HOCH
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ENGLISH LANGUAGE MODULE HANDBOOK



HOCH SCHULE OFFEN BURG

Courses taught in English

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Last updated on: 17.11.2026

1 General Information and Provider of Courses

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

In the chart, x means that a module is offered in this semester ✓.

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 course **Intercultural Leadership** has 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

International Management and Logistics minor offer

Every summer semester from 2027 on, the study programme International Management and Logistics (IML) offers a 30 ECTS programme taught completely in English. These modules are timetabled in such a way that there are no clashes between them. The modules (IML-xxx) usually consist of two components, which need to be taken together.

While Incomings exchange students can mix this semester with "other courses" from outside of this programme, there is no guarantee that these will not clash with the timetable.

Winter Semester	Summer Semester	Module Name	Course Type	Credits	Exam Type
	x	Global Business and Sustainability	Lecture	5	Practical Project
	x	Logistics Engineering	Lecture	5	Written Exam
	x	Global Sourcing and Value Chain Management	Lecture	5	Written Exam
	x	International Finance and Accounting	Lecture	5	Written Exam
	x	International Project Management	Lecture and Seminar	10	Practical Project
		TOTAL		**30**	

Other courses offered

Winter Semester	Summer Semester	Course Name	Course Type	Credits	Exam Type
x	x	Artificial Intelligence	Lecture	3	Term Paper + Presentation
x	x	Economics	Seminar	3	Term Paper
x	x	Human Resource Management and Organization	Lecture	5	Written Exam and Project Work
x	x	Intercultural Leadership	Seminar	3	Project Work
x		International Business Project (Business Administration)	Seminar	5	Project Work

x	x	International Business Project (Business Psychology)	Seminar	5	Project Work
x	x	Social and Intercultural Competences	Seminar	3	Project Work
x	x	Social Psychology	Lecture	5	Written Exam
	x	Software Implementation Project	Project	6	Project work

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IML-25 Global Business and Sustainability

Recommended prerequisites
General principles of economics and business administration

Course type
Lecture

Learning outcomes
The lecture deals with fundamental topics of the global business environment, especially economic, technological, political-legal, societal-social and ecological-sustainable influencing factors in the international business environment. The analysis and evaluation of indicators and processes of globalization, current conditions and motives for participation in international trade as well as the effects of globalization on international business organizations (multinational and national companies) play an important role. Furthermore, the effects of protectionism, new technologies and innovation potentials from a global and local perspective will be examined in more detail. In addition, international financial markets and direct investments are included for the systematic analysis of foreign markets and entire national economies. The topic of sustainability management is dealt with comprehensively and holistically using the three pillars of sustainability. The focus is on the criteria of logistics. Current examples, case studies and discussions bring an up-to-date relevance to the course.

Duration / Hours per week / Workload / ECTS
1 semester | 4.0 h/week | Classwork: 60 h, Self-study and groupwork: 90 h, Total: 150 h | 5.0 ECTS

Assessment
Module assessment of Practical Project (PA)

Module coordinator
Prof. Dr. Thomas Baumgärtler

Recommended semester / Frequency / Applicability
6th semester | Every year (summer) | International Management Logistics (Bachelor)

W0528 Global Business Environment (in English)

Type: Lecture | No.: W0528 | Hours/week: 2.0

Contents
- Topics of the global business environment, especially economic, technological, political-legal, societal-social and ecological-sustainable influencing factors in the international business environment.
- Analysis and evaluation of the indicators and processes of globalization and de-globalization.
- Current conditions and factors driving participation in international trade.
- Effects of globalization and de-globalization on international business organizations (multinational and national companies).
- Effects of protectionism, new technologies and innovation potential from a global and local perspective.
- International financial markets and direct investments for the systematic analysis of foreign markets and entire national economies.

Literature
Hamilton, L. / Webster, P. (2018): The International Business Environment. 4th ed., Oxford University Press. | Krugman, P. / Obstfeld, M. / Melitz, M. (2022): International Economics: Theory and Policy. 12th ed., Pearson. | Morrison, J. (2023): The Global Business Environment. 6th ed., Bloomsbury Publishing. | Morrison, J. (2009): International Business. Challenges in a Changing World. Macmillan International. | Worthington, I. / Britton, C. / Thompson.

W0529 Sustainability Management (in English)

Type: Lecture | No.: W0529 | Hours/week: 2.0

Contents

- Concept and pillars of sustainability.
- Classification of sustainability in logistics.
- Achieving strategic goals of sustainable action.
- Structured research of current case studies.
- Standards and guidelines, political and social requirements.

Literature

Primarily current contributions from research and practice.

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IML-26 Logistics Engineering

Recommended prerequisites
Basic Logistics

Course type
Lecture

Learning outcomes
Students gain insights into the technical aspects of logistics. Manual processes are increasingly supported by information technologies and automation technologies. Knowledge and application skills from the previous IT-related courses are taken up and applied in depth to specific logistics issues. Students acquire the basic principles of automating the value creation network and apply these to simple problems. One of the main themes of the course is the overarching concept of Industry 4.0.

Duration / Hours per week / Workload / ECTS
1 semester | 4.0 h/week | Classwork: 60 h, Self-study and groupwork: 90 h, Total: 150 h | 5.0 ECTS

Assessment
Module assessment of written exam (K90)

Module coordinator
Prof. Dr.-Ing. Manuel Kölz

Recommended semester / Frequency / Applicability
6th semester | Every year (summer) | International Management Logistics (Bachelor)

W0530 Logistics Engineering (in English)

Type: Lecture | No.: W0530 | Hours/week: 4.0

Contents
- Systematic introduction to automation solutions for logistics.
- Business classification of automation solutions in logistics.
- Linking information technologies and automation solutions (e.g. digital twin).
- Current developments and research prospects.

Literature
Primarily current contributions from research and practice.

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IML-27 Global Sourcing and Value Chain Management

Recommended prerequisites
Basics of the module: IML-11 Procurement and Purchasing

Course type
Lecture

Learning outcomes
Manufacturing companies have systematically reduced their vertical range of manufacture in recent decades and internationalized procurement activities. This requires more and well-founded purchasing activities with a growing purchasing volume. In addition, the purchasing of merchandise increasingly requires a strategic approach in global markets that are undergoing significant change. The resulting flows of goods must be seen as a complex network and must be planned and managed. Value chain management also involves understanding and shaping an overall view of the network, from suppliers to production and the distribution network through to customers.

Duration / Hours per week / Workload / ECTS
1 semester | 4.0 h/week | Classwork: 60 h, Self-study and groupwork: 90 h, Total: 150 h | 5.0 ECTS

Assessment
Module assessment of written exam (K90)

Module coordinator
Prof. Dr.-Ing. Manuel Kölz

Recommended semester / Frequency / Applicability
6th semester | Every year (summer) | International Management Logistics (Bachelor)

W0531 Global Sourcing (in English)

Type: Lecture | No.: W0531 | Hours/week: 2.0

Contents
- Management of international purchasing projects.
- International purchasing management across the entire purchasing process from simultaneous engineering, supplier search and evaluation, contract design and operational order processing, including the development of purchasing strategies.
- Preparing and conducting price and contract negotiations with international partners.
- Applying methods and instruments of international purchasing in a practical environment.

