2012) Doing Business in Emerging Markets. London: Sage.
- Hill, C.W.L. (2014) International Business. Maidenhead: McGraw.
- Holtbrügge, D. and Welge, M. (2010) Internationales Management. Stuttgart: Schäffer-Poeschel.
- Klasen, A. and Bannert, F. (2015) The Future of Foreign Trade Support. Durham: Global Policy and Wiley.

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International Economic Law	
Module ID	IBC-07-01
Level	Master
Course Type	Lecture
Hours per Week	2
Credits	3
Host Semester	IBC 1
Examination	Written Exam
Location	Gengenbach

Lecturer(s): Prof. Dr. Andreas Klasen

Prerequisites:

Basics in Business Administration

Objectives of the Course:

At the end of the course, participants will be able to apply selected concepts and basic techniques used in international transactions and/or consulting projects; therefore students will build up expertise to

- understand basic concepts of commercial law, international trade law, international investment law and competition law,
- assess transactional requirements and the problems that threaten the success of trade,
- understand tools in international trade processes and legal structure to further global development, and
- analyse selected issues in international trade and competition policy, the transactional conditions conductive to its development and the specific and general problems which threaten the success and integrity of individual transactions.

Contents:

International economic law is related to significant bodies of rules and institutions involved in shaping the 21st century international economic order. The subject is not only relevant due to its central role facilitating the integration of global markets, but also because of the opportunity to gain specialist expertise in a very important area of international law and global commerce. The lecture includes, in particular:

- Understanding fundamental principles of the law of the World Trade Organization (WTO). Key topics include sources of WTO law, the relationship between WTO law and international and domestic law, the WTO dispute settlement system, and substantive rules on market access.
- Assessing international law governing foreign investments. Important topics include sources, scope and content of the substantive international law rules that determine investor-state relationships, and discusses their application in practice.
- Analysing crucial elements of competition law and policy. This covers, for example, the role of international organisations and multinational enterprises, competition rules of the EU and the UK, as well as the relationship between competition policy and trade policy.

Literature and Downloads:

- Agarwal, A.A. (2017) Business Leadership and Law. New Delhi, Springer.

- Chaisse, J., Choukroune, L. & Jusoh, S. (eds.) (2020) Handbook of International Investment Law and Policy. Singapore, Springer.
- Fatehi, K. & Choi, J. (2019) International Business Management. Cham, Springer.
- Hüschelrath, K. & Schweitzer, H. (eds.) (2014) Public and Private Enforcement of Competition Law in Europe. Heidelberg, Springer.
- Jenny, F. & Katsoulacos, Y. (2016) Competition Law and Enforcement in the BRICS and in Developing Countries. Cham, Springer.
- Klasen, A. (ed.) (2020) The Handbook of Global Trade Policy. Oxford, Wiley.
- Morschett, D., Schramm-Klein, H. & Zentes, J. (2015) Strategic International Management. Wiesbaden, Springer Gabler.
- OECD (2022) Arrangement on officially supported export credits. Paris, OECD

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International Financial Management	
Module and Course ID:	BWM-02/ B+W1154
Level:	Master
Course Type:	Lecture
Semester Hours per Week:	2
Credits:	3
Examination:	Written exam
Location:	Gengenbach

Lecturer(s): Prof. Dr. Andreas Klasen

Requirements:

Basics in finance

Objectives and Competences:

At the end of the course, participants will be able to apply concepts of international financial management; students will build up expertise to

- develop a critical understanding of key theories, approaches and issues in the field of global financial management,
- apply knowledge and understanding of complex issues to improve business and management practice, and
- understand tools in international financing processes and related legal structures.

Contents:

In times of poly-crises and challenging economic conditions, financial management is one of the most dynamic disciplines in the world. This lecture addresses key issues and developments in the sector and aims to provide students with a solid understanding of the changing global context in which firms operate. The lecture includes, in particular:

- Understanding fundamental principles of corporate finance in an international environment.
- Assessing international financial institutions and understand key concepts of public development banks and export credit agencies.
- Analysing crucial elements of financing transactions in an international environment such as trade finance, export finance, development finance, structured finance and project finance.

Literature and Downloads:

- Corelli, A. (2018) Analytical Corporate Finance. Cham, Springer.
- Fatehi, K. & Choi, J. (2019) International Business Management. Cham, Springer.
- García, F.J.P. (2017) Financial Risk Management. Cham, Palgrave Macmillan.
- Götze, U., Northcott, D. & Schuster, P. (2015) Investment Appraisal. Berlin Heidelberg, Springer.
- Klasen, A. (ed.) (2020) The Handbook of Global Trade Policy. Oxford, Wiley.
- Morschett, D., Schramm-Klein, H. & Zentes, J. (2015) Strategic International Management. Wiesbaden, Springer Gabler.

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Leadership – Leading People and Organizations	
Module ID	BWM-05/ B+W1147W
Level	Master
Course Type	Seminar
Hours per Week	2
Credits	3
Host Semester	BWM
Examination	Project Work
Location	Gengenbach

Lecturer(s):

Prof. Dr. Adrian Bekman (Guest Lecturer)

Prerequisites:

Basics of General Business Administration / Business Organizations

Objectives of the Course:

- The students will have a clear insight in leadership concepts and key qualities
- The students will be better able to lead themselves and their processes
- The students experienced the key leadership competences in organizational context
- The students developed a personal vision on leadership

Contents:

- Key qualities of leadership
- Methodology of the social evidential: dealing with questions
- Process, dialogue, biography: man and organization
- Judgement-building and decision-making
- 7 leadership exercises to experience the methodology
- The art of conscious creation
- Self-leadership
- Key leadership concepts
- The process organization

Literature and Downloads:

- Adriaan Bekman: Horizontal Leadership. Alert Verlag Berlin
- Adriaan Bekman: The mystery of leadership Alert Verlag Berlin
- Adriaan Bekman: The art of conscious living Alert verlag Berlin

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Strategic Information Management and Decision Making	
Module ID	BWM-01/ B+W1315
Level	Master
Course Type	Seminar
Hours per Week	2
Credits	3
Host Semester	BWM
Examination	Written Exam
Location	Gengenbach

Lecturer(s):

Prof. Dr. Klasen

Prerequisites:

None

Objectives of the Course:

This module aims to develop student skills to apply strategic information management concepts in support of business objectives. It enables participants to understand the principles of data, information and knowledge and their lifecycle necessary to drive and support business capability. It also helps to critically assess the strategic use of information, systems and tools, as well as techniques necessary to optimise information use in business processes. In addition, the module aims to develop students' understanding of the roles, strengths and weaknesses of different types of analytical models to support management decision-making. Participants will be able to produce solutions to practical decision-making, planning, control and performance evaluation scenarios by applying management concepts and techniques.

Contents:

- Foundations
- The strategic role and nature of information
- Strategic information management projects
- Implementing information management strategy
- Decision-making strategies and objectives
- Analytical models and problem-structuring for decision-making

Literature and Downloads:

- Brocke, J. vom and Rosemann, M. (ed.) (2015). Handbook on Business Process Management 2. Heidelberg: Springer.
- Eisenführ, F., Weber, M. and Langer, T. (2010). Rational Decision Making. Heidelberg: Springer.
- Galliers, R.D. (2009). Strategic Information Management. New York: Routledge.
- Obermaier, R. and Saliger, E. (2013). Betriebswirtschaftliche Entscheidungstheorie. München: Oldenbourg.

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Strategic International Marketing	
Module ID	BWM-05/ B+W1033W
Level	Master
Course Type	Seminar
Hours per Week	2
Credits	3
Host Semester	BWM
Examination	Project Work
Location	Gengenbach

Lecturer(s):

Mr. Daniel Otte (Guest Lecturer)

Prerequisites:

Marketing lecture

Objectives of the Course:

By the end of the lecture students are able to

- Analyze and evaluate the attractiveness and structure of international markets
- Prioritize and choose markets to be entered
- DeDatee a market-entry strategy
- Design a suitable marketing mix for a foreign market

Contents:

The lecture sets the topic of entering foreign markets into perspective and then follows a 3-step approach starting with market analysis, followed by strategies in international marketing und then leading to go-to-market considerations (international marketing mix). It is designed to provide an understanding of what role international markets play for a corporation and how to better understand markets as well as their respective consumers in an international context. The lecture builds on existing knowledge of the marketing mix and puts the elements in an international context. It provides students with a holistic understanding of how to better understand and evaluate markets for a corporation, how to prioritize and choose foreign markets to be entered and how to design a suitable market-entry strategy.

The central focus is set upon:

- How to evaluate a foreign market
- Market choice and market entry strategy
- Go-to-market (marketing mix in the international context)

Literature and Downloads:

Slides of the course “Strategic International Marketing” are available in moodle. Additional Literature Recommendations:

- Becker, J. (2019): Marketing-Konzeption, 11. Auflage, München.
- Kotler, P. /Armstrong, G. (2015): Principles of Marketing, 16thedition.
- Homburg, C. (2016): Marketingmanagement, 6. Auflage, Wiesbaden.
- Bruhn, M. (2019): Marketing, 14. Auflage, Wiesbaden.
- Meffert et al (2015): Marketing, 12. Auflage, Wiesbaden.
- Simon, H. / Fassnacht, M. (2019): Price Management, 1stedition, Berlin.

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Technical Logistics Seminar	
Module ID	BWM-15/ B+W1170
Level	Master
Course Type	Seminar
Hours per Week	4
Credits	6
Host Semester	BWM
Examination	Project Work
Location	Gengenbach

Lecturer(s):

Prof. Dr. Dittrich

Prerequisites:

Previously acquired knowledge of Logistics is required.

Objectives of the Course:

TBD

Contents:

Project work (over both teaching terms) in teams to strengthen the ability to work in a team and to achieve a span over previously practised individual sequences on a more comprehensive topic; presentation and defence of the results at the end of the semester.

Literature and Downloads:

The literature is largely case- and exercise-related and will be mentioned in the course of the seminar or researched by the students themselves as an exercise.
Exercise script on the intranet of the Offenburg University of Applied Sciences (Moodle).

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3.2 Department of Electrical Engineering, Medical Engineering and Computer Science

Course List

Autumn Term	Spring Term	Course Name	Course Type	Credits	Exam Type
	x	Advanced Digital Signal Processing	Lecture	4	Written Exam
	x	Advanced Channel Coding	Lecture	3	Written Exam
x		Automotive Radar			
x		Computer Networks	Lecture	3	Written Exam
	x	Computer Vision	Lecture + Lab	4	Written Exam + Lab Work
x		Digital Communications with Lab	Lecture	3	Written Exam
x		Digital Signal Processing (DSP) Lab	Lab	1	Lab Work
x		Digital Signals and Systems	Lecture	3	Written Exam
	x	Embedded and Industrial Networks	Lecture	2	Written Exam
	x	Embedded and Industrial Networks Lab	Lab	3	Lab Work
	x	Guided Wave Theory	Lecture	5	Written Exam
x		Information Theory and Coding	Lecture	3	Written Exam
x		Microwave Lab	Lab	2	Lab Work
x		Internet of Things	Lecture	2	Presentation
x		Statistical Signal Processing and Information Theory	Lecture	2	Written Exam
	x	Telecommunication Networks	Lecture	3	Written Exam

Advanced Digital Signal Processing	
Module ID	CME-07/ EMI414
Level	Master
Course Type	Lecture
Hours per Week	2
Credits	4
Host Semester	CME
Examination	Written Exam
Location	Campus Offenburg

Lecturer(s):

Prof. Dr. Christian Reich

Prerequisites:

- Basics of continuous-time and discrete-time signals and systems (impulse response, step response, frequency response)
- Fourier Series, Fourier Transformation, Laplace Transformation, z-Transformation
- Lecture "Digital Signals and Systems"

Objectives of the Course:

- Profound knowledge of digital signal processing systems
- Ability to implement modern signal processing concepts

Contents:

- Transform Analysis of Linear Time-Invariant Systems: Frequency Response Components, All-Pass Filters, Minimum-Phase Systems.
- IIR Filter Design: Approximation of Differential Equation, Impulse and Step Invariance Design, Bilinear Transformation.
- IIR Filter Structures: Noncanonical and Canonical Direct Form, Transposed Direct Form, Parallel Form, Cascade Form. Finite Precision Numerical Effects.
- FIR Filter Design Techniques: Fourier Approximation, Windowing, Optimum Equiripple Approximation.
- Discrete Fourier Transform (DFT): Linear and Circular Convolution, Fast Fourier Transform (FFT) Algorithms.
- Multirate Processing: Downsampling, Decimation Filter, Upsampling, Interpolation Filter.
- Adaptive Signal Processing: Configuration in different Applications, Optimum Filter, Least-Mean-Squares Algorithm.

Literature and Downloads:

- Oppenheim, Alan V.; Schafer, Ronald W.: Discrete-Time Signal Processing. Pearson, 2013.