Literature
Will be announced in the lecture.

W0532 Value Chain (Risk) Management (in English)

Type: Lecture | No.: W0532 | Hours/week: 2.0

Contents
- Shaping business processes in the value chain or supply networks to support and achieve the strategic fit between stakeholder requirements and organizational capabilities.
- Effects of strategic and operational decisions on the supply network.
- Further development of suppliers and other supply network participants.
- Recognizing and managing risks in the supply network.

Literature
Will be announced in the lecture.

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IML-28 International Finance and Accounting

Recommended prerequisites
General Business Administration, External Accounting, Mathematical basics, Investment and financing basics, basics of economics

Course type
Lecture

Learning outcomes
Students learn about international finance and accounting, enabling them to understand the complexity of global financial markets and the characteristics of international accounting standards. The module offers an analysis of the principles and practices of international financial management, including the assessment of political and economic risks in foreign business, and basic principles of export financing and export credit insurance. In addition, participants gain insights into International Financial Reporting Standards (IFRS), which are essential for preparing and analyzing financial statements of multinational companies. The focus here is on developing the ability to critically analyze and apply accounting standards in an international context and to deal with reporting requirements.

Duration / Hours per week / Workload / ECTS
1 semester | 4.0 h/week | Classwork: 60 h, Self-study and groupwork: 90 h, Total: 150 h | 5.0 ECTS

Assessment
Module assessment of written exam (K90)

Module coordinator
TBAIM

Recommended semester / Frequency / Applicability
6th semester | Every year (summer) | International Management Logistics (Bachelor)

W0533 International Accounting (IFRS) (in English)

Type: Lecture | No.: W0533 | Hours/week: 2.0

Contents
- Fundamentals of international accounting standards according to IFRS (concept, structure, system, objectives).
- Basic assumptions in the framework concept.
- Recognition standards for key balance sheet items.
- Valuation standards for assets and liabilities.
- Disclosure.
- Reporting obligations and systems.
- Sustainability reporting.

Literature
International financial reporting standards / German-English text edition of the standards and interpretations endorsed by the EU. | European Sustainability Reporting Standards. | Norbert Lüdenbach, Wolf-Dieter Hoffmann, Jens Freiberg: Haufe IFRS-Kommentar, Freiburg/Munich/Stuttgart, current ed. | Quick/Wolz: Bilanzierung in Fällen, current ed. | Roos: Grundlagen der Rechnungslegung nach IFRS, Konstanz, current ed.

W0534 International Finance and Insurance (in English)

Type: Lecture | No.: W0534 | Hours/week: 2.0

Contents
- Basic principles of international financing.
- Strategies and instruments for financing exports and foreign investments.
- Risk mitigation through state and private insurance of export risks and foreign investments.
- Regulatory aspects.
- Fintech and Insuretech.

Literature

García, F. J. P. (2017): Financial Risk Management. Springer. | Klasen, A. (2020): The Handbook of Global Trade Policy. Wiley. | Lee, H. (2021): Risk Management. Springer. | Manos, R., Parker, L. & Myddelton, D. R. (2023): Corporate Finance for Business. Springer. | Morschett, D., Schramm-Klein, H. & Zentes, J. (2015): Strategic International Management. Springer Gabler.

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IML-29 International Project Management

Recommended prerequisites
Parallel attendance of the modules IML-24, IML-25 and IML-26 as well as general knowledge of business administration and economics

Course type
Lecture and seminar

Learning outcomes
Students develop the ability to analyze, plan and implement strategic issues by combining methods and discipline-specific expertise. They become familiar with the advantages and disadvantages of quantitative and qualitative methods as well as the methodological differences between various disciplines such as economics, political science and law. In this interdisciplinary and international context, students are able to integrate theoretical knowledge and practical experience. Accordingly, they will be able to implement projects in selected business areas. Through project work in small groups, they develop not only their methodological but also their social skills.

Duration / Hours per week / Workload / ECTS
1 semester | 6.0 h/week | Classwork: 90 h, Self-study and groupwork: 210 h, Total: 300 h | 10.0 ECTS

Assessment
Module assessment of Practical Project (PA)

Module coordinator
Prof. Dr.-Ing. Ingo Dittrich

Recommended semester / Frequency / Applicability
6th semester | Every year (summer) | International Management Logistics (Bachelor)

W0535 International Project Management (in English)

Type: Lecture | No.: W0535 | Hours/week: 2.0

Contents
Following on from general project management, students learn the specifics and processes of an international project in terms of the task and team composition. In international projects, other methods of team leadership and project organization may be necessary. Intercultural differences must also be taken into account.

Literature
Will be announced in the lecture.

W0536 International Business Project (in English)

Type: Seminar | No.: W0536 | Hours/week: 4.0

Contents
At the core of the practical project is students working on topics individually and in teams while closely supervised by lecturers. In addition to the content, students also practise project management methods on their topics. Students work in groups of five each on a real topic from the field of logistics and/or trade, which are provided by companies, associations or similar; university-internal topics are possible as well. The topics can have a national and/or international reference. International topics may require communication and documentation in English language. The practical project focuses on operational, tactical and strategic topics relating to the internationalization of companies.

Literature
Will be announced or determined independently depending on the respective project

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Artificial Intelligence	
Course ID:	WP-21
Level:	Bachelor
Course Type:	Lecture
Semester Hours per Week:	2
Credits:	3
Examination:	Project Work
Location:	Campus Gengenbach
German name:	Digital Work

Lecturer(s):

Dr. Tobias Kopp

Requirements: Please note that his course aims to understand Artificial Intelligence from a social, ethical and economic view, not from a developer's/technical view. Students with an IT background are welcome to join, but should be aware of this.

Objectives:

- Acquire knowledge about the history and subfields of artificial intelligence
- Gain a well-founded overview of the topic of artificial intelligence, in particular different forms of intelligence
- Acquire knowledge of typical problems and functions of artificial intelligence in various application areas – also in a daily environment
- Understanding the opportunities, risks and implications of AI applications

Literature and Downloads:

- Russel, S., Norvig, P., (2020), Artificial Intelligence – A Modern Approach, 4th edition, Pearson.
- Ertel, W., (2016), Grundkurs Künstliche Intelligenz: eine praxisorientierte Einführung, Wiesbaden, Springer.
- Rainsberger, L., (2021), KI – Die neue Intelligenz im Vertrieb, Wiesbaden, Springer
- Barton, T., (2021), Künstliche Intelligenz in der Anwendung, Wiesbaden, Springer.
- Wennker, P., (2020), Künstliche Intelligenz in der Praxis, Wiesbaden, Springer.
- additional literature and downloads provided in class

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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
German name	Volkswirtschaftliches Seminar

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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Human Resource Management and Organization	
Module ID	WP-17
Level	Bachelor
Course Type	Lecture/Exercise
Hours per Week	4
Credits	5
Examination	Written Exam (90 minutes) + Lab Work
Location	Campus Gengenbach
German name	Personalmanagement und Organisation

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
Level	Bachelor
Course Type	Seminar
Hours per Week	2
Credits	3
Examination	Project Work
Location	Campus Gengenbach
German name	Intercultural Leadership

Lecturer(s):

Mr. Srdan Skobo (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 (Business Administration)	
Module ID	BW-23
Level	Bachelor
Course Type	Seminar
Hours per Week	4
Credits	5
Examination	Project Work
Location	Campus Gengenbach
German name	International Business Project (Studiengang Betriebswirtschaft)

Please note that you can only take one "Business Project" course per semester.

Lecturer(s): TBA

Prerequisites: Students should have a general knowledge of Business Studies, as typically acquired in the first semesters of a Business Degree.

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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International Business Project (Business Psychology)	
Module ID	WP-23
Level	Bachelor
Course Type	Seminar
Hours per Week	4
Credits	5
Examination	Project Work
Location	Campus Gengenbach
German name	International Business Project (Studiengang Wirtschaftspsychologie)

Please note that you can only take one "Business Project" course per semester.

Lecturer(s): Prof. Dr. Landkammer

Prerequisites: Students should have a general knowledge of Business Studies, as typically acquired in the first semesters of a Business Degree. Recommended knowledge includes content from modules: Management and Innovation, Introduction to Business Psychology, Work and Organizational Psychology, Personality Psychology and Diagnostics, Business Management, Digital Work

Objectives and Competences:

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

- develop the ability to analyze, plan, and implement international strategic issues by combining methods and specialist knowledge
- be familiar with the advantages and disadvantages of quantitative and qualitative methods and understand the methodological differences between various disciplines such as economics, political science, and law
- combine theoretical knowledge and practical experience in an international context in an interdisciplinary setting
- possess the ability to implement projects in selected business areas
- expand not only their methodological skills but also their social skills through project work in small groups

Contents:

- Methods and processes for initiating, establishing, and implementing research-based learning in an interdisciplinary and international context
- Theoretical approaches and practical phenomena in psychology, economics, business administration, law, sociology, and political science
- The importance of projects for action in internationally active commercial enterprises and standard instruments of strategy development
- Methods for planning and implementing a project, such as requirements analysis, business case, and structural planning
- Methods for evaluating an interdisciplinary project in an international context

Literature and Downloads:

The current reading list will be announced in class. Excerpt from the reading list:

- Weidinger, C., Fischler, F., & Schmidpeter, R., (2014), Sustainable Entrepreneurship, Heidelberg 2014, Springer Gabler.

- August, R., Mayer, D., & Bixby, M., (2013), International Business Law, Harlow, Pearson.
- Hill, C., (2011), International Business, New York, McGraw-Hill.
- Pless, N., & Maak, T., (2011), Responsible Leadership, Dordrecht, Springer.
- Hofstede, G., Hofstede, G.J., & Minkov, M., (2010), Cultures and Organizations, 3. Aufl., New York, McGraw-Hill.
- Holtbrügge, D., & Welge, M., (2010), Internationales Management, Stuttgart, Schäffer-Poeschel.
- Backhaus, K., & Voeth, M., (2010), Internationales Marketing, Stuttgart, Schäffer-Poeschel.

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Social and Intercultural Competences	
Module ID:	WP-06
Level:	Bachelor
Course Type:	Seminar
Semester Hours per Week:	2
Credits:	3
Examination:	Project Work
Location:	Campus Gengenbach
German name:	Soziale und interkulturelle Kompetenzen

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
Level	Bachelor
Course Type	Lecture+Lab
Hours per Week	4
Credits	5
Examination	Written Exam+Lab Work
Location	Campus Gengenbach
German name	Sozialpsychologie

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
Level	Bachelor
Course Type	Project
Hours per Week	4
Credits	6
Examination	Project Work
Location	Campus Gengenbach
German name	Software-Implementierungs-Projekt

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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2.2 Department of Electrical Engineering, Medical Engineering and Computer Science

Course List

Winter Semester	Summer Semester	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

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Operating Systems + Operating Systems Lab	
Module ID	AI-07
Level	Bachelor
Course Type	Lecture and Lab
Hours per Week	2 and 2
Credits	2 and 3
Examination	Written Exam and Lab Work
Location	Campus Offenburg
German name	Betriebssysteme + Praktikum der Betriebssysteme

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
Level	Bachelor
Course Type	Lab
Hours per Week	2
Credits	2
Examination	Lab Work
Location	Campus Offenburg
German name	Software Defined Radio

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

Winter Semester	Summer Semester	Course Name	Course Type	Credits	Exam Type
x	x	AI Media Business	Lecture	5	Project Work
	x	Audio Design	Seminar	4	Presentation
	x	Practical Project 1 VIW	Project	6	Project Work
	x	Project Work bmuk	Project	10	Project Work
	x	Project Work mgp	Project	10	Project Work
	x	Project Work UNITS	Project	10	Project Work
	x	Security of Web Applications	Lecture	2,5	Lab Work
	x	Security of Web Applications Lab	Lecture	2,5	Lab Work
	x	Software Engineering	Lecture	5	Term Paper

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AI Media Business	
Module ID	Bmk-20
Level	Bachelor
Course Type	Lecture
Hours per Week	4 (2 hrs Lecture, + Colloqium)
Credits	5
Examination	Project Work
Location	Campus Offenburg
German name	AI Media Business

Lecturer(s): Prof. Dr. Jürgen Seitz

Prof. Dr. Jürgen Seitz

Prerequisites: Interest in AI Media Product Development; first practical experience with AI. No technological depth needed.

Objectives and Competences:

Contents:

Students develop the skills to design, implement, and position AI-powered media products in the market in a practical manner. Through concrete project assignments, they work on a variety of formats—ranging from AI-based program concepts to interactive, conversational applications. Companion courses cover the fundamentals of product design, media production, media-specific costing, and consumer testing. Particular emphasis is placed on visual solutions in images and video, as well as on agent-based approaches that provide practical and effective support for media production and interaction processes in real-world application scenarios.

Literature and Downloads:

All material will be provided in class.

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Audio Design	
Module ID	MGP-B-26
Level	Bachelor
Course Type	Seminar
Hours per Week	2
Credits	4
Examination	Presentation
Location	Campus Offenburg
German name	Audiogestaltung

Lecturer(s):

Prof. Markus Birkle

Prerequisites:

Objectives and Competences:

Contents:

The course begins with knowledge of the terminology of hearing, which develops the ability to compare sound forms, sound sequences, sound spaces and (world) sound cultures via the workflow of acoustic design. We design auditory production projects, determine the function of sound in the media and experience the aesthetic interaction of the visual and the auditory in media design.

Literature and Downloads:

Provided in class

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Design Thinking	
Module ID	bmk-08
Level	Bachelor
Course Type	Seminar
Hours per Week	2
Credits	3
Examination	Project Work
Location	Campus Offenburg
German name	**Design Thinking (module name is "Team-Kompetenzen")**

Lecturer(s):

Prof. Dr. Robert Gücker

Prerequisites:

Content:

The course is structured as follows:

- Five phases of design thinking in practice:

Research phase

▪ Methodological input on qualitative research
▪ Implementation in a real project

Synthesis phase

▪ Methodological input on analysis and synthesis
▪ Implementation in a real project

Ideation phase

▪ Creative techniques and idea development
▪ Implementation in a real project

Prototyping phase

▪ Methodological input on visualization and prototyping
▪ Implementation in a real project

Testing phase

▪ Testing methods and iteration, agile approach
▪ Implementation in a real project

Literature and Downloads:

- Freudenthaler-Mayrhofer, D. & Sposato, T. (2017). Corporate Design Thinking. Wiesbaden: Springer Fachmedien Wiesbaden.