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Advanced Channel Coding	
Module ID	CME-04/ EMI406
Level	Master
Course Type	Lecture
Hours per Week	2
Credits	3
Host Semester	CME
Examination	Written Exam
Location	Campus Offenburg

Lecturer(s):

Prof Dr Tobias Felhauer

Prerequisites:

Objectives of the Course:

Contents:

Introduction:

- Coding; Types of Coding; Modelling of noisy Digital Communication Channels; Coding Gain
- Information Theoretical Analysis of a Communication Link
- Digital Communication System Model; Information Measures; Entropy and Redundancy, Equivocation, Irrelevance and Transinformation of a Communication Link; Channel Capacity; Examples

Error Protection Coding (FEC)

• General error protection strategies, Types and Capabilities of Linear Codes; Boundaries of Linear Codes

• Mechanisation of Coding and Decoding of linear Block Codes

• Special linear block codes: Hamming Codes, Simplex Codes, Reed-Muller Codes, cyclic block codes, Reed-Solomon (RS)

Codes; Bose-Chaudhuri-Hocquenghem (BCH) Codes

- Error Protection Coding for burst error channels: CRC-Codes, Fire-Codes, Interleaving
- Convolutional Coding: Description of convolutional Codes (Tree-, State- and Trellis-Diagram);
- Characteristics of convolutional Codes (minimum free distance, catastrophic error propagation etc.); ML-Decoding Principle (hard/soft decision Viterbi decoding); puncturing

Advanced Error Protection Coding

• Concatenated Coding:

serial concatenated coding (Product Codes)

parallel concatenated Coding (Turbo Codes)

• Low-density parity-check codes (LDPC - Gallager-Codes)

Literature and Downloads:

- J. G. Proakis: Digital Communications. McGraw-Hill, New York, 2007.

- D. Declercq et al.: Channel Coding: Theory, Algorithms, and Applications: Academic Press, 2014.

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Automotive Radar	
Module ID:	CME-05/ EMI442
Level:	Bachelor + Master
Course Type:	Lecture
Semester Hours per Week:	2
Credits:	2
Host Semester:	CME
Examination:	Oral Exam
Module:	Electives
Location:	Campus Offenburg

Lecturer(s):

Prof. Dr.-Ing. Marlene Harter

Prerequisites:

- Basic knowledge in signal processing
- Basic knowledge in high-frequency but not strictly required

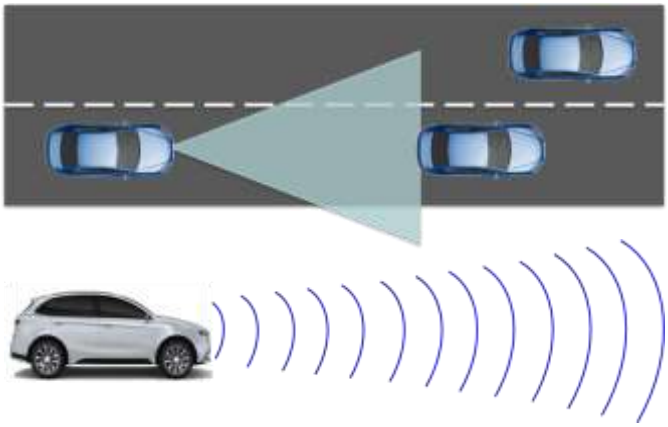
Objectives and Competences:

- Understanding the principle and types of automotive radars
- Being capable to understand the advantages of radar compared to other technologies
- Being capable to know the applications and functions of current and future automotive radar systems

Contents:

Advanced Driver Assistance Systems (ADAS), employing available camera, lidar and radar technology, are in worldwide deployment these days. Up to now about 180 million radar units are worldwide circulating on our roads. Today ADAS are no longer comfort devices anymore, but they have become a safety feature for various AEB-Systems (Automatic Emergency Braking) in cars and trucks worldwide.

- History of automotive radar
- Radar basics: Wave propagation, automotive radar frequencies and regulations, comparison to other technologies
- Radar techniques: Radar principles and components, radar signal modulation, basic radar signal processing,
  radar system specifications and characteristics
- Principles for angle measurement
- Automotive radar in praxis: Applications and examples of automotive radars, radar sensor vehicle installation,
  mutual interference of radar aensors
- Future trends in automotive radar



Literature and Downloads:

- Winner, H., Hakuli, S., Lotz, F., Singer, C. (eds.), Handbook of Driver Assistance Systems, Basic Information, Components and Systems for Active Safety and Comfort, Springer, 2016.
- Skolnik, M.,Radar Handbook, 3rd edition, McGraw-Hill Education, 2008.
- Pozar, D. M., Microwave Engineering, 2nd edition, Wiley, 2011.

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Computer Networks	
Module ID:	CME-03/ E+I407
Level:	Master
Course Type:	Lecture
Semester Hours per Week:	2
Credits:	3
Host Semester:	CME1
Examination:	Written Exam
Location:	Campus Offenburg

Lecturer(s):

Prof. Dr. Erwin Mayer

Prerequisites:

- Background knowledge in communication and networks
- General background in computer science

Objectives and Competences:

- Understanding general communication concepts and their practical application
- Understanding role and implications of a layered communication architecture
- Obtaining the capability to analyze, organize and maintain IP networks
- Learning the Dateology and methodology to be able to analyze and tune communication systems
- Identifying typical requirements and problems in network environments and devise adequate solutions (e.g. addressing, error recovery, flow control, routing)
- Capability to select and adequately use standard network equipment (repeater, hubs, switches, routers,..) for given tasks
- Being capable to interpret data traffic visualized over a network sniffing tool and understand the rationale of the exchanged messages
- Understanding advanced modulation and coding schemes being used in modern computer networks
- Competence to understand, design, implement and analyze medium access control (MAC) mechanisms being used in modern computer networks
- Competence to understand the basics of traffic engineering for the use in modern computer networks
- Understanding performance issues in network environments and how to avoid performance bottlenecks

Contents:

- General Communication Concepts
- OSI and TCP/IP Reference Model
- Physical Layer
- Data Link Layer
- Network Layer
- Transport Layer
- Application Layer
- Performance Analysis

Literature and Downloads:

- A.S. Tanenbaum, Computer Networks, 5th ed., Prentice Hall, 2010.
- J. F. Kurose, K. W. Ross, Computer Networking (A Top-Down Approach Featuring the Internet), 6th ed., Prentice Hall, 2012.
- Comer, Droms, Computer Networks and Internets, 6th ed., Addison-Wesley, 2014.

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Computer Vision	
Module ID	EIM-15/ EMI407
Level	Master
Course Type	Lecture and Lab
Hours per Week	4
Credits	4
Host Semester	EIM
Examination	Written Exam and Lab Work
Location	Campus Offenburg

Lecturer(s):

Prof Dr Hensel

Prerequisites:

Objectives of the Course:

After successful completion of this module
- the students have become acquainted with feature-based methods of machine vision.
- are able to name and implement different algorithms of the optical motion field.
- have a mental map of selected machine learning methods in the field of computer vision
- have the ability to select and use deep neural networks in image processing tasks

Lecture contents:

Feature-based methods:
- Feature detectors and feature descriptors
- Image pyramids
- SIFT detector and descriptor

Image Transformations:
- Affine and Projective Transformations
- Robust transformation estimation (RANSAC)

Image Motion and Tracking
- Ooptical flow (local and global methods)

Machine learning in image processing
- Clustering/Segmentation: k-means, SLIC Superpixel
- Classification: Bayes, Support Vector Machines, Perceptron
- Neural Networks: Base and Backpropagation learning

Deep learning in machine vision
- Fundamentals of deep neural networks in image processing (convolutional neural networks, CNNs)
- Training and training data collection
- Object classification with neural networks
- Object detection and segmentation with neural networks

Laboratory contents:

- Image mosaicing: image transformations and scale-invariant feature detectors
- Optical Flow: Motion estimation in image sequences with Lucas-Kanade-Method
- Machine learning methods for segmentation: K-Means in image compression
- Neural Networks: Training with Backpropagation and Classification
- Deep Learning: Keras and Tensorflow in Python. Image classification and transfer learning with deep architectures

Literature and Downloads:

- Szeliski, R., Computer Vision: Algorithms and Applications; Springer, 2020, online pdf version: http://szeliski.org/Book/
- Burger, Burge, Digital Image Processing - An algorithmic introduction, 3rd ed. Springer, 2015
- Gonzalez, Digital Image Processing, 4th ed., Pearson, 2017
- Goodfellow, Bengio, Courville, Deep Learning, MIT Press 2016, onlineversion: http://www.deeplearningbook.org/

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Digital Communications with Lab	
Module ID:	CME-04/ EMI404
Level:	Master
Course Type:	Lecture
Semester Hours per Week:	3
Credits:	3
Host Semester:	CME1
Examination:	Written Exam
Location:	Campus Offenburg

Lecturer(s):

Prof. Dr. Tobias Felhauer

Prerequisites:

- Basic knowledge about signal and linear system theory
- Basic knowledge about digital communications
- Experience with MATLAB/Simulink is helpful but not strictly required

Objectives and Competences:

- Understanding the structure and basic mechanisms in digital communication systems
- Having the capability to design, implement and optimize digital communication systems for different applications
- Understanding basic digital modulation schemes for baseband and passband transmission
- Being capable to evaluate the performance of digital communication systems
- Having the capability to model and simulate digital communication systems by using MATLAB/Simulink in combination with the communication blocksets.

Contents:

- Introduction - Review:
  General block diagram of a digital communication system, characterisation of signals and systems (periodic signals, transient signals, random signals and noise), linear - system characterisation

- Basics of Digital Communications:
  Pulse code modulation (sampling theorems for lowpass and bandpass signals, quantization, coding and SNR calculations), pulse shaping for optimum transmission (inter - symbol - interference (ISI), Nyquist criteria, raised cosine rolloff filtering), filtering for optimum detection (matched filter, correlation)

- Baseband Transmission and Line Coding:
  Binary and multilevel signaling, line codes and spectra (NRZ, RZ, Manchester, CMI, AMI, HDBn, 4B3T etc., general requirements, line codes and applications, power spectra and spectral efficiency of binary line codes)

- Bandpass modulation of Carrier Signals:
  Digital bandpass modulations overview, phase constellation diagram, digital quadrature modulator and demodulator implementation structures, analysis of exemplary digital carrier modulation schemes

- Digital Communication System Analysis and Simulation:
  Eye pattern diagram, bit-error-rate calculation, simulation and optimization of digital communication systems
  using MATLAB/SIMULINK/communication toolbox (lab course)

Literature and Downloads:

- Glover, P.M. Grant: Digital Communications. Prentice Hall, London, 1997.
- L. W. Couch II: Digital and Analog Communication Systems. Prentice Hall, London, 2012.
- J. G. Proakis: Digital Communications. McGraw-Hill, New York, 2007.

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Digital Signal Processing (DSP) Lab	
Module ID:	CME-07/ EMI415
Level:	Master
Course Type:	Lab
Semester Hours per Week:	2
Credits:	1
Host Semester:	CME
Examination:	Lab Work
Location:	Campus Offenburg

Lecturer(s):

Prof. Dr. Christian Reich

Prerequisites:

Objectives of the Course:

Contents:

Experiment 1: A-to-D and D-to-A-Conversion
- Aliasing Effect
- Mirror Components
- (sin x)/x-Distortion
- Quantization Effects: Estimation of Signal-to-Noise-Ratio
- Nonlinearity of D-to-A-Converter
- Subjective Listening Tests

Experiment 2: Finite Impulse Response (FIR-) Filters
- Filter Design Using the Fourier Approximation
- Modification by Using Window Functions
- Optimum Design (Parks-McClellan-Algorithm)
- Finite Precision Effects
- Design of Hilbert Filters (Wideband Phase Shifters)

Experiment 3: Fast Fourier Transformation
- Speed Measurements
- Spectral Analysis, Windows to reduce Leakage Effects
- Comparison of direct and fast Implementation of Correlation
- Comparison of direct and fast Convolution

Literature and Downloads:

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Digital Signals and Systems	
Module ID:	CME-02/ EMI403
Level:	Master
Course Type:	Lecture
Semester Hours per Week:	2
Credits:	3
Host Semester:	CME
Examination:	Written Exam
Location:	Campus Offenburg

Lecturer(s):

Prof Dr Stephan Pfletschinger

Prerequisites:

Objectives of the Course:

TBD

Contents:

- Elementary signals: sine, rectangle, complex exponential, Dirac impulse
- Properties of Signals and Systems: periodicity, orthogonality, signal power and signal energy
- Description of linear time-invariant systems in time and frequency domain: Impulse response, step response and transfer function
- Fourier series, Fourier transform, discrete-time Fourier transform, z-transform
- The Sampling Theorem
- Digital Filters: FIR and IIR, Pole-zero-plot, canonical structures

Literature and Downloads:

- Alan V. Oppenheim, Alan S. Willsky: *Signals & Systems*. Pearson, 2013.
- Alan V. Oppenheim, George V. Verghese: *Signals, Systems and Inference*. Pearson, 2017.
- John G. Proakis, Dimitros K. Manolakis: *Digital Signal Processing*. Pearson, 2014.
- Stephan Boyd, Lieven Vandenberghe: *Introduction to Applied Linear Algebra*. Cambridge University Press, 2018.
- Mark Wickert: *Signals & Systems for Dummies*. Wiley, 2013.