- Gerstbach, I. (2017). 77 Tools für Design Thinker. Insidertipps aus der Design-Thinking-Praxis. Offenbach: GABAL Verlag.
- Lewrick, M., Link, P. & Leifer, L. (Hg.) (2018). Das Design Thinking Playbook. Mit traditionellen, aktuellen und zukünftigen Erfolgsfaktoren. Unter Mitarbeit von Nadia Langensand (2., überarbeitete Auflage). München, Zürich: Verlag Franz Vahlen GmbH; Versus Verlag.
- Osann, I. & Wiele, I. (2018). Design Thinking Schnellstart. Kreative Workshops gestalten: Lernlogbuch, Phasen-Check, Handwerkszeug, Dokumentation, Agendabeispiele. München: Hanser.
- Schallmo, D. R. A. (2018). Jetzt Design Thinking anwenden. Wiesbaden: Springer Fachmedien Wiesbaden.
- Suri, J. F. & Howard, S. G. (2006). Going deeper, seeing further: Enhancing ethnographic interpretations to reveal more meaningful opportunities for design. Journal of Advertising Research 46(3), 246-250.
- Thompson, L. & Schonthal, D. (2020). The Social Psychology of Design Thinking. California Management Review, 62 (2), 84-99.

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Practical Project 1 VIW	
Module ID	viw-06
Level	Bachelor
Course Type	Project
Hours per Week	2
Credits	6
Examination	Project Work
Location	Campus Offenburg
German name	Praktisches Projekt 1 (Virtuelle Welten)

Please note that for this module you must first contact the lecturer to discuss possible topics and area of work in order to identify a suitable supervisor.

Lecturer(s):

Prof. Dr. Göhrlich (first contact)

Prerequisites:

Objectives and Competences:

In these modules, groups of students develop their own projects - four in total as part of the degree programme. These can be thematically coordinated (e.g. a game project from character design to implementation) or focus on completely different facets of virtual worlds. The aim is to build up an individual portfolio.

Contents:

Working on a topic in a team (typically 3 to 5 students) according to the rules of agile project management. The content of the topic can be proposed by the team, but must be accepted by the supervisor. Supervisors can also suggest topics. Co-operation with companies or institutions is expressly encouraged.

Literature and Downloads:

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Project work mgp	
Module ID	MGP-B-14
Level	Bachelor
Course Type	Project Work
Hours per Week	4
Credits	10
Examination	Project Work
Location	Campus Offenburg
German name	Projektarbeit

Please note that for this module you must first contact the lecturer to discuss possible topics and area of work in order to identify a suitable supervisor.

Lecturer(s):

Prof. Markus Birkle (first contact)

Prerequisites:

Objectives and Competences:

In groups of 2-5 participants, conceptualise and produce a media production set as a task in teamwork and be able to complete and present it by a set deadline. Be able to independently develop and create ideas, brainstorming, research, concepts or scripts and storyboards, the distribution of tasks within the team, schedules and shooting plans, produce a media product based on teamwork, submit interim results and present and comment on them by a set deadline.

Contents:

Working on a given topic in a team (3 to max. 6 students) according to the rules of project management (regular meetings with the supervising lecturer and completion by the specified presentation date at the end of the semester). Own topics can be proposed to the professors until the end of the previous semester (during the internship period). (extensive practical work)

Literature and Downloads:

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Project Work bmuk	
Module ID	bmk-72
Level	Bachelor
Course Type	Project Work
Hours per Week	4
Credits	10
Examination	Project Work
Location	Campus Offenburg
German name	Projektarbeit

Please note that for this module you must first contact the lecturer to discuss possible topics and area of work in order to identify a suitable supervisor.

Lecturer(s):

Prof. Sabine Hirtes (first contact)

Prerequisites:

Objectives and Competences:

Contents:

The project work is related to the wide field of Media Studies/Enterprise an IT Security etc. The students work on selected topics covering a particular challenge in a relevant sub-domain.

Literature and Downloads:

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Project Work UNITS	
Module ID	UNITS-35
Level	Bachelor
Course Type	Project Work
Hours per Week	4
Credits	10
Examination	Project Work
Location	Campus Offenburg
German name	Projektarbeit

Please note that for this module you must first contact the lecturer to discuss possible topics and area of work in order to identify a suitable supervisor.

Lecturer(s):

Prof. Dr. Schaad (first contact)

Prerequisites:

Knowledge equivalent to these German-language modules is recommended:

UNITS-14 Sicherheit & Unternehmenskultur (Strategie, Organisation, Corporate Governance, Compliance, Sicherheitsstandards, mathematische Statistik) *(Security & Corporate Culture (strategy, organisation, corporate governance, compliance, security standards, mathematical statistics))*

UNITS-32 Sicherheitsmanagement und Unternehmensprozesse (Prozessmanagement, Informationssysteme) *(Security management and corporate processes (process management, information systems))*

Objectives and Competences:

After completing the module, students will be able to

...learn facts, knowledge and concepts relating to risk intelligence, risk management, business continuity and disaster recovery management as well as quantitative risk analysis,
...understand, organise, interpret and independently describe the core ideas of the lectures with regard to risk intelligence, risk management, business continuity and disaster recovery management as well as quantitative risk analysis,
...apply the knowledge they have acquired in new situations to solve problems relating to risk intelligence, risk management, business continuity and disaster recovery management and quantitative risk analysis,
...break down more complex issues in order to generate new application-related knowledge with regard to risk intelligence, risk management, business continuity and disaster recovery management as well as quantitative risk analysis.

Contents:

Working on a given topic in a team (typically 4 to 5 students) according to the rules of project management.

Literature and Downloads:

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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	Lab Work
Location	Campus Offenburg
German Name	Sicherheit in Webapplikationen

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	
Module ID	UNITS-30
Level	Bachelor
Course Type	Lecture
Hours per Week	3
Credits	5
Host Semester	UNITS 2
Examination	Term Paper
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

Mechanical Systems Engineering degree programme

Exchange students are welcome to join the English-taught classes of the Mechanical Systems Engineering (MSE) Bachelor programme. These modules are timetabled in such a way that there are no clashes between the modules for one semester. The modules (MSE-x) usually consist of two components (a lecture and lab), which need to be taken together.

While incoming exchange students can mix this semester with" other courses" from outside of this programme, there is no guarantee that the "other courses" will not clash with the timetable.

Winter Semester	Summer Semester	Course Name	Semester	Credits	Exam Type
x		Design	MSE-1	6	Written Exam + Practical Work
x		Mechanics 1	MSE-1	6	Written Exam + Lab Work
x		Digital Science	MSE-1	6	Practical Work + Lab Work
x		Mathematics 1	MSE-1	6	Written Exam
	x	Thermodynamics	MSE-2	6	Written Exam
	x	Mechanics 2	MSE-2	6	
	x	Materials	MSE-2	6	Written Exam + Lab Work
	x	Mathematics 2	MSE-2	6	Written Exam
x		Robotics and Manufacturing	MSE-3	6	Written Exam + Lab Work
x		Mechatronics	MSE-3	6	Written Exam
x		Mechanics 3	MSE-3	6	Written Exam + Lab Work
x		Modeling and Simulation (CAE)	MSE-3	6	Practical Work + Practical Work

Other courses offered

Winter Semester	Summer Semester	Course Name	Course Type	Credits	Exam Type
x	x	Basics CAD[1]	Lab	3	Lab Work
	x	Fluid Mechanics I/II	Lecture	5	Written Exam
	x	AI-aided Innovative Design and Inventive Problem-Solving[2]	Seminar	2	Lab Work
x		Industrial Production Planning & Leadership	Lecture	2	Presentation + Written Exam

[1] Basics CAD is offered as part of two other modules, Design 1 in the winter semester and MKA-B in the summer semester.

[2] Last time offered in summer semester 2027. Students should choose the module Materials in the future.

x	SS2027 only	Materials Engineering Lab	Lab	3	Lab Work
	x	Heat Transfer and Lab	Lecture + Lab	6	Oral Exam
	x	System Dynamics and Control	Lecture + Lab	7	Written Exam
	x	Machine Design[3]	Lecture + Lab	5	Written Exam + Lab Work

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[3] Last time offered in summer semester 2027. For the winter semester, students should choose the module Design 1.

Mathematics 1	
Module ID	MSE-B 01
Level	Bachelor
Course Type	Lecture
Hours per Week	6
Credits	6
Examination	Written Exam 90 minutes
Location	Offenburg campus
German name	NA

Lecturer(s): Prof. Harald Wiedemann

Prerequisites:

Objectives and Competences:

Upon completion of the module, students will have the tools to understand key causal relationships in the applied sciences and to deal with them constructively. Students will have mastered the mathematical terminology, the tools, and the fundamental approach to problem-solving to the extent that they can transfer and apply them to specific engineering tasks. Students will be able to independently solve real-world problems using the material covered in the lecture.

Contents:

The course is structured as follows:

- Review of the basics (sets, equations and inequalities, propositional logic)
- Vector Algebra and Analytical Geometry
- Functions and curves
- Sequences and series
- Differential Calculus
- Integral Calculus

Literature and Downloads:

- Papula, L.: Mathematics for Engineers and Natural Scientists, Volume 1, Vieweg, Papula, L. (Vieweg, 2000)
- Arens et al: Mathematics, (Spektrum Akademischer Verlag, 2011)

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Mechanics 1	
Module ID	MSE-B 02
Level	Bachelor
Course Type	Lecture and Lab
Hours per Week	5 (4 Engineering Mechanics 1 + 1 Experimental and Numerical Mechanics)
Credits	6
Examination	Engineering Mechanics 1: Written Exam 90 Minutes (module grade) Experimental and Numerical Mechanics 1: Lab work (ungraded)
Location	Offenburg Campus
German name	NA

Lecturer(s): Prof. Dr. Gerhard Kachel

Recommended Prerequisites: Preliminary courses in mathematics and physics are beneficial

Objectives and Competences:

Students will be able to

- confidently apply the concepts of statics
- determine the centers of gravity of lines, surfaces, and solids
- classify mechanical systems and decompose them into analyzable subsystems
- assess the solvability of subsystems
- Determine bearing forces and shear loads
- Evaluate and account for friction flows

Contents:

Engineering Mechanics 1: The course is structured as follows:

- Introduction, theorems of statics
- Force vectors, vector calculus
- Equilibrium at a point
- Resultant forces of force systems
- Equilibrium of a rigid body
- Trusses and systems of rigid bodies
- Internal forces
- Friction
- Center of gravity
- Application examples for the respective degree programs

Experimental and Numerical Mechanics: The lecture content is reinforced in labs, partly with computer support and through experiments.

Literature and Downloads:

The current reading list will be announced during the course.

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Design 1	
Module ID	MSE-B 03
Level	Bachelor
Course Type	Lecture and Lab
Hours per Week	6 (4h Design 1 + 2h CAD1 Lab)
Credits	6
Examination	Design 1: Written Exam 90 Minutes (module grade) CAD 1 – Lab: PA (ungraded)
Location	Campus Offenburg
German name	NA

Lecturer(s): Prof. Dr. Christian Wetzel

Recommended prerequisites: Prerequisite courses in mathematics, physics, and programming are beneficial

Objectives and Competences:

Students will acquire knowledge in the areas of

- Technical documentation and CAD
- Load assumptions and stresses in static and dynamic mechanical systems
- Strength calculations for mechanical systems according to the FKM guideline and DIN 743
- Design and sizing of bearing systems (rolling bearings and plain bearings)

This enables future engineers to make technically sound decisions in their professional lives, regardless of specific applications, based on a solid understanding of technical documentation, design methodology, and strength calculations.

Contents:

Design 1: The course is structured as follows:

- Technical Documentation and Standard-Compliant Technical Drawing
- Surface specifications, dimensional, form, and positional tolerances
- Fundamentals of methodical design and the systematic development process
- Basic types of stress in mechanical systems
- Design methods/strength analysis methods for mechanical systems according to the FKM guideline and DIN 743
- Fundamentals of shafts/axles, design guidelines, and preliminary sizing
- Rolling bearings, bearing concepts, design, and service life calculation
- Sliding bearings, bearing concepts, design, and service life calculation
- Exercises and assignments during the lecture and for self-study

CAD1 Lab: The course is structured as follows:

- Fundamentals of CAD programs and modeling philosophy
- Three-dimensional part creation in a CAD program
- Assembly creation from components in a CAD program
- Generation of technical drawings for assemblies and components
- Reinforcement of lecture content and CAD skills through exercises and assignments

Literature and Downloads:

Design 1:

- FKM Guidelines, RFN-07-20-EN

- DIN 743
- Childs, Mechanical Design, Elsevier
- Stefano Tornincasa, Technical Drawing for Product Design, Springer
- Labisch, Wählisch, Technical Drawing: Independent Learning and Effective Practice, Springer

Additional reading list will be announced during the course.

CAD1 Lab:

- Childs, Mechanical Design, Elsevier
- Stefano Tornincasa, Technical Drawing for Product Design, Springer
- Jannik Ludewig, Creo Parametric 10.0 for Beginners: A Concise Guide, Springer
- Willis, Dogra, Creo Parametric 12.0: A Power Guide for Beginners and Intermediate Users, CADArtifex

Additional reading list will be announced during the course.