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Embedded and Industrial Networks and Lab	
Module ID:	CME-12/ EMI2205 (Lecture) CME-12/ EMI2206 (Lab)
Level:	Master
Course Type:	Lecture and Lab
Semester Hours per Week:	2.0 and 2.0
Credits:	2 and 3
Host Semester:	CME2/EIM2
Examination:	Written Exam and Lab Work
Location:	Campus Offenburg

Lecturer(s):

Prof. Dr. Axel Sikora

Prerequisites:

Basics in embedded and industrial networks

Objectives and Competences:

- The students gain a deeper insight into the internal structure of Communication protocols.
- In this way, they also learn about the most important design paradigms and are thus able to select and implementnot only the communication protocol that is optimal for the application, but also to design appropriate adaptations and extensions themselves.

Contents:

- Lab 1: Diodes for signal limitation
- Lab 2: Amplifier with transistors
- Lab 3: Power amplifier
- Lab 4: Oscillators
- Lab 5: Amplitude modulation
- Lab 6: Frequency modulation

Literature and Downloads:

Provided in class

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Guided Wave Theory	
Module ID	CME-06/ EMI411
Level	Master
Course Type	Lecture
Hours per Week	4
Credits	5
Host Semester	CME
Examination	Written Exam
Location	Campus Offenburg

Lecturer(s):

Prof Dr Andreas Christ

Prerequisites:

Objectives of the Course:

TBD

Contents:

Maxwell's equations: general forms, cause-effect-relations, continuity relation, time harmonic fields
Wave concept: uniform plane waves, propagation and energy flux, skin effect
Boundary conditions

Transmission lines:
- Modes: concept and classification, orthogonality
- Properties of rectangular waveguides, other waveguide types and coaxial lines

Circuit theory for waveguide systems:
- Scattering matrix formulation
- Equivalent circuits
- Examples of passive devices

Literature and Downloads:

1. Balanis, C. A., *Advanced Engineering Electromagnetics*, John Wiley&Sons, New York, 2012.
2. Ulaby, F. T., *Fundamentals of Applied Electromagnetics*, Pearson, 2014.
3. Fleisch, D., *A Student's Guide to Maxwell's Equations*, Cambridge University Press, 2008.

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Information Theory and Coding	
Module ID	CME-02/ EMI405
Level	Master
Course Type	Lecture
Hours per Week	2
Credits	3
Host Semester	CME
Examination	Written Exam
Location	Campus Offenburg

Lecturer(s):

Prof Dr Stephan Pfletschinger

Prerequisites:

Objectives of the Course:

Contents:

- Channel coding
  - Error detection and correction
  - Binary linear block codes
  - Hard decoding and soft decoding
- Information, Entropy and Redundancy
  - Information content
  - Entropy of random variables and random vectors
- Source Coding
  - The source coding theorem
  - Shannon-Fano coding
  - Huffman coding
- Discrete memoryless channels
  - Conditional and joint entropy
  - Mutual information
  - The channel coding theorem
- Continuous channel models
  - The AWGN channel
  - Fading channels

Literature and Downloads:

- Stefan. M. Moser, Po-Ning Chen, *A Student´s Guide to Coding and Information Theory*, Cambridge University Press, 2012.
- Benedetto, S., Biglieri, E., *Principles of Digital Transmission*, Kluwer Academic, Plenum Publishers, 1999.
- Robert McEliece: *The Theory of Information and Coding*, Student Edition, Cambridge University Press, 2004.
- David MacKay: *Information Theory, Inference, and Learning Algorithms*, Cambridge University Press, 2003.
- Thomas M. Cover, Joy A. Thomas, *Elements of Information Theory*, Wiley, 2006.

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Internet of Things	
Module ID	CME-10/ EMI419
Level	Master
Course Type	Lecture
Hours per Week	2
Credits	2
Host Semester	CME
Examination	Written Exam
Location	Campus Offenburg

Lecturer(s):

Prof. Dr.-Ing. Axel Sikora

Prerequisites:

- knowledge of communication and networking technologies
- basic understanding of system architectures and distributed programming
- basic understanding of wireless communication

Objectives of the Course:

- understand IoT architectures, technologies and solutions
- get an insight into IoT platform solutions
- achieve a good understanding of practical aspects of wireless technologies
- discuss cellular communication & LPWAN as fundamental stepping stones towards IoT networks
- see and understand some hands-on examples

Contents:

ch.1 IoT Introduction
ch.2 Reference Models and Protocols
ch.3 IoT Architectures
ch.4 Industrial Wireless Communication
ch.5 Cellular Communication
ch.6 LPWAN Technologies

Literature and Downloads:

A. Holtschulte, " Praxisleitfaden IoT und Industrie 4.0: Methoden, Tools und Use Cases für Logistik und Produktion", Mai 2021, : Carl Hanser Verlag GmbH & Co. KG, ISBN 978-3446466838
A. Tamboli, "Build Your Own IoT Platform: Develop a Fully Flexible and Scalable Internet of Things Platform in 24 Hours", April 2019, Apress, ISBN 978-1484244975
D. Serpanos, M.C. Wolf, „Internet-of-Things (IoT) Systems", 2018, Springer, ISBN 978-3-319-69715-4.
L. Peterson, O. Sunay, "5g Mobile Networks: A Systems Approach", Morgan & Claypool Publishers, July 2020, ISBN 978-1681738901, online available at https://5g.systemsapproach.org/
H. Fattah, „5G LTE Narrowband Internet of Things (NB-IoT)", September 2018, Taylor & Francis Ltd, ISBN 978-1138317604.
many (actual) online ressources

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Microwave Lab	
Module ID	CME-06/ EMI412
Level	Master
Course Type	Lab
Hours per Week	1
Credits	2
Host Semester	CME
Examination	Lab Work
Location	Campus Offenburg

Lecturer(s):

Prof Dr Marlene Harter

Prerequisites:

Objectives of the Course:

Contents:

- Network Analysis of passive microwave elements
- Rectangular Waveguide in microwave communications
- Circuit Simulations with Microwave Office

Literature and Downloads:

1. Pozar, David: Microwave Engineering, John Wiley & Sons, 2011.
2. Wandell, Brian C.: Transmission Line Handbook, Artech House, 1991.

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Statistical Signal Processing and Information Theory	
Module ID	EIM-16/ EMI2252
Level	Master
Course Type	Lecture
Hours per Week	2
Credits	2
Host Semester	
Examination	Written Exam
Location	Campus Offenburg

Lecturer(s):

Prof Dr Stephan Pfletschinger

Prerequisites:

Objectives and Competences:

Contents:

- **Random Variables and Random Processes**
  - discrete and continuous random variables
  - pdf, cdf, pmf, expectation, moments, variance
  - transformations of random variables
- **Parameter and Spectrum Estimation**
  - power spectral density and periodogram
  - parameter estimation
- **Probability and Information**
  - Entropy, conditional and joint entropy
  - mutual information
- **Source Coding**
  - Shannon-Fano, Huffman
  - Source coding theorem
- **Channel Capacity and Channel Coding**
  - Discrete memoryless channels
  - AWGN channel
  - Fading channels
- **Decision Theory**
  - MAP, ML, hypothesis testing
- **Factor Graphs and Belief Propagation**
- **Applications**
  - Frame synchronization
  - MIMO
  - Analog-Digital-Conversion

Literature and Downloads:

- Stefan. M. Moser, Po-Ning Chen, A Student's Guide to Coding and Information Theory, Cambridge University Press, 2012.
- Martin Bossert, Einführung in die Nachrichtentechnik, Oldenbourg Verlag, 2012.
- David MacKay: Information Theory, Inference, and Learning Algorithms, Cambridge University Press, 2003Alan V. Oppenheim, Alan S. Willsky: Signals & Systems. Pearson, 2013.
- Alan V. Oppenheim, George V. Verghese: Signals, Systems and Inference. Pearson, 2017.

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3.3 Department of Media

Course List

Autumn Term	Spring Term	Course Name	Course Type	Credits	Exam Type
x		Anonymity and Surveillance	Lecture	4	Written Exam
x		Anonymity and Surveillance Seminar	Seminar	2	Term Paper
x		Applied Cryptanalysis	Lecture	4	Written Exam
x		Applied Cryptanalysis Lab	Lab	2	Report
x		Database Systems	Lecture	3	Written Exam
x		Database Systems Lab	Lab	1	Lab Work
	x	Data Analysis for Risk and Security Management	Lecture	3	Written Exam
x		Data Mining	Lecture	3	Written Exam
x		Data Mining Lab	Lab	3	Report
x		Ethics and EU Law	Lecture + Seminar	3	Presentation + Written Exam
	x	Global Risk and Security Management	Seminar	3	Term Paper + Oral Exam
x		Interactive Distributed Applications	Lecture	5	Written Exam
x		Interactive Media	Lecture	3	Written Exam
x		Intercultural Media Design	Seminar	3	Project Work
x		Intercultural Media Design Lab (IMD Lab)	Lab	3	Lab Work
	x	IT SEC Lab Work	Lab	12	Term Paper
	x	Marketing[2]	Lecture	3	Term Paper
	x	Mobile Security	Lecture	3	Written Exam
	x	Mobile Security Lab	Lab	3	Report
x		Multimedia Web Technologies: • Multimedia Databases • Network Security in Multimedia Systems • Next Generation Internet	 Lecture Lab Lab	7	Written Exam
	x	Security in Ubiquitous Computing	Lecture	3	Written Exam
	x	Security in Ubiquitous Computing Lab	Lab	3	Report
x		Software Security	Lecture	3	Written Exam
x		Software Security Lab	Lab	3	Report
	x	Ubiquitous Applications	Lecture	5	Written Exam and Report

[2] The module Marketing will run for the last time in the spring term of 2023.

Anonymity and Surveillance	
Module ID	ENITS-04/ M+I807
Level	Master
Course Type	Lecture
Hours per Week	3
Credits	4
Host Semester	ENITS
Examination	Written Exam
Location	Campus Offenburg

Lecturer(s): Prof Dr Daniel Hammer

Prerequisites:

Computer networks and network security, Applied Crypt- Analysis

Objectives of the Course:

After successful participation in the course students shall be able to:

- have knowledge of basic terms and concepts of anonymity and privacy protection in computer networks
- to describe attacks on anonymous network communication and the exchange of sensitive data and explain defense mechanisms
- explain selected anonymization technologies (such as anonymizers, digital mixers, remailer systems and TOR) and their functionality as well as OTR technologies

Contents:

- Communication in networks when internal and external attackers are present
- Definition and usage of the terms anonymity, non-linkability and unobservability
- Concepts of distinguishability, concatenation and pseudonymity
- Privacy with different protection levels of communication data
- legal framework of anonymity and data protection in the Internet
- Anonymization technologies, overlay networks
- Anonymizer, digital mixing according to Chaum, Java Anon Proxy (JAP) / JonDo
- TOR networks and hidden services
- Threat models, mechanisms for protecting private network communication
- Self-protection in social networks, Deep Web und crime
- Remailer-systems and OTR-technologies
- Techniques for identifying users on the web
- Impact of anonymous Internet usage

Literature and Downloads:

- TOR-Projekt (https://www.torproject.org)
- Jens Kubieziel: Anonym im Netz; Open Source Press; 2007

- Bäumler/v.Mutius (Hrsg.): Anonymität im Internet; Vieweg; 2003
- Electronic Frontier Foundation: Surveillance Self-Defense; (https://ssd.eff.org/)
- Bruce Schneier: Applied cryptography. protocols, algorithms, and source code in C; John Wiley & Sons; 2015

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Anonymity and Surveillance Seminar	
Module ID	ENITS-04/ M+I808
Level	Master
Course Type	Seminar
Hours per Week	1
Credits	2
Host Semester	ENITS
Examination	Term Paper
Module	ENITS-04 Anonymity and Surveillance
Location	Campus Offenburg

Lecturer(s):

Prof Dr Daniel Hammer

Prerequisites:

See VL M+I807 Anonymity and Surveillance

Objectives of the Course:

See VL M+I807 Anonymity and Surveillance

Contents:

See VL M+I807 Anonymity and Surveillance

Literature and Downloads:

See VL M+I807 Anonymity and Surveillance

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Applied Cryptanalysis	
Module ID	ENITS-01/ M+I801
Level	Master
Course Type	Lecture
Hours per Week	3
Credits	4
Host Semester	ENITS
Examination	Written Exam
Location	Campus Offenburg

Lecturer(s):

Prof Dr Erik Zenner

Prerequisites:

- Module Algorithms and Data Structures (“Algorithmen und Datenstrukturen”) or similar
- Module Mathematics and Cryptography (“Mathematik und Kryptografie”) or similar: basic knowledge in symmetric and asymmetric cryptography and related basic principles of number theory

Objectives of the Course:
After successful participation in the course students shall be able to:

- understand methods of applied cryptanalysis
- apply them to concrete cryptographic systems

create implementations on their own or use third-party tools.

Contents:

Specific methods of modern cryptanalysis, e.g.

- differential cryptanalysis and its variants
- time-memory tradeoffs
- number-theoretical analysis methods
- practical attacks of the recent past (e.g. against TLS, random number generators etc.)