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Digital Science	
Module ID	MSE-B 04
Level	Bachelor
Course Type	Lecture and Lab
Hours per Week	6 (4h Computer Science + 2h Numerical Physics)
Credits	6
Examination	Computer Science: Practical Work (Module Grade) Numerical Physics: Lab work (ungraded)
Location	Campus Offenburg
German name	NA

Lecturer(s): Prof. Dr. Bernd Waltersberger

Recommended prerequisites: Preliminary courses in mathematics, physics, and programming are recommended

Objectives and Competences:

Upon successful completion of the course, students will be familiar with the fundamentals of applied computer science and will be able to solve engineering problems using methods and techniques from computer science. In particular, the course lays the groundwork for students to confidently engage with key topics and digitalization in later semesters and to develop solutions.

Contents:

Computer Science: The course covers a selection of the following topics:

- Lecture:
  - Fundamentals of Computer Science
  - Information representation, number systems, coding
  - Algorithms and algorithm design
  - Fundamentals of software development (flowcharts, programming paradigms, program structure, programming languages, scripting languages vs. compiled languages, input and output, functions)
- Programming Exercises:
  - Learning and deepening understanding of programming and algorithmic thinking through various program examples
  - Simple data types, variables, and higher-level data structures (definition, declaration)
  - Program and control structures (loops, functions, modules)
  - Documentation, testing, and validating code

Numerical Physics:
The course supports the consolidation of lecture content using computer-aided methods. The practical relevance is established in particular by examining physical problems, e.g.

- Error analysis, linear regression, error propagation
- Elementary mathematics using computer algebra systems
- Simple mechanical or electrical problems, e.g., oblique throw, circuit calculations

Literature and Downloads:
The current reading list will be announced during the course.

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Mathematics 2	
Module ID	MSE-B 06
Level	Bachelor
Course Type	Lecture
Hours per Week	6
Credits	6
Examination	Written Exam (90 minutes)
Location	Campus Offenburg
German name	

Lecturer(s): Prof. Harald Wiedemann

Prerequisites: Mathematics 1 (or a similar knowledge level)

Objectives and Competences:

Upon completion of the module, students will have the tools to understand key relationships in the applied sciences and to deal with them constructively. Students will have mastered the mathematical terminology, tools, and fundamental approach to problem-solving to the extent that they can transfer and apply them to specific engineering tasks. Students will be able to independently solve real-world problems using the material covered in the lecture. The material of the Mathematics 1 module is reinforced through the deliberate selection of examples.

Contents:

The course is structured as follows:

- Error analysis, error propagation, and linear regression
- Complex numbers
- Matrix calculus
- Ordinary differential equations, including Laplace transforms
- Differential and integral calculus for functions of several variables

Literature and Downloads:
See the reading list for the Mathematics 1 course.
The current reading list will be announced during the course.

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Mechanics 2	
Module ID	MSE-B 07
Level	Bachelor
Course Type	Lecture and Lab
Hours per Week	5 (4h Engineering Mechanics 2 + 1h Experimental and Numerical Mechanics 2)
Credits	6
Examination	Engineering Mechanics 2: Written Exam 90 Minutes (module grade) Experimental and Numerical Mechanics 2: Lab work (ungraded)
Location	Campus Offenburg
German name	NA

Lecturer(s): Prof. Dr. Gerhard Kachel

Prerequisites: Mathematics 1, Mechanics 1, Digital Science ((or a similar knowledge level))

Objectives and Competences:

Students acquire in-depth knowledge of the computational strength assessment of components, particularly in technical applications. They will understand the fundamental methodology as well as the basic mechanical equations and input parameters relevant to strength analysis. This will enable them to independently plan and perform a computational strength analysis, to represent fundamental structural elements in an abstract manner, and to identify critical points regarding component failure. This equips future engineers to make well-founded decisions regarding design and material selection in their professional lives, based on solid mechanical principles and independent of specific applications.

Contents:

Engineering Mechanics 2: The course covers the following topics:

- Learning the basic methodology, the fundamental mechanical equations (equilibrium condition, kinematic relationship, law of elasticity), and the basic quantities
- Learning the fundamentals of strength analysis under multi-axial loading: stress and strain states and the law of elasticity
- Application of the fundamentals to specific structural elements: tension and compression members, beam bending, torsion members
- Applying the fundamentals to more complex loading situations by superimposing simple loading cases
- Assessing application limits and uncertainties in computational strength analysis
- Application examples for the respective degree programs

Experimental and Numerical Mechanics 2: The lecture content is reinforced in labs, partly with computer support and through experiments.

Literature and Downloads:
The current reading list will be announced during the course.

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Materials	
Module ID	MSE-B 08
Level	Bachelor
Course Type	Lecture and Lab
Hours per Week	6 (4h Materials Engineering + 2h Material Engineerings Lab)
Credits	6
Examination	Materials Engineering: Written Exam 90 Minutes (Module Grade) Materials Engineering – Lab: Lab work (ungraded)
Location	Campus Offenburg
German name	NA

Lecturer(s): Prof. Dr. Dirk Velten

Prerequisites:

Objectives and Competences:

Upon completion of the module, students will be able to:

- Explain the structure-property relationships of materials,
- distinguish and evaluate major classes of materials,
- classify microstructures, phase diagrams, and heat treatment of metallic materials,
- describe and evaluate material testing and damage mechanisms,
- select materials for biomechanical and mechanical engineering applications.

Contents:

Materials Engineering: The course is structured as follows:

- Fundamentals of Materials Science
  - Bonds in solids
  - Classification of materials
  - Structure and Properties of Materials
- Metallic materials (focus)
  - Crystal Structure and Lattice Defects
  - Alloys and phase diagrams
  - Iron-carbon diagram
  - Heat treatment of metals
  - Mechanical Properties and Materials Testing
- Non-metallic materials
  - Ceramic materials: structure, properties, and applications
  - Polymers: Structure, Processing, and Technical Applications
  - Composite materials: Matrix and fiber materials
- Material Selection and Applications in Biomechanics and Mechanical Engineering
  - Criteria for material selection
  - Influence of environmental conditions and stress
  - Sustainability and recycling of materials
- Material testing and damage analysis
  - Destructive and non-destructive testing methods
  - Fracture mechanics and types of damage
  - Corrosion and wear behavior of materials

Materials Engineering – Lab: The course is structured as follows:

- Microstructural Analysis of Metallic Materials
  - Objective: Examination of the microstructure of metallic materials using a light microscope
  - Methods: Section preparation, etching, microscopy
  - Relation to theory: Microstructure, phase diagrams, heat treatment
- Mechanical testing of materials
  - Objective: Determination of mechanical properties (hardness, tensile strength, elongation at break)
  - Methods: e.g., tensile test, hardness test, notched impact test
  - Relation to theory: Elasticity, plasticity, fracture mechanics
- Heat treatment of steels
  - Objective: Effect of annealing, hardening, and tempering on microstructure and hardness
  - Methods: e.g., temperature control, hardness measurement, microstructural analysis
  - Theoretical background: iron-carbon phase diagram, phase transformations
- Non-Destructive Testing (NDT)
  - Objective: Detection of defects in materials without causing damage
  - Methods: e.g., ultrasonic testing, radiographic testing, magnetic particle testing
  - Relation to theory: Material defects, testing methods, quality control

Literature and Downloads:

The current reading list will be announced during the course.