Literature and Downloads:

Provided for download at the beginning of the lecture.

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Applied Cryptanalysis Lab	
Module ID	ENITS-01/ M+I802
Level	Master
Course Type	Lab
Hours per Week	1
Credits	2
Host Semester	ENITS
Examination	Report
Location	Campus Offenburg

Lecturer(s):

Prof Dr Erik Zenner

Prerequisites:

See M+I801 Applied Cryptanalysis

Objectives of the Course:

See M+I801 Applied Cryptanalysis

Contents:

See M+I801 Applied Cryptanalysis

Literature and Downloads:

See M+I801 Applied Cryptanalysis

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Database Systems	
Module ID	CME-21/ M+I401
Level	Master
Course Type	Lecture
Hours per Week	2
Credits	3
Host Semester	CME
Examination	Written Exam
Location	Campus Offenburg

Lecturer(s):

Prof Dr Volker Sänger

Prerequisites:

Objectives of the Course:

Contents:

- Introduction: Database System, Data Model, Database Applications
- The Relational Model: Relations and Attributes, Selection, Join, Projection
- SQL: Schema Definition, Queries, Changing the Data, Views, Consistency, ACID-Principle, SQL-Transactions,
- Databank Design: Design Phases, Semantic Data Models, Dependencies, Normalisation, Transfering the Entity-Relationship Model into Relations
- Database-Programming: JSP, Object-relational Mapping, JDBC, Stored-Procedures, Trigger
- Beyond Relations: SQL3, No-SQL-Datenbanken, CAP und BASE, MongoDB, Main Memory Databases

Literature and Downloads:

- R. Elmasri, S.B. Navathe: Fundamentals of Database Systems, 7th Edition, Addison-Wesley, 2016.
- M. Keith, M. Schincariol: Pro JPA 2 - A Definitive Guide to Mastering the Java Persistence API, Apress Media, 2013.
- Hector Garcia-Molina, Jeff Ullman and Jennifer Widom: Database Systems, Prentice-Hall, 2009.

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Database Systems Lab	
Module ID	CME-21/ M+I411
Level	Master
Course Type	Lab
Hours per Week	1
Credits	1
Host Semester	CME
Examination	Lab Work
Location	Campus Offenburg

Lecturer(s):

Prof Dr Volker Sänger

Prerequisites:

Objectives of the Course:

Contents:

1. Introduction to a standard relational database and its SQL-dialects
2. Mapping a relational model to a physical model
3. Implementing the physical model with SQL-commands
4. Inserting, deleting and updating of data with SQL
5. Various forms of Queries with SQL

Literature and Downloads:

- R. Elmasri, S.B. Navathe: Fundamentals of Database Systems, Addison-Wesley, 2013
- Hector Garcia-Molina, Jeff Ullman and Jennifer Widom: Database Systems, Prentice-Hall, 2008

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Data Analysis for Risk and Security Management	
Module ID	ENITS-07/ M+I812
Level	Master
Course Type	Lecture
Hours per Week	2
Credits	3
Host Semester	ENITS
Examination	Written Exam
Location	Campus Offenburg

Lecturer(s):

Prof Dr Dirk Drechsler

Prerequisites:

- Statistics and Mathematics (Statistik und Mathematik)
- Risk Management (Risikomanagement)
- BCDR, Excel
- Business Economics (Betriebswirtschaftslehre)

Objectives of the Course:

After successful participation in the course students shall be able to:

- work out and apply autonomously selected issues of international risk and security management
- work out and apply chosen methods of quantitative risk management under guidance
- develop an independent risk and security awareness and its application in current problem areas of enterprise security

Contents:

1. Digital Business Ecosystems, Threat Landscape and Anomaly Detection
2. A Refresher in Statistics
3. Regression Analysis and Time Series Regression
4. Markov Processes
5. Time Series Forecasting (without Regression)

Literature and Downloads:

1. Anderson, David R. et al.: An Introduction to Management Science; Cengage; most recent edition.
2. Anderson. David R. et al.: Quantitative Methods for Business; Cengage; most recent edition.
3. Camm, Jeffrey D. et al.: Essentials of Business Analytics; Cengage; most recent edition.
4. Evans, James: Business Analytics; Pearson; most recent edition.
5. Selected scientific papers.

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Data Mining	
Module ID	ENITS-02/ M+I803
Level	Master
Course Type	Lecture
Hours per Week	2
Credits	3
Host Semester	ENITS
Examination	Written Exam
Location	Campus Offenburg

Lecturer(s):

Prof Dr Janis Keuper

Prerequisites:

Requires basic knowledge of data bases, statistics and experience with a modern programming language.

Objectives of the Course:

Contents:

- Introduction to data mining: overview, CRISP, data pre-processing, concepts of supervised and unsupervised learning, visual analytics
- Association rules
- Linear regression: simple linear regression, introduction to multiple linear regression
- Classification: logistic regression, decision trees, SVM
- Ensemble methods: bagging, random forests, boosting
- Clustering: K-means, K-medoids, Hierarchical clustering
- Evaluation and validation: cross-validation, assessing the statistical significance of data mining results
- Ethics and privacy
- Selection of advanced topics such as neural networks, outlier detection, relation to big data analysis
- In the lab, students apply data mining methods and algorithms to problem sets and develop data mining applications, using tools such as R and RapidMiner.

Literature and Downloads:

1. Aggarwal, C. C. (2015). Data Mining: The Textbook. SpringerLink : Bücher. Cham: Springer International Publishing.
2. Han, J., Kamber, M., & Pei, J. (2011). Data Mining: Concepts and Techniques (3rd ed.). Burlington: Elsevier Science.
3. James, G., Witten, D., Hastie, T., & Tibshirani, R. (2014). An introduction to statistical learning: With applications in R (Corrected at 4th print). Springer texts in statistics. New York: Springer.
4. Witten, I. H., & Hall, M. A. (2011). Data mining: Practical machine learning tools and techniques (3rd ed.). Burlington, MA: Morgan Kaufmann.

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Data Mining Lab	
Module ID	ENITS-02/ M+I804
Level	Master
Course Type	Lab
Hours per Week	2
Credits	3
Host Semester	ENITS
Examination	Report
Location	Campus Offenburg

Lecturer(s):

Prof Dr Janis Keuper

Prerequisites:

See M+I803 Data Mining

Objectives of the Course:

TBD

Contents:

See M+I803 Data Mining

Literature and Downloads:

See M+I803 Data Mining

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Ethics and EU Law	
Module ID	ENITS-03/ M+I805 (Ethics) ENITS-03/ M+I806 (Law)
Level	Master
Course Type	Seminar
Hours per Week	4
Credits	6
Host Semester	ENITS
Examination	Presentation (1/2) in Ethics and written exam (1/2) in Law
Location	Campus Offenburg

Lecturer(s): Prof Dr Westhoff, Prof Dr Erik Zenner

Prerequisites:

Ability to work scientifically (Literature study, presentation).

Objectives of the Course:

After successful participation in the course students shall be able to:

M+I805 Ethics:
understand and analyse ethical dilemmas in computer science.
derive a qualified judgement on the matter.
defending said judgement in discussions.

M+I806 Law:
understand the respective legal provisions and evaluate the consequences therefrom for companies.
understand what kind of legal measures exist to check the security of IT systems.

Participants shall understand the legal requirements in other areas of law that pertain to IT security, especially data protection laws, labor laws and contract laws.

Contents:

M+I805 Ethics:
- theoretical foundations of ethics
- current topics in computer ethics: Facts and ethical evaluation

M+I806 Law:
- legal and organizational consequences of the NIS Directive
- explanation of the legal situation in certain other countries in and beyond the EU
- related topics from the data protection
- related topics from other areas of law

Literature and Downloads:

Recent case studies and papers will be announced at the beginning of the course.

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Global Risk and Security Management	
Module ID	ENITS-07/ M+I812
Level	Master
Course Type	Seminar
Hours per Week	2
Credits	3
Host Semester	ENITS
Examination	Term Paper and Oral Exam
Location	Campus Offenburg

Lecturer(s):

Prof Dr Janis Keuper

Prerequisites:

Requires basic knowledge of data bases, statistics and experience with a modern programming language.

Objectives of the Course:

TBD

Contents:

1. Digital Business Ecosystems, Threat Landscape and Anomaly Detection
2. A Refresher in Statistics
3. Regression Analysis and Time Series Regression
4. Markov Processes
5. Time Series Forecasting (without Regression)

Literature and Downloads:

1. Anderson, David R. et al.: An Introduction to Management Science; Cengage; most recent edition.
2. Anderson. David R. et al.: Quantitative Methods for Business; Cengage; most recent edition.
3. Camm, Jeffrey D. et al.: Essentials of Business Analytics; Cengage; most recent edition.
4. Evans, James: Business Analytics; Pearson; most recent edition.
5. Selected scientific papers.

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Interactive Distributed Applications	
Module ID:	CME-20/ M+I400
Level:	Master
Course Type:	Lecture
Semester Hours per Week:	4
Credits:	5
Host Semester:	CME3
Examination:	Written Exam
Location:	Campus Offenburg

Lecturer(s):

Prof. Dr. Tom Rüdebusch

Prerequisites:

Familiarity with a procedural programming language/good programming skills in C or Java

Objectives and Competences:

Upon successful completion of the module students are able to understand Internet and Web technologies and are able to implement basic Web applications.

Contents:

- User Interfaces
- Internet Services
- The World Wide Web
  - Protocol (WWW System Architecture)
  - Page Description (HTML)
  - Server (Static vs. Dynamic Web Pages, CGI/C, PHP)
  - Client (JavaScript, CSS, DOM)
  - Structuring Information (Extensible Markup Language XML)
- Applications

Literature and Downloads:

- Shneiderman et al.: Designing the User Interface. Pearson, 2017.
- Freeman: The Definitive Guide to HTML5. Apress, 2011.
- Flanagan: JavaScript. O'Reilly, 2011.
- Tatroe, MacIntyre, Lerdorf: Programming PHP. O'Reilly, 2013.
- Harold, Means: XML in a Nutshell. O'Reilly, 2004.

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Interactive Media	
Module ID:	CME-21/ M+I409
Level:	Master
Course Type:	Lecture
Semester Hours per Week:	2
Credits:	3
Host Semester:	CME1
Examination:	Written Exam
Location:	Campus Offenburg

Lecturer(s):

Prof. Dr. Roland Riempp

Prerequisites:

None

Objectives and Competences:

- To be capable of planning and implementing multimedia projects

Contents:

1. Introduction, Basics
1. Web technology: HTML, CSS, CMS
2. Media types and formats for static and dynamic media
3. Data compression for static and dynamic media, container and codec formats
4. Transmission technologies, streaming
5. Basic workflow of media integration and multimedia production

Literature and Downloads:

- Istvan Novak (2014): Unraveling HTML5, CSS3, and JavaScript
- Julie C. Meloni (2014): HTML, CSS and JavaScript All in One
- Jennifer Niederst Robbins (2012): Learning Web Design: A Beginner's Guide to HTML, CSS, JavaScript, and Web Graphics
- Tay Vaughan (2011): Multimedia - Making it Work
- T. M. Savage, K.E. Vogel (2008): An Introduction to Digital Multimedia
- Dr. Nigel Chapman, Jenny Chapman (2009): Digital Multimedia

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Intercultural Media Design + IMD Lab	
Module ID:	CME-22/ M+I403 (Seminar) CME-22/ M+I404 (Lab)
Level:	Master
Course Type:	Seminar and Lab
Semester Hours per Week:	2 and 2
Credits:	3 and 3
Host Semester:	CME1
Examination:	Project Work and Lab Work
Location:	Campus Offenburg

Lecturer(s):

Prof. Daniel Fetzner / Prof. Dr. Robert Gücker

Prerequisites:

Interest in Intercultural Design and Audiovisual Communication

Objectives and Competences:

- Participants extend their ability for the audiovisual language of color, form, typography, sound, interactive and audiovisual media with emphasis on intercultural communication
- Commercial, scientific and artistic forms of media communication will be applied to analyse design projects
- Sensibility for interdisciplinary fields of visualisation and sonification will be augmented seminar and laboratory are part of an intercultural team learning process

Contents:

- The students start with a self-portrait and a reflection about their personal belongings. They document their daily observations in groups out of five people via different media like text, sound and video

Literature and Downloads:

- Chen, Ling (2018): Intercultural Communication. Boston/Berlin: De Gruyter
- Heidkamp, Philipp (2010): Learning from Nairobi. Köln: kisdedition
- Ware, Colin (2008): Visual Thinking. Burlington: Penros

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IT SEC Lab Work	
Module ID	ENITS-06/ M+I811
Level	Master
Course Type	Lab
Hours per Week	8
Credits	12
Host Semester	ENITS
Examination	Term Paper
Location	Campus Offenburg

Lecturer(s):

Prof Dr Daniel Hammer

Prerequisites:

This module has several requirements. Please contact us to clarify if you are eligible to join this module.

Objectives of the Course:

Implementation of theoretical knowledge in a challenging project (practical, research-oriented and in a team)

Contents:

Practical security management in the context of real tasks in an enterprise environment.