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Thermodynamics	
Module ID	MSE-B 09
Level	Bachelor
Course Type	Lecture
Hours per Week	6
Credits	6
Examination	Written Exam 120 minutes
Location	Campus Offenburg
German name	NA

Lecturer(s): Prof. Dr. Peter Treffinger

Prerequisites:

- Mathematics, particularly differential and integral calculus;
- Fundamentals of classical mechanics;
- General physics, in particular the fundamentals of physical quantities, the International System of Units, and knowledge of fundamental physical laws and principles;
- Basic knowledge of programming in Python is also recommended, particularly for performing calculations and visualizing data.

Objectives and Competences:

Upon completion of the module, students will have a solid understanding of the fundamental terms and concepts of thermodynamics. They will be able to define appropriate systems depending on the specific problem and to formulate the laws of conservation precisely. In addition, students will be familiar with various model substances (e.g., ideal gas, incompressible liquid, vapor-liquid equilibrium) and will be able to apply both thermal and caloric equations of state to them. They will be familiar with the interpretation and use of phase diagrams and will understand the significance of the second law of thermodynamics. They can apply the quantity of entropy in calculations and place it in its physical context.
Furthermore, students are able to systematically analyze thermodynamic cyclic processes (such as gas and vapor processes) and calculate the energy flows within the process and its components. They understand approaches to describing mixtures of substances and can independently familiarize themselves with advanced areas of phenomenological thermodynamics, such as multiphase thermodynamics or chemical thermodynamics.

Contents:

The course is structured as follows:

- Introduction
  - Applications, Distinction Between Phenomenological and Statistical Thermodynamics Using Selected Examples
  - Fundamentals and terminology (systems, state variables, processes)
- The Second Law of Thermodynamics
  - First Law: Conservation of Energy
  - Second Law: Entropy and Irreversibility
  - Application of the laws to closed and open systems
- Description of pure substances and mixtures
  - Ideal gas and real gas, incompressible liquid
  - Vapor-liquid equilibrium

    - Fundamentals of thermodynamics of mixtures (inert gas-vapor mixture, humid air)
- Cyclic processes
    - Gas processes (including Otto, Diesel, and Brayton cycles)
    - Vapor processes (including Clausius-Rankine cycle, cold vapor process)
- Outlook and in-depth analysis using selected examples

Literature and Downloads:

- Baehr, Hans Dieter; Kabelac, Stephan: Thermodynamics. Berlin: Springer, 2016,
- Labuhn, Dirk; Romberg, Oliver: Don’t Panic About Thermodynamics!: Success and Fun in the Classic “Dry-as-Dust Subject” of Engineering Studies. Wiesbaden: Springer Fachmedien, 2012
- Treffinger, Peter: Lecture Materials and Exercise Collection on Thermodynamics, Offenburg University of Applied Sciences, 2025

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Robotics and Manufacturing	
Module ID	MSE-B 11
Level	Bachelor
Course Type	Lecture and lab
Hours per Week	6 (Robotics Lecture 2 SWS, Robotics Lab 2 SWS, Manufacturing Processes Lecture 2 SWS)
Credits	6
Examination	Robotics and Manufacturing: K90 (module exam), (module grade) Robotics Lab: Practical Work (LA) (ungraded)
Location	Campus Offenburg
German name	NA

Lecturer(s): Prof. Dr. Marco Schneider

Prerequisites: Knowledge of the content covered in Mechanics 1/2, Design 1

Objectives and Competences:

Upon completion of this module, students will be able to:

- Understanding the basic principles of mobile, collaborative, and industrial robotics, including their topologies and sensor integration
- Applying forward and inverse kinematics to analyze and model robotic systems
- Identifying the basic manufacturing processes according to the German DIN 8580 standard in industrial applications and evaluating their properties and suitability for different products

Contents:

Robotics Lecture: The lectures introduce the fundamental principles as well as current research areas of mobile, collaborative, and industrial robotics. To provide a comprehensive overview of the challenges in modern cobotics, the course covers the basics and extends them to state-ofthe-art applications. The core topics include, but are not limited to:

• Definition and basics of collaborative and industrial robotics,
• Forward and inverse kinematics,
• Approaches to system modeling,
• Topology, joints, motors, and transmission technology
• Sensor technology and integration,
• Positioning and repeatability accuracy,
• Force control and advanced control strategies,
• Current trends and emerging research topics in robotics

Robotics Lab: Practical application of the theoretical concepts introduced in the lectures. The laboratory work involves hands-on experiments and project-based tasks using modern robotic systems or simulation software. Core aspects include:

• Familiarization with the operation and programming of industrial and/or collaborative robots
• Practical implementation of kinematic models and trajectory planning
• Verification of simulation models through real-world testing

Manufacturing Processes Lecture: The lectures follow the German DIN 8580 standard and cover the following aspects of manufacturing processes:

• casting and molding processes,
• forming and bending processes,

• cutting processes,
• joining and coating processes,
• additive manufacturing.

Literature and Downloads:

- Siciliano, B., Khatib, O., & Kröger, T. (Eds.). (2008). *Springer Handbook of Robotics (Vol. 200, p. 1).* Berlin: Springer.
- Kajita, S., Hirukawa, H., Harada, K., & Yokoi, K. (2014). *Kinematics. In Introduction to humanoid robotics (pp. 19–67).* Berlin, Heidelberg: Springer Berlin Heidelberg.
- Kalpakjian, S.; Schmid, S.: *Manufacturing Engineering and Technology.* Pearson, 2022.

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Mechatronics	
Module ID	MSE-B 12
Level	Bachelor
Course Type	Lecture and Lab
Hours per Week	6 (Electrical Engineering 6 SWS)
Credits	6
Examination	Written exam (90 minutes)
Location	Campus Offenburg
German name	NA

Lecturer(s): Prof. Dr. Grit Köhler

Prerequisites: Knowledge of the content covered in Mathematics 1/2

Objectives and Competences:

Upon completion of the module, students will be able to:

- identify the basic concepts of electrical engineering and mechatronics and apply them correctly in context calculate direct-current and alternating-current circuits as well as magnetic circuits,
- calculate power in DC and AC circuits as well as in three-phase systems,
- explain the occurrence of forces and energies in electric and magnetic fields and calculate them for simple configurations,
- recognize analogies between electric current fields and electric fields in non-conductors as well as magnetic fields
- understand and explain the functioning of important electrical equipment and circuits,
- Model electromechanical and mechatronic systems in an application-oriented manner and evaluate them mathematically (numerically or via simulation, as appropriate).