Literature and Downloads:

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Marketing	
Module ID	CME-42/ M+I428
Level	Master
Course Type	Lecture
Semester Hours per Week	2
Credits	3
Host Semester	CME
Examination	Term Paper
Location	Campus Offenburg

+++ This seminar takes place on Saturdays. +++

++++ This module will run for the last time in Spring term 2023. ++++

Lecturer(s):

Ms. Christine Miclau

Prerequisites:

Objectives and Competences:

- Awareness of the (marketing) challenges for companies operating internationally
- Understanding of major concepts, methods and instruments used in marketing

Contents:

- Marketing
- Marketing management, strategic planning and marketing process.
- Planning, execution and control of marketing programs.
- Development of marketing-mix: product development, product-life-cycle strategies, price strategies, product placement, distribution, communication, sales, promotion strategies.
- International Marketing
- The Scope and Challenge of International Marketing.
- Selection of target markets: consumer markets, business to business.
- Market segmentation.
- Researching International Markets.
- The International Political and Legal Environment.
- Marketing Strategies
- Business Customs and Practices in International Marketing.

Literature and Downloads:

- Hollensen, S. (2020): Global Marketing, 8th Edition, Pearson Education Limited.
- Green, M.C., Keegan, W.J. (2020): Global Marketing, 10th Edition, Pearson Education Limited.

Kotabe, M., Helsen, K. (2020): Global Marketing Management, 8th Edition, Wiley.

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Mobile Security	
Module ID	ENITS-08/ M+I814
Level	Master
Course Type	Lecture
Hours per Week	2
Credits	3
Host Semester	ENITS
Examination	Written Exam
Location	Campus Offenburg

Lecturer(s):

Prof Dr Dirk Westhoff

Prerequisites:

- Computer Networks (Computernetze)
- Network Security (Netzwerksicherheit)
- Applied cryptanalysis

Objectives of the Course:

After successful participation in the course students shall be able to:

- understand and assess basic mobile and wireless security aspects
- understand selected security protocols and connection to infrastructure services of wireless networks as well as assess the security level provided
- understand selected system security aspects, and vulnerability of mobile devices as well as assess the security level provided

Contents:

- introduction
- overview of threats and attack techniques in the context of mobile devices and wireless networks
- system security of mobile devices
- Android OS: covert channels over IPC
- approaches to limitation of horizontal privilege escalation and control flow integrity on restricted devices
- trust anchors: MTM, T-time signatures
- mobility aspects
- security and mobility: safety concepts for MIPv4 and MIPv6
- pseudonymity architectures for car-to-car communication
- security protocols and wireless networks, such as
- security considerations of cellular networks (GSM, UMTS), wireless local networks (WLAN 802.1, ZigBee WSN), PANs (Bluetooth), WIDS and L2 PiP injections (802.15.4)
- approaches in coding techniques for selective jamming and robustness
- connection to infrastructure services
- remote codes attestation
- robust and secure OTA programming
- key exchange between low-power (RFD) and high-performance devices (FFD)

- non-repudiational charging in multi-hop AdHoc networks

Literature and Downloads:

1. Selected publications of IEEE & ACM DLs
2. Levente Buttyan, Jean-Pierre Hubaux Security and Cooperation in Wireless Networks, 2007
3. Dirk Westhoff, Mobile Security - Schwachstellen verstehen und Angriffsszenarien nachvollziehen, Springer Vieweg, 264 Seiten, ISBN 978-3-662-60855-5, 2020

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Mobile Security Lab	
Module ID	ENITS-08/ M+I815
Level	Master
Course Type	Lab
Hours per Week	2
Credits	3
Host Semester	ENITS
Examination	Report
Location	Campus Offenburg

Lecturer(s):

Prof Dr Dirk Westhoff

Prerequisites:

See M+I814 Mobile Security

Objectives of the Course:

See M+I814 Mobile Security

Contents:

See M+I814 Mobile Security

Literature and Downloads:

See M+I814 Mobile Security

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Multimedia Web Technologies	
Module ID	CME-24/ M+I405
Level	Master
Course Type	Lab
Hours per Week	6
Credits	7
Host Semester	CME
Examination	Written Examination
Location	Campus Offenburg

Lecturer(s):

Prof Dr Sänger, Prof Dr Hammer, Prof Dr Schmidt

Prerequisites:

- Relational and object-relational databases
- SQL
- At least one programming language, e.g. Java
- UML, Entity-Relationship modelling
- Principles of computer networks
- Internet protocols
- Authentication in computer networks
- Computer technology, computer networks and cryptography

Objectives of the Course:

The students will learn to understand how to design and implement multimedia web applications. They will know the concepts for a secure data transmission and storage and to be able to apply them.

Please note: This module consists of three components: Multimedia Databases, Network Security in Multimedia Systems and Next Generation Internet. The three components must be taken together and share one written exam.

Contents:

Literature and Downloads:

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Multimedia Databases	
Module ID	CME-24/ M+I405
Level	Master
Course Type	Lecture
Hours per Week	2
Credits	
Host Semester	CME3
Examination	Written Examination
Location	Campus Offenburg

Lecturer(s):

Prof Dr Sänger

Prerequisites:

SQL, Data Modeling

Objectives of the Course:

In this course students learn the handling of multimedia data (image, audio, video and free text) in databases. The lecture provides insights into the storage of images, sounds, and videos together with corresponding meta data in different types of databases. Furthermore it explains the query process of multimedia data in combination with innovative user interfaces. On completion of the course students will know how to model, store and query multimedia databases and they understand how well known multimedia systems like e.g. Google image search, Shazam or Pinterest work.
Please note: This module must be taken together with the other components of CME-24 Multimedia Web Technologies.

Contents:

- Introduction to Multimedia Databases: Meta Data, Features, Segmentation, Similarity, Data Models
- Technological Foundations: Information Retrieval, Neural Networks, Deep Learning, Architecture of Multimedia Databases
- Image Databases: Meta Data for Images, Semantic Gap, Deep Learning for Images, Image Retrieval, Case Studies
- Audio Databases: Meta Data for Audio, Audio Retrieval , Case Study Shazam
- Video Databases: Meta Data for Video, Deep Learning for Videos, Video Retrieval, Case Studies
- Text Databases

Literature and Downloads:

- Blanken, H.M.; de Vries, A.P.; Blok, H.E.; Feng, L. (Eds.): Multimedia Retrieval, Springer-Verlag, 2007 (ebook: http://www.springer.com/computer/database+management+&+information+retrieval/book/978-3-540-72894-8
- S. Rüger: Multimedia Information Retrieval. Morgan & Claypool, 2010
- R. Baeza-Yates and B. Ribeiro-Neto: Modern Information Retrieval - the concepts and technology behind search. ACM Press, 2. Edition, 2011
- A. Géron: Neural Networks and Deep Learning, O'Reilly, 2018. ebook
- A. Krizhevsky, I. Sutskever, G.E. Hinton: ImageNet Classification with Deep Convolutional Neural Networks. In Advances in Neural Information Processing Systems 25, NIPS 2012
- A. Wang: An Industrial-Strength Audio Search Algorithm. In ISMIR Proceedings, Baltimore 2003
- A. Basiri et.al.: Chaos Engineering. IEEE Software May/June 2016, pp 35-41
- Y. Jing, D. Liu, D. Kislyuk, A. Zhai, J. Xu, J. Donahue, S. Tavel: Visual Search at Pinterest. In KDD Proceedings, Sydney, 2015
- P. Covington, J. Adams, E. Sargin: Deep Neural Networks for YouTube Recommendations, Proceedings of the 10th ACM Conference on Recommender Systems, New York, 2016

- J. Redmon, S. Divvala, R. Girshick and A. Farhadi, "You Only Look Once: Unified, Real-Time Object Detection," *2016 IEEE Conference on Computer Vision and Pattern Recognition (CVPR)*, 2016, pp. 779-788

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Network Security in Multimedia Systems	
Module ID	CME-24
Level	Master
Course Type	Lab
Hours per Week	
Credits	
Host Semester	
Examination	
Location	Campus Offenburg

Lecturer(s):

Prof Dr Hammer

Prerequisites:

Objectives of the Course:

Please note: This module must be taken together with the other components of CME-24 Multimedia Web Technologies.

Contents:

- IT-Security
- Internet Forensics
- Anonymity and Pseudonymity
- Linkability, Unobservability, Privacy
- Anonymizer, Digital Mixing, Remailer
- Darknet, Overlay Networks
- TOR, Affiliate Systems

Literature and Downloads:

- https://www.torproject.org
- https://geti2p.net
- https://www.privacy-handbuch.de/
- https://www.anonym-surfen.de
- AN.ON: Technischer Hintergrund von JAP. http://anon.inf.tu-dresden.de/JAPTechBgPaper.pdf
- Reporters Without Borders (Organisation): Internet access barred aswave of new legislation threatens freedom of Information. http://en.rsf.org/russia-internet-access-barred-as-wave-of-01-11-2012,43627.html.
- Clarke, Ian: The Philosophy behind Freenet. https://freenetproject.org/philosophy.html.
- Chaum, David: Untraceable Electronic Mail, Return Addresses, and Digital Pseudonyms. (1981). https://mirror.robert-marquardt.com/anonbib/cache/chaum-mix.pdf
- Clarke, Ian; Sandberg, Oskar; Toseland, Matthew; Verendel, Vilhelm: Private Communication Through a Network of Trusted - Connections: The Dark Freenet. PET 2010. https://freenetproject.org/papers/freenet-0.7.5-paper.pdf.

- Federrath, Hannes; Golembiewski, Claudia: Speicherung von Nutzungsdaten durch Anonymisierungsdienste im Internet. In: Datenschutz und Datensicherheit 28/8 (2004), 486-490. http://epub.uni-regensburg.de/7349/1/FeGoDuD2004.pdf
- I2P Techincal Introduction. http://www.i2p2.de/techintro.html

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Next Generation Internet	
Module ID	CME-24
Level	Master
Course Type	Lab
Hours per Week	
Credits	
Host Semester	
Examination	
Location	Campus Offenburg

Lecturer(s):

Prof Dr Schmidt

Prerequisites:

Objectives of the Course:

Please note: This module must be taken together with the other components of CME-24 Multimedia Web Technologies.

Contents:

- Internet Architecture (principles and critical discussion of changes)
- IPv6
- Content Distribution in the Internet (CDNs, P2P systems, Information Centric Networking)
- Multimedia communication (new transport protocols, congestion control, quality-of-service

Literature and Downloads:

- J. F. Kurose, K. W. Ross: Computer Networking -- A Top-down Approach Featuring the Internet. Pearson, 2013.
- additional articles and books are presented in the lecture

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Security in Ubiquitous Computing	
Module ID	ENITS-09/ M+I816
Level	Master
Course Type	Lecture
Hours per Week	2
Credits	3
Host Semester	ENITS
Examination	Written Exam
Location	Campus Offenburg

Lecturer(s): Prof Dr Andreas Schaad

Prerequisites:

- Computer networks / Network security
- Cryptography
- Application Security
- Software Security

Objectives of the Course:

Students will be able to read recent scientific literature and assess currently emerging security technologies.

Contents:

In this lecture series we will look at different aspects of „ubiquitous“ security, i.e. security concerns and solutions in our daily life as consumers, application developers or software architects interacting with distributed systems and across different layers in a system stack.
We will start with selected topics in the lifecycle of a mobile or IoT device, covering readily available security technologies as well as emerging R&D. We will realize that an important aspect is to identify what can be assumed to be available as a trusted computing base, i.e. the set of all hardware, firmware, and/or software components that are critical to the security of a computing device. For that reason, we will investigate trusted execution environments (TEEs) trusted platform modules (TPM) as well as the currently emerging software guard extensions (SGX).
We will address different security concerns in cloud computing and cloud infrastructures, for example looking at identity management in distributed systems as well as selected emerging topics when interacting with encrypted cloud databases.
As part of this lecture series we will also touch on blockchain technology as well as security in industrial control systems.

Literature and Downloads:

1. Pfleeger, C. et al.: “Security in Computing“, 5th Edition, Prentice Hall, 2015
2. Russell, B., van Duren, D.:“ Practical Internet of Things Security“, 2016, Packt Publishing
3. Will, A. and Challener, D.: „A Practical Guide to TPM 2.0 Using the Trusted Platform Module in the New Age of Security“, Apress, 2015
4. Ginter, A.: „SCADA Security: Security: What's Broken and How To Fix It“, Abterra Technologies,2016
5. https://www.owasp.org/index.php/Application_Threat_Modeling
6. https://software.intel.com/en-us/articles/intel-software-guard-extensions-tutorial-part-1-foundation

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Security in Ubiquitous Computing Lab	
Module ID	ENITS-09/ M+I817
Level	Master
Course Type	Lab
Hours per Week	2
Credits	3
Host Semester	ENITS
Examination	Report
Location	Campus Offenburg

Lecturer(s):

Prof Dr Andreas Schaad

Prerequisites:

See M+ Security in Ubiquitous Computing I816

Objectives of the Course:

See M+ Security in Ubiquitous Computing I816

Contents:

We will do various exercises related to SGX & TPM programming.

Literature and Downloads:

See M+ Security in Ubiquitous Computing I816

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Software Security	
Module ID	ENITS-05/ M+I809
Level	Master
Course Type	Lecture
Hours per Week	2
Credits	3
Host Semester	ENITS
Examination	Written Exam
Location	Campus Offenburg

Lecturer(s):

Prof Dr Andreas Schaad

Prerequisites:

- Prior knowledge of Assembly and C is beneficial, but not required.
- Basic software development skills / Software Engineering Lecture.

Objectives of the Course:

After successful participation in the course students shall have

- ability to engineer security requirements
- knowledge and application skills with selected tools for ”Threat Modelling”
- knowledge and application skills with selected tools for ”Secure Development & Testing”
- familiarity with basic considerations of security for software components and ability to evaluate them

Students will understand the impact of security vulnerabilities within software components and achieve competence in mitigating them.

Contents:

Introduction

- Historical considerations of “reverse engineering” and software security assessment

Reverse engineering

- Overview of reverse engineering tools (system tools, disassemblers, debuggers, decompilers)
- Detailed introduction to different tools, such as gdb and radare2
- Introduction to Assembly and C, with practical examples of reverse engineering
- Architecture-specific differences of reverse engineering of software components
- Introduction of obfuscation methods for hardening

Software security assessment

- Overview of security-critical vulnerabilities in software components (e.g. memory-corruption vulnerability, format-string vulnerability)
- Impact of vulnerabilities with practical examples of “exploitation”
- Detection of vulnerabilities by means of reverse engineering
- Introduction to various security mechanisms for mitigation of such vulnerabilities (data execution prevention, address space layout randomization, stack canaries, etc.)

Literature and Downloads:

- Shostak, Threat Modeling: Designing for Security (Englisch) Taschenbuch - 7. Februar 2014, Wiley
- Selected academic papers (ACM, IEEE, Springer) and reading list as announced in lecture.

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Software Security Lab	
Module ID	ENITS-05/ M+I810
Level	Master
Course Type	Lab
Hours per Week	2
Credits	3
Host Semester	ENITS
Examination	Report
Location	Campus Offenburg

Lecturer(s):

Prof Dr Andreas Schaad

Prerequisites:

See M+I809 Software Security

Objectives of the Course:

See M+I809 Software Security

Contents:

See M+I809 Software Security

Literature and Downloads:

See M+I809 Software Security

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Ubiquitous Applications	
Module ID	CME-23/ M+I412
Level	Master
Course Type	Lecture
Hours per Week	2
Credits	5
Host Semester	CME
Examination	Written Exam and Report
Location	Campus Offenburg

Lecturer(s):

Prof Dr Katharina Mehner-Heindl, Mr Calros Jérez-Vargas

Prerequisites:

- Object oriented programming in a programming language like Java or Objective C
- HTML programming with PHP scripting
- Database design and SQL basic knowledge

Objectives of the Course:

- To know and differentiate the Ubiquitous Applications particularities in comparison with Internet applications
- To know sensors, actuators, processors and operating systems of ubiquitous and mobile hardware as a means to develop context-sensitive user-centric applications
- To specify, design, realize and develop Ubiquitous Applications using contemporary hardware and APIs

Contents:

- Introduction and basic concepts
- Processors and OS
- Input and output
- Communication between processors
- Sensors and actuators
- Just-in-Time services and applications
- Introduction to smartphone APIs (e.g. Android, Phonegap, etc.), software architecture, frameworks, and installation
- Program examples for GPS, sensors, Web interfaces, databases, user interfaces
- Self-guided practical development of a prototype using e.g. a smartphone (100 hours)

Literature and Downloads:

- Weiser, Mark. The Computer for the 21st Century. In ACM SIGMOBILE Mobile Computing and Communications Review - Special issue dedicated to Mark Weiser. Volume 3 Issue 3, July 1999, pp 3-11. (https://www.ics.uci.edu/~corps/phaseii/Weiser-Computer21stCentury-SciAm.pdf)
- Varun Nagpal. Android Sensor Programming by Example: Take your Android applications to the next level of interactivity by exploring the wide variety of Android sensors. Packt Publishing. 2016. (http://proquest.tech.safaribooksonline.de/9781785285509)
- Ammar Rayes, Salam Samer. Internet of Things From Hype to Reality: The Road to Digitization. Springer Verlag. 2017. (http://dx.doi.org/10.1007/978-3-319-44860-2)

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3.4 Department of Mechanical and Process Engineering

Course List

Autumn Term	Spring Term	Course Name	Course Type	Credits	Exam Type
x		Energy Economics	Lecture + Practical Work	4	Written Exam
x		Energy Storage, Conversion and Transport	Lecture + Lab	4	Written Exam
x		Energy Systems Engineering	Lecture + Lab	4	Written Exam
x		Energy Usage in Industrial Processes	Lecture + Seminar	4	Written Exam
x	x	German Culture and Society	Lecture	2	Term Paper
	x	Grid Control, Analysis, Planning and Coordination	Lecture + Lab	4	Written Exam
x		Managing Complexity	Lecture + Seminar	2	Term Paper
	x	Operations Research in Energy Economics	Lecture	4	Written Exam
	x	Power Electronics and Grid Control	Lecture	4	Written Exam
x		Power Plants and Power Systems • Power Plants • Power Systems	Lecture + Seminar Lecture + Seminar	8	Written Exam
x		Process Control Engineering	Lecture	2	Written Exam
	x	Renewable Energy Systems	Lecture + Lab	5	
x	SS23[3]	Solar Technologies	Lecture	4	Written Exam
x		Tools to Manage Environmental Affairs	Lecture + Lab	2	Term Paper

[3] The module **Solar Engineering** will be offered for the 2023 spring term only. The description can be found on the pages directly after the description of **Solar Technologies**.

Course Descriptions

Energy Economics	
Module ID	RED-01/M+V3037
Level	Master
Course Type	Lecture and Practical Work
Hours per Week	4
Credits	4
Host Semester	RED
Examination	Written exam 90 minutes
Location	Campus Offenburg

Lecturer(s):

Prof. Dr. Niklas Hartmann

Prerequisites:

Objectives of the Course:

The students know and apply the common terminology in the energy sector. They know and understand the structure of an energy sector by example of Germany and are able to access systematically the structures of other energy markets. The students know how to access data in the energy sector; they are acquainted to statistical methods allowing critical analysis of data.
The students got the background to judge the impact of actual developments in industry, politics, legacy etc. on the energy sector.
The students know how to gain information and data required for techno-economic analyses of energy projects. They are able to perform cost calculation and investment appraisal studies. By applying computer tools they are able to perform extensive sensitivity analyses.

Contents:

- Terminology in the energy sector
- Primary energy resources (conventional and renewable) and energy conversion chains
- Environment protection (impact of exploitation, transport and conversion on environment, environment protection and international law)
- Structure of the energy sector (government agencies, organisations, industry, etc. involved and their role; Regulations in the energy sector by example of Germany and Europe; Liberalisation in the energy market; regulation of grid-bound energy sector)
- Cost calculation; Learning Curves; Investment appraisal Methods
- Energy demand and energy systems (sectors; daily, weekly and seasonal load profiles; electricity market and heat market; district heating; cogeneration)
- Electrical supply (example Germany, Europe; power plant fleet; virtual power plants; base load, middle load, peak load; decentralised energy supply; grid topology; grid operation; quality and reliability of grid operation)

Literature and Downloads:

1. MÜLLER, L.: Handbuch der Elektrizitätswirtschaft - Technische, wirtschaftliche und rechtliche Grundlagen. 2. Auflage, Berlin : Springer, 2001.
2. KONSTANTIN, P.: Praxisbuch Energiewirtschaft - Energieumwandlung, -transport und -beschaffung im liberalisierten Markt. 2. Auflage, Berlin : Springer, 2009.

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Energy Storage, Conversion and Transport	
Module ID	RED-03/ M+V3047
Level	Master
Course Type	Lecture and Lab
Hours per Week	4
Credits	4
Host Semester	RED
Examination	Written Exam 90 minutes
Location	Campus Offenburg

Lecturer(s):

Prof Dr Wolfgang Bessler/Prof. Dr. Daniel Kray

Prerequisites:

Objectives of the Course:

The students are familiar with various types of electrical energy conversion and storage technology, specifically, batteries, fuel cells, and electrolyzers. They are also familiar with chemical (e.g., hydrogen) and thermal energy transport technologies as well as interconversion between electrical, chemical and thermal storage (e.g., power-to-gas, power-to-heat). On the fundamental level, they know the thermodynamic and kinetic working principles of electrochemical cells. On the technology level, the students know the setup and design principles the systems, including their properties in terms of efficiency and durability. On the application level, the students are aware of applicability, requirements, and potential of different energy storage and transport systems. They have an insight into the economic status of energy storage, conversion and transport technologies and understand the future trends in research and development.

Contents:

1. Introduction, history, thermodynamic and kinetic fundamentals
2. Batteries, types (lithium-ion, lead-acid, redox-flow) and properties
3. Fuel cells, electrolyzers, gas storage
4. Thermal storage and transport
5. Stationary and mobile applications, grid connection and integration

Literature and Downloads:

- Bessler, Lecture notes
- Kurzweil and Dietlmeier, Elektrochemische Speicher, 2015
- Larminie and Dicks, Fuel Cell Systems Explained, 2003.

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Energy Systems Engineering	
Module ID	RED-07/ M+V735
Level	Master
Course Type	Lecture and Lab
Hours per Week	4
Credits	4
Host Semester	RED
Examination	Written Exam
Location	Campus Offenburg

Lecturer(s):

Prof Dr Niklas Hartmann

Prerequisites:

Objectives of the Course:

The students are able to analyse energy systems and they can derive solutions to improve the whole energy system.
The students know how to apply agile project management to organize themselves in teams.
Furthermore, the students know how to do data acquisition, data analysis, and to evaluate measures with the data. They consolidated their knowledge in energy management systems and renewable energy systems.
The students know how to connect the results from data engineering to the renewable energy systems and the energy management systems to find better solutions.
The students apply their knowledge to real world problems with data from existing companies. They will present their results to the company.

Contents:

1. System analysis of energy systems
2. Application of data acquisition, data refinement, data representation, and regression techniques on real energy systems
3. Application of agile project management
4. Renewable energy systems

Literature and Downloads:

Literature recommendations will be given in the lectures.

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Energy Usage in Industrial Processes	
Module ID	RED-04/ M+V3048
Level	Master
Course Type	Lecture and Seminar
Hours per Week	4
Credits	4
Host Semester	RED
Examination	Written Exam 90 minutes
Location	Campus Offenburg

Lecturer(s):

Prof Dr Peter Treffinger

Prerequisites:

Objectives of the Course:

The students know the essential technologies for energy conversion and storage in industry. They know the boundary conditions for the collection of energy-related data industry. They are able to setup a monitoring platform and to perform a energy flow analysis. Based on the energy flow analysis, they can propose energy efficiency measures.

The students are able to implement an energy management system (e.g. according to DIN EN ISO 50001). The students learn the principles of project management.

Contents:

1. Energy conversion and energy storage in industry
2. Energy efficiency measures
3. Visualisation, monitoring, data acquisition and control of industrial processes
4.. Energy efficiency in the context of regulations and standards (DIN EN ISO 50001, EN 16001, EN 15232, ...)

Exercises: Data analysis of monitoring data, energy balances of industrial plants.

Literature and Downloads:

Neugebauer (ed.): Handbuch Ressourcenorientierte Produktion. München: Carl Hanser Verlag, 2014

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German Culture and Society	
Module ID	MPE-16/ M+V910
Level	Master
Course Type	Lecture
Hours per Week	2
Credits	2
Host Semester	MPE1
Examination	Oral Exam
Location	Campus Offenburg

Lecturer(s):

Ms. Zumholz (Guest Lecturer)

Prerequisites:

- Only for non-Germans
- Interest and basic knowledge in history, politics, society, in particular with respect to Germany and the Germans

Objectives and Competences:

Improving knowledge about and understanding of Germany and the Upper Rhine region and its inhabitants

Contents:

Possible topics:

- Germany: East and West, federal structure, political parties, "social market economy", free democratic basic law, national anthem ("*über Alles*"?), public and private media (papers, radio, TV, films), education system, present challenges (EU, regional effects of climate change, terrorism, integration of refugees)
- The image of Germany and "the" Germans in the students' countries of origin
- The tri-national Upper Rhine region: Baden, Alsace, northwestern Switzerland
- Industrialization in Germany, medium-sized enterprises ("mittelständische Unternehmen"), region-based industries and global players ("Herrenknecht", "Tesa", "Daimler", "BASF"), mining in the Black Forest, tourism, winegrowing and beer brewing, media enterprises ("Burda")
- The revolution in Baden and the Offenburg freedom movement, German emigration to the second and third world, the synod of Konstanz, religion now and then, hierarchical structures
- German language and culture: regional dialects ("badisch", "schwäbisch", "alemannisch", "schwiizerdütsch", "plattdüütsch"), humour and political satire as reflecting the *zeitgeist* ("Heinz Erhardt", "Dieter Hildebrandt", "Loriot"), contemporary music ("Stockhausen", "Udo Lindenberg", "Neue Deutsche Welle", "Guggemusik"), code of conduct ("Knigge")

Literature and Downloads:

- Watson, P.: The German Genius; Simon & Schuster UK, London 2010
- Fullbrook, M.: A Concise History of Germany; Cambridge University Press, 2nd edition 1991, 16th Printing 2015
- The Federal President - representing and integrating: www.bundespraesident.de/EN/Role-and-Functions/WorkInGermany/RepresentingAndIntegrating/representing-and-integrating.html
- Basic Law of the Federal Republic of Germany: www.bundestag.de/blob/284870/ce0d03414872b427e57fccb703634dcd/basic_law-data.pdf
- The German revolution 1848 - Frankfurt Vorparlament - German National Assembly: www.age-of-the-sage.org/history/1848/german_revolution.html
- The Hecker uprising (Baden including Offenburg in 1848/49): https://en.wikipedia.org/wiki/Hecker_uprising
- In the heart of Europe - The Upper Rhine Valley (2000): www.regbas.ch/de/assets/File/downloads/Economy_-_Uppper_Rhine_Valley.pdf
- The Baden Revolution of 1848/49: https://en.wikipedia.org/wiki/Baden_Revolution
- Guide to German culture, customs and etiquette: http://www.uni-frankfurt.de/46329991/Guide-to-German-culture_and-etiquette.pdf

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Grid Control, Analysis, Planning and Coordination	
Module ID	RED-11/ M+V3052
Level	Master
Course Type	Lecture and Lab
Hours per Week	4
Credits	4
Host Semester	RED
Examination	Written Exam
Location	Campus Offenburg

Lecturer(s):

Prof Dr Grit Köhler

Prerequisites:

Objectives of the Course:

After completing the course the students have acquired a fundamental understanding of those methods and tools, which are needed for the planning of economic, reliable and technically secure operation of networks of electrical power supply.

Contents:

1. Selection/dimensioning of network structures including communication structures.
2. Methods of network analyses and network planning.
3. Software for load flow and short circuit calculation and for the analysis of power system faults.
4. Selective network protection, criteria for network protection, power system control.
5. Operations in electric power systems.
6. Grid stability and reliability.
7. Operational management of networks.

Lab Work: Experimental network analyses with test rig.

Literature and Downloads:

- Heuck, Klaus, Dettmann, Klaus-Dieter, Schulz, Detlef: Elektrische Energieversorgung. 8. Auflage, Wiesbaden: Vieweg+Teubner, 2010.
- Hiller, Thomas, Bodach, Mirko, Castor, Walter: Praxishandbuch Stromverteilungsnetze. Würzburg: Vogel Buchverlag, 2014.
- Ungrad, Helmut, Winkler, Willibald, Wiszniewski, Andrzej: Schutztechnik in Elektroenergiesystemen (Taschenbuch). 2. Auflage, Berlin, Heidelberg: Springer-Verlag, 2013.

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Managing Complexity	
Module ID	MPE-16/ M+V3032
Level	Master
Course Type	Lecture and Seminar
Hours per Week	2
Credits	2
Host Semester	MPE1
Examination	Term Paper
Location	Campus Offenburg

Lecturer(s):

Prerequisites:

Objectives of the Course:

Contents:

The course is designed to provide a fundamental basis for management and leadership in the information age. It will introduce a scientific and philosophical approach to management and explore the historical origins of an analytical methodology that allows profound insight into the behaviour of processes and systems. It will teach that management is prediction and provide an understanding of a methodology for transforming raw data into knowledge in order to secure a sound basis for future action. Case histories will demonstrate how the costly errors of inappropriate action and sub-optimisation can be avoided and how a scientific basis for continual improvement and sustainable competitiveness is achieved.

Literature and Downloads:

- Spare, N.C.: Managing Complexity - A Compendium of Papers for a System of Knowledge; collection of selected papers
- Deming, W. Edwards: Out of the Crisis; Massachusetts Institute of Technology 1982 and 1986
- Deming, W. Edwards: The New Economics; Massachusetts Institute of Technology 1994/95
- Scholtes, Peter R.: The Leaders Handbook; McGraw-Hill 1988
- Neave, Henry R.: The Deming Dimension; SPC Press Inc. 1990
- Wheeler, Donald J.; Chambers, David S.: Understanding Statistical Process Control; SPC Press Inc. 1992
- Wheeler, Donald J.: Understanding Variation - The Key to Managing Chaos; SPC Press Inc. 1993
- Wheeler, Donald J.: Advanced Topics in Statistical Process Control; SPC Press Inc. 1995
- Spare, Noel C.: The Four Pillars of Wisdom - A System for 21st Century Management; pp. 63-68; in
- Think Different - Collection of the English Papers in the December 2006 Revision of the Deming Homepage;
- https://www.skgep.gov.ae/docs/default-source/Articles/article2.pdf
- same series of articles in German: http://public.fh-wolfenbuettel.de/~hamannm/umdrucke/demming_collect.pdf

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Operations Research in Energy Economics	
Module ID	RED-09/ M+V3038
Level	Master
Course Type	Lecture
Hours per Week	4
Credits	4
Host Semester	RED
Examination	Term Paper
Location	Campus Offenburg

Lecturer(s):

Prof. Dr. Niklas Hartmann

Prerequisites:

Objectives of the Course:

Qualitative and quantitative methods of management science / Operational Research are gaining ever higher importance in the energy sector e. g. optimization problems play a prominent role in energy economics, considering for example development of power plant fleets, development of grids and the usage of power plants. Students learn about the background of forecasting methods and optimization as mathematical tool for analysing power systems. They are able to formulate mathematical models and to apply optimization methods, e. g. linear programming, and forecasting methods, e. g. time series analysis.

Within module RED-02 the students also apply the knowledge and competencies in economics and business strategy gained so far. Within required elective courses the students deepen and expand their capabilities when implementing a revised business strategy and experience the impact on an enterprise as a whole or when analysing and further developing energy management solutions in industry.

Contents:

1. System analysis in Energy Economics (data acquisition and data refinement, data representation, regression techniques)
2. Optimization problems in Energy Economics (types of problems; e.g. development of power plant fleet; resource planning)
3. Approaches to develop models for optimization problems in energy sector
4. Application of selected computational optimization techniques

Literature and Downloads:

- KONSTANTIN, P.: Praxisbuch Energiewirtschaft - Energieumwandlung, -transport und -beschaffung im liberalisierten Markt. 2. Auflage, Berlin: Springer, 2009.
- RUDOLPH, M., WAGNER, U.: Energieanwendungstechnik. Wege und Techniken zur effizienteren Energienutzung. Berlin: Springer, 2008.
- SUHL, L., MELLOULI, T.: Optimierungssysteme : Modelle, Verfahren, Software, Anwendungen. 2. Auflage, Berlin : Springer, 2009.

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Power Electronics and Grid Control	
Module ID	RED-10
Level	Master
Course Type	Lecture
Hours per Week	4
Credits	4
Host Semester	RED
Examination	Written Exam 120 minutes
Location	Campus Offenburg

Lecturer(s):

Mr. Wolfgang Diener

Prerequisites:

Objectives of the Course:

- The students are familiar with the functionality of power electronic devices for affecting energy flow in power grids.
- The students are able to create and implement concepts for the integration of power electronic devices into power grids in order to optimize power flow.
- The students can weigh up which form of energy transmission (three phase current or high voltage direct current) is the most appropriate from a technical and economic point of view under given auxiliary conditions.
- The students are familiar with the current concepts for power grid control and can apply them.

Contents:

1) Active and reactive power in power grids
2) Reactive power compensation
    2.1 passive reactive power compensation
    2.2 active reactive power compensation
    2.2.1 reactive power compensation using three-phase AC power controllers
    2.2.2 reactive power compensation using voltage source inverters
    2.2.3 flexible AC Transmission Systems
3) line-commutated and self-commutated converters for HVDC transmission)
4) grid control

Literature and Downloads:

- Schröder, D.: Leistungselektronische Schaltungen, 3. Auflage, SpringerVerlag, Berlin, Heidelberg, 2012
- Specovius, J.: Grundkurs Leistungselektronik, 8. Auflage, Springer Vieweg, Wiesbaden, 2017
- Zhang, X., Rehtanz, C.: Flexible AC Transmission Systems: Modelling and Control, Springer-Verlag, Berlin, Heidelberg, 2012

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Power Plants and Power Systems	
Module ID	RED-02
Level	Master
Course Type	Lecture and Practical Work
Hours per Week	4 and 4
Credits	8
Host Semester	RED
Examination	Written Exam 180 minutes
Location	Campus Offenburg

Lecturer(s):

Prof. Dr. Andreas Schneider

Prerequisites:

Objectives of the Course:

The students know in-depth fluid dynamics and mechanics of thermal and hydraulic turbo-machinery. They know about different types of steam generators and understand their requirements with respect to fluid mechanics and heat exchange in two-phase-flow. The students are aware of instabilities, which can occur when operating steam generators. The students are able to formulate a specification sheet for the main components of thermal power plants. Optimization strategies for the operating conditions of power plants can be judged and examined in a qualified way.

Please note: This module consists of two components: Power Plants and Power Systems (Energiesysteme). The two components must be taken together and share one written exam.

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Power Plants	
Module ID	RED-02/ M+V3046
Level	Master
Course Type	Lecture and practical work
Hours per Week	4 and 4
Credits	8
Host Semester	RED
Examination	Written exam
Location	Campus Offenburg

Lecturer(s):

Prof. Dr. Andreas Schneider

Prerequisites:

Objectives of the Course:

Please note: This module must be taken together with the other components of RED-02 Power Plants and Power Systems.

Contents:

1. Energie und Kraftwerk / energy and power plant
2. Wärmefreisetzung / heat release
3. Apparate im Kraftwerk / components in power plants
4. Verwendung von Wärme und Kraft / Use of heat and power
5. Massen- und Energietransport / mass and energy transport
6. Function of power stations
7. Basic idea of construction of power stations
8. Flexibility, transient operation, life cycle models in the context of flexible operation
9. Exercises: solving energy balances

Literature and Downloads:

1. Nag; Power Plant Engineering; McGrawHill, 2014
2. El-Wakil; Powerplant Technology; McGrawHill, 1995
3. Dolezal; Energetische Verfahrenstechnik; Teubner Stuttgart, 1983
4. VDI-Wärmeatlas

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Power Systems (Energiesysteme)	
Module ID	RED-02/ M+V3054
Level	Master
Course Type	Lecture and practical work
Hours per Week	4
Credits	
Host Semester	RED
Examination	Written Exam
Location	Campus Offenburg

Lecturer(s):

Prof. Dr. Andreas Schneider

Prerequisites:

Objectives of the Course:

Please note: This module must be taken together with the other components of RED-02 Power Plants and Power Systems.

Contents:

1. Introduction and Overview
1.1. General
1.2. Working Fluid Water
1.3. Working Fluid Air
1.4. Combined Cycles
1.5. Possibilities / Major Components
1.6. Sites
1.7. Brief Economy
1.8. Cost Discussion
1.9. Optimization
1.10. Energy Consumption in Germany

2. Thermodynamic Review

3. Power Boilers
3.1 Furnaces
3.1.1 Fuels
3.1.1.1 Solid Fuels
3.1.1.2 Liquid Fuels
3.1.1.3 Gaseous Fuels
3.1.2 Combustion Calculation
3.1.3 Combustion Systems
3.1.3.1 Grate Firing
3.1.3.2 Fluidized Bed Combustion
3.1.3.3 Dust Firing
3.1.3.4 Combustion of Liquid and Gaseous Fuels
3.1.4 Operation Problems
3.2 Power Boilers
3.2.1 Historical Look back
3.2.2 Heat transport
3.2.3 Basics of Twophase Flows
3.2.3.1 Heattransfer with Twophase Flows
3.2.3.2 Boiling Crises

3.2.3.3 Pressure Loss with Twophase Flows
3.2.4 Boiler Systems and Types
3.2.4.1 Shell-Type Power Boilers (Fluegas Tube SG)
3.2.4.2 Water Tube Power Boilers
3.2.4.3 Heat Recovery Power Boilerss
3.2.5 Design of a Power Boiler
3.2.5.1 Balance Power Plant (Heat Process Diagram)
3.2.5.2 Total Balance Steam Generator
3.2.5.3 Arrangement and Balance of Heating Areas
3.2.5.4 Materials for Boilers
3.2.5.5 Design of Heating Areas
3.2.6 Aspects of Construction
3.2.7 Starting, Shut-Down and Control of Boilers
3.3 Nuclear Boilers

4. Steamturbines
4.1 Introduction
4.2 Operating processes
4.3 main equation of the theory of turbines
4.4 working processes
4.4.1 constant pressure (=simple impulse) turbine
4.4.2 overpressure / reaction turbine
4.4.3 radial turbines
4.4.4. comparison between simple impulse and reaction turbines
4.4.5 specific numbers of the machine
4.4.6 performance / power and consumption
4.5. Fundamentals of turbine control
4.6. Miscellaneous
4.6.1 Casing
4.6.2 Rotor types
4.6.3 Blade roots
4.6.4 Cover Bands and Tie Wire
4.6.5 Bearing

Literature and Downloads:

1. Dolezal; Energetische Verfahrenstechnik; Teubner Stuttgart, 1983
2. Thomas, Thermische Kraftanlagen, Springer Berlin, 1984
3. El-Wakil; Powerplant Technology; McGrawHill, 1995
4. VDI-Wärmeatlas, Springer, Berlin, 2006
5. Nag; Power Plant Engineering; McGrawHill, 2014
6. Strauss, Kraftwerkstechnik, SpringerVieweg, Berlin, 2016

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Process Control Engineering	
Module ID	MPE-14/ M+V916
Level	Master
Course Type	Lecture
Hours per Week	2
Credits	2
Host Semester	MPE
Examination	Lab Work
Location	Campus Offenburg

Lecturer(s):

Prerequisites:

Objectives of the Course:

TBD

Contents:

- The automation pyramid
- Norms and regulations
- The most relevant DCS systems
- Sensors and actuators
- Fieldbus systems
- Controller Level
- DCS Level

Literature and Downloads:

1. Schildt, G.-H.; Kastner, W.: Prozeßautomatisierung; Springer, Berlin 1998
2. Polke, M. (ed.): Process Control Engineering; VCH, Weinheim 1994, ISBN-13: 978-3527286898
3. Urbas, L.: Process Control Systems Engineering; Oldenbourg Industrieverlag, 1st ed. 2012

Downloads:
Siemens: Manual of Siemens Simatic PCS 7 Getting Started, parts 1 and 2:
http://www.pacontrol.com/siemens-manuals/Process-Control-System-PCS-7-Part1.pdf
http://www.pacontrol.com/siemens-manuals/Process-Control-System-PCS-7-Part2.pdf
http://www7.informatik.uni-wuerzburg.de/fileadmin/10030700/user_upload/vorlesungen/ss03/lit_reg_aut_tech.pdf

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Renewable Energy Systems	
Module ID	RED-08
Level	Master
Course Type	Lecture and Lab
Hours per Week	4
Credits	4
Host Semester	RED
Examination	Written Exam 60 minutes Lab experiments and reports
Location	Campus Offenburg

Lecturer(s): Prof. Dr. Michael Schmidt

Prerequisites:

Objectives of the Course:

Contents:

Lecture:
1. Overview of renewable energy conversion technologies, their physical principles and techno-economic potentials
2. Solar resource: properties, measurement, variability, forecasting
3. Solar cells: Basic principle and different technologies
4. Solar plants: Main concepts, Planning & grid integration, modeling and evaluation of plant performance, site assessments
5. Wind resource: properties, measurement, variability, forecasting
6. Wind power: Basic principle
7. Wind power plants: Planning & grid integration, modeling and evaluation of plant performance, site assessments
8. Basic grid integration aspects of solar and wind power (microgrids and power grids)
9. Lab work on operation of solar plants and wind power plants and their simulation via software

Lab:
1. Lab work on the operation of solar power plants
2. Lab work on the operation of wind power plants
3. Simulation of wind power plants, solar power plants, and microgrids on the basis of industry-relevant software
4. Presentation of practical work in form of written scientific reports

Literature and Downloads:

- Kleissl, Jan (2013): Solar energy forecasting and resource assessments. Oxford, Waltham: Academic Press, Elsevier.
- Manwell, J. F.; McGowan, J. G.; Rogers, Anthony L. (2009): Wind energy explained. Theory, design and application. 2nd ed. Chichester, U.K.: Wiley.
- Planning and installing photovoltaic systems. A guide for installers, architects and engineers (2012). 3rd ed. London: Earthscan.
- Mermoud, A. "Pvsyst: Software for the study and simulation of photovoltaic systems." ISE, University of Geneva, www. pvsyst. com (2012).

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Solar Technologies	
Module ID	RED-07/ M+V730
Level	Master
Course Type	Lecture
Hours per Week	4
Credits	4
Host Semester	RED
Examination	Written Exam
Location	Campus Offenburg

Lecturer(s):

Prof. Dr. Daniel Kray

Prerequisites:

Recommended: Thermodynamics, Fluid Dynamics, Optics, physics of semiconductors

Objectives of the Course:

TBD

Contents:

1. Introduction sustainable energy conversion
2. Solar radiation
3. Solar thermal energy conversion
4. Solar thermal systems
5. Solar cell design
6. PV process technology
7. PV process and cell characterization
8. PV systems

Literature and Downloads:

1. Bollin, Elmar: Solartechnik. In: Zahoransky, Richard, A.: Energietechnik. 4. Auflage, Wiesbaden : Vieweg+Teubner, 2009, 265-301.
2. Bollin, Elmar (Hrsg.): Automation regenerativer Wärme- und Kälteversorgung von Gebäuden. Wiesbaden : Vieweg+Teubner, 2009.
3. Mertens, Konrad: Photovoltaik, Hanser-Verlag, 2011
4. Würfel, Uli: Physics of solar cells : from basic principles to advanced concepts, Wiley-VCH
5. Goetzberger, Adolf: Photovoltaic solar energy generation, Springer

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Solar Engineering	
Module ID	RED-07
Level	Master
Course Type	Seminar
Hours per Week	4
Credits	4
Host Semester	RED
Examination	Oral Exam
Location	Campus Offenburg

+++ Please note that this module is only offered one time in 2023 spring term. +++

Lecturer(s): Prof. Dr. Daniel Kray/Prof. Dr. Peter Treffinger

Prerequisites:

The students know the basics of photovoltaic energy conversion, the main elements of solar cells and the industrial production processes. They have basic understanding of semiconductor physics. They know the process of solar module manufacturing and can calculate and analyze IV curves.

Additional Literature:

- Konrad Mertens, "Photovoltaics: Fundamentals, Technology, and Practice“, second edition, Wiley, 2018.
- www.pveducation.org

++ See next page for more Information ++

+++ Please note that this module is only offered one time in 2023 spring term. +++

2 Solar Engineering

Title	Solar Engineering
Lecturers	In summer term 2023 Daniel Kray / Peter Treffinger
Format of course	Seminar (S)
ECTS points	4 CP
Examination	Oral exam
Short description	to be done
Learning outcome and competencies	The students know the most important basics of solar radiation. They know the influence of geographical, seasonal, diurnal and weather-dependent parameters on solar radiation and are able to determine the solar radiation with simplified models depending on location and time. Students will be familiar with tracking systems and common non-concentrating and concentrating solar thermal collector designs. They can apply simplified procedures for calculating annual yields. The students know the basic design of systems with solar thermal components such as solar thermal process heating systems, solar thermal power plants and systems for solar thermal cooling.
Literature	Lecturers provide lecture material and recommendations on textbooks. This is supplemented by selected technical articles. Almasri, R. A.; Abu-Hamdeh, N. H.; Esmaeil, K. K. & Suyambazhahan, S. T *Thermal solar sorption cooling systems - A review of principle, technology, and applications.* Alexandria Engineering Journal, Elsevier BV, 2022, 61, 367-402 Feldhoff, J. F.; Schmitz, K.; Eck, M.; Schnatbaum-Laumann, L.; Laing, D.; Ortiz-Vives, F. & Schulte-Fischedick, J. *Comparative system analysis of direct steam generation and synthetic oil parabolic trough power plants with integrated thermal storage* Solar Energy, 2012, 86, 520-530. IRENA. *Solar Heat for Industrial Processes*, 2015, ISBN: 978-92-95111-61-5, https://www.irena.org/publications/2015/Jan/Solar-Heat-for-Industrial-Processes

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Tools to manage Environmental Affairs	
Module ID	MPE-16/ M+V911
Level	Master
Course Type	Lecture and Lab
Hours per Week	3
Credits	3
Host Semester	MPE
Examination	Lab Work
Module	MPE-16 Non-Technical Competences
Location	Campus Offenburg

Lecturer(s):

Prerequisites:

Objectives of the Course:

TBD

Contents:

TBD

Literature and Downloads:

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4 Language Courses

The Language Center ("Sprachenzentrum") at Offenburg University provides a wide range of language classes every semester, both for credits and as extracurricular classes. Our offer typically includes general and specialized English language classes (mostly B1, B2 level), a full range of German language classes (complete beginners (A1) to advanced (C1)), French, Spanish, Polish and Japanese.

Some classes are put on for specific degree courses; interested exchange students should please enquire beforehand if there are still spaces available for them to join. The email of the Language Center is sprachenzentrum@hs-offenburg.de .

The most current list of the classes, lectures and the class descriptions are on the webpage of the Language Centre: https://www.hs-offenburg.de/en/international/language-center/

ECTS TABLE FOR LANGUAGE COURSES

All language classes – with one exception – follow the same format of either 2 hours per week and 3 ECTS or 4 hours per week and 5 ECTS.

Course	Hours per week (SWS)	Corresponding ECTS
Any language	2	3
Any language	4	5
German	6	CME-Students: 2 Other international students: 5

Language classes

SOMMERSEMESTER/SPRING TERM 2023

Registration on Moodle vom 06.03. – 16.03.2023:

Information on our Website.

Seminar	*Hours per week*	*Degree course*	*Lecturer*	*Date*	*Room*	*Start*
English *Campus Offenburg*						
Business English (B2)	2	any	Philippa Dart-Cleiß	WED 14:00	B106	22.03.23

English for Engineers (B2)	2	any	David Potter	WED 15:45	B122	22.03.23
Englisch f. Medienschaffende (B2)	2	MI	David Potter	WED 14:00	B122	22.03.23
Technisches Englisch (B2)	4	any	Kevin Parr	WED 14:00 + 15:45	A301	22.03.23
DAAD Test (Englisch)	2	any	Bianca Elliott	Dates on website	E411	-
German Culture and Society	2	any	Dörte Zumholz	TUE 17:30	A111a	21.03.23
English *Campus Gengenbach*						
Wirtschaftsenglisch (B2)	4	BW1 / Gruppe A	David Potter	FRI 09:45 + 11:35	G 1.13	24.03.23
Wirtschaftsenglisch (B2)	4	BW1 / Gruppe B	Philippa Dart-Cleiß	FRI 09:45 + 11:35	G 1.09	24.03.23
Wirtschaftsenglisch (B2)	4	BW1 / Gruppe C	Chuck Cashdollar	FRI 09:45+11:35	G 1.10	24.03.23
Wirtschaftsenglisch (B2) WPF für WI, WIN und WP(B2)	2	Bachelor WI,WIN,WP	Kiersta Halseth	THU 15:45	BC 2.2.1	23.03.23

Seminar	***Hours per week***	***Degree Course***	***Lecturer***	***Date***	***Room***	***Start***
French *Campus Offenburg*						
Französisch (B1.2) (als WPF wählbar für EMI)	2	any	Marie-Ch. Nicaud	FRI 11:35	A111	24.03.23
French *Campus Gengenbach*						
Französisch (A2.1)	2	any	Marie-Ch. Nicaud	FRI 09:45	G 2.13	24.03.23

Spanish *Campus Offenburg*						
Spanisch II (A1.2)	2	any	Ninfa Mock	WED 15:45	A110	22.03.23

Spanisch B1.1 / B1.2	2	any	Ninfa Mock	FRI 09:45	A111a	24.03.23

Chinese and Japanese *Campus Offenburg*						
Japanisch I	2	any	Kaori Müller-Shibayama	FRI 11:35	A311	24.03.23
Chinesisch I	2	any	Chengqi Song	FRI 14:00	E110	24.03.23
Chinesisch III	2	any	Chengqi Song	FRI 11:35	E110	24.03.23

Seminar	***Hours per week***	***Degree course***	***Lecturer***	***Date***	***Room***	***Start***
German *Campus Offenburg*						
Deutsch A1.1	4	any	Kornelia Klein	WED 14:00 + 15:45	A111	22.03.23
Deutsch A1.2	6	any	Caroline Gehl	TUE 14:00 and WED14:00 + 15:45	B106 B152	21.03.23
Deutsch A2.1	4	any	Martin Krapf	WED 14:00 + 15:45	A312	22.03.23
Deutsch A2.2	4	any	Anika Meckesheimer	WED 14:00 + 15:45	A111a	22.03.23
Deutsch B1.2	4	any	Susanne Schmidt-Lossau	WED 14:30 + 15:45	A112	22.03.23
Deutsch B2.2	4	any	Birgitta Fruttiger	WED 14:00 + 15:45	A311	22.03.23
Deutsch C1.1	4	any	Astrid Listner	WED 14:00 + 15:45	E309	22.03.23

Deutsch *Campus Gengenbach*						
German Language II A1.2	4	IBC	Susanne Ramm-Weber	TUE 14:00 + 15:45	G 213	21.03.23
German Language IV (A2.2)	4	IBC	Susanne Schmidt-Lossau	MON 15:15 + 17:00	G113	20.03.23

German Language VI (B2.1)	4	IBC	Bettina Roblin	MON 14:00 + 15:45	G110	20.03.23

Rooms:
A, B, C, D – Campus Offenburg
G - Campus Gengenbach Kloster GVorb – Campus Gengenbach Vorbeck BC - Gengenbach Bildungscampus

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