Contents:

The course covers selected chapters from the following subject areas:

• Basic concepts of electronics: electric charge, electric current, electric voltage, electric potential, electric resistance, electric power, electric energy

• Direct current circuits: Networks of linear passive and active two-port elements, Kirchhoff's laws, circuit analysis (branch current analysis, loop current analysis, node voltage analysis, superposition method, two-port theory), power conversion in circuits, power matching

• The electric field: Concept of a field (including source and vortex fields, homogeneous and inhomogeneous fields), electric field in conductors and non-conductors (electrostatic field and time-varying electric field), Displacement current and displacement current density, electric field strength, displacement current, electric influence, Faraday's cage, displacement and orientation polarization, capacitance and capacitors, series and parallel connection of capacitors, energy and force effects in the electric field

• The magnetic field: Magnetic flux, magnetic induction, magnetic field strength, material effects (especially ferromagnetism), the law of magnetic flux, magnetic circuits and their calculation, analogies between the electric current field and the magnetic circuit, Analogies between electric and magnetic fields, static and dynamic induction (Lorentz force), electromagnetic fields, inductance and coils, self-inductance and mutual inductance, series and parallel connection of coils, energy and force effects in the magnetic field

• The Alternating Current Circuit: Generation of alternating voltages, alternating quantities and their characteristic values, power in alternating current circuits, sinusoidal currents and voltages across resistors, coils and capacitors, as well as simple circuits in, e.g., oscillating circuits and filters; connection of AC circuits to three-phase systems in star and delta configurations; power in symmetrical and asymmetrical three-phase systems; basic principles of operation of electrical equipment (transformers, motors, and generators)

• Be able to classify, model, calculate, and, if necessary, simulate electromechanical and mechatronic systems.

• Application examples for the respective degree programs

Literature and Downloads:

- Heimann, Albert, Ortmaier, Rissing, *Mechatronics: Components – Methods – Examples*, Hanser, 2016
- Hering, Steinhart*, Handbook of Mechatronics,* Hanser
- R. Isermann, *Mechatronic Systems,* Springer

The current reading list will be announced during the course.

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Mechanics 3	
Module ID	MSE-B 13
Level	Bachelor
Course Type	Lecture and Lab
Hours per Week	5 (Engineering Mechanics 4 SWS, Experimental and Numerical Mechanics 3 Lab 1 SWS)
Credits	6
Examination	Engineering Mechanics 3: Written Exam 90 minutes Experimental and Numerical Mechanics 3: Lab work (ungraded)
Location	Campus Offenburg
German name	NA

Lecturer(s): Prof. Dr. Bernd Waltersberger

Prerequisites: Knowledge of the content covered in Mechanics 1, Mathematics 1/2

Objectives and Competences:

Students acquire in-depth knowledge in the field of theoretical analysis of dynamic technical mechanisms. They learn fundamental methods for the analysis and synthesis of dynamic mechanical systems, particularly in mechanical engineering. This enables them to identify components relevant to dynamic behavior in given technical designs and to abstract them into models. This enables future engineers to make technically sound decisions in their professional lives, independent of specific applications, based on a solid understanding of the fundamentals of mechanics.

Contents:

Engineering Mechanics: The course is structured as follows:
• Students will be able, in particular, to represent simple mechanical systems as abstract mechanical-mathematical models and to assess the limits of reasonable model assumptions.
• Reasonably assess the limits of application of mass-point models, describe and analyze the motion of mass points.
• Appropriately apply abstract mechanical concepts such as work, energy, power, momentum, angular momentum, and instantaneous poles to describe real technical systems.
• Describe the planar motion of bodies under the influence of forces and moments using practical, simplified models.
• Identify and quantitatively describe simple oscillating technical systems.
• Assess the common approaches to dealing with complex spatial mechanisms (gyroscopes, multi-body systems) qualitatively and, within limits, quantitatively in terms of their significance for practical development work.
• Students can analyze simple mechanical systems in the exercises
• Application examples for the respective degree programs

Experimental and Numerical Mechanics 3 Lab: The lecture content is reinforced in laboratory sessions, partly with computer support and through experiments.

Literature and Downloads:

Recommended reading: Gross, Hauger, Schnell, *Technical Mechanics 3,* Springer.

The current reading list will be announced during the course.

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Modeling and Simulation (CAE)	
Module ID	MSE-B 14
Level	Bachelor
Course Type	Lecture and Lab
Hours per Week	6 (CAE 4 SWS, Basic FEM 2SWS)
Credits	6
Examination	CAE: Practical work (weighting of module grade: 2/3 Basic FEM: Practical work (weighting of module grade: 1/3
Location	Campus Offenburg
German name	NA

Lecturer(s): Prof. Dr. Bernd Waltersberger

Prerequisites: Knowledge of the content covered in Mechanics 1/2 , Mathematics 1/2 , Design 1

Objectives and Competences:

Students acquire in-depth knowledge in the field of computer-aided development and analysis of primarily mechanical systems in mechanical engineering and biomechanics. Building on the fundamental knowledge they have acquired, they learn advanced methods of computer-aided product development. Students will be able to contribute to the analysis of mechanical problems using computer-aided methods, particularly with regard to dynamic and biomechanical systems. They will understand the capabilities and limitations of simulation methods. By applying the fundamentals of modeling, strength of materials, dynamics, and machine elements, they will be able to plausibly analyze and interpret the results obtained from computational models and simulations. This enables students to apply computer-aided development methods (for the optimal selection of materials, processes, and machine elements) in a targeted manner and to sensibly assess the capabilities and benefits of analysis tools within the development process.
In addition, students master the typical application fundamentals of commercially available CAE systems. This enables future engineers to make technically sound decisions in their professional lives, independent of specific CAE applications, based on a solid knowledge of the fundamental working techniques in the field of computer-aided development methods. Furthermore, this significantly facilitates their transition to company-specific software applications.

Contents:
CAE: The course covers selected topics from
• Classification of the terms CAD, CAE, CAM, FEM, MKS, CFD, and PDM within the development process.
• Selection of fundamental cross-application possibilities of advanced computer-aided development techniques
• Fundamental information technology and, in particular, the mathematical background of computer-aided development tools.
• The basic approach in the modeling process, from the physical to the mathematical model of a mechanical structure, with a focus on machine dynamics
• Cross-application basic capabilities for computer-aided kinematic and dynamic analysis of mechanisms derived from geometric models (generally elastic multi-body systems).
• Across various applications, the fundamental possibilities for computer-aided analysis of mechanical engineering systems, and in particular machine dynamics systems, with regard to loading, stress, stability, and dynamic behavior.
• Computer-aided development methods are explored in depth through computer exercises using commercially available CAE software.
• Application examples for the respective degree programs

Basic FEM: The course is structured as follows:
• Theoretical foundations of the FEM
• Calculation examples from the fields of elastostatics, vibration analysis, and stability theory
• Application examples for the respective degree programs

Literature and Downloads:
The current reading list will be announced during the course.

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Basic Computer Aided Design (Basics CAD)	
Module ID	See “German name”
Level	Bachelor
Course Type	Lab
Hours per Week	2
Credits	3
Host Semester	MA2
Examination	Lab Work
Location	Campus Offenburg
German name	Winter semester: MSE-B CAD 1 - Lab (from the module Design I, MSE-B 03) Summer Semester: MKA-B Grundlagen CAD

PLEASE NOTE: Basics CAD cannot be taken together with Design I (MSE-B 03), as they share the same class for the CAD-related content and the same exam, with Basic CAD having additional CAD-related questions on the exam.

Basics CAD can also not be combined with Machine Design.

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 I/II	
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
German name	Technische Strömungslehre

Lecturer(s):

Prof. Dr. Wolfgang Bessler

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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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
German name	Wärmeübertragung mit Labor

Lecturer(s):

Prof. Dr.-Ing. Susanne Gleißle

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

DRAFT

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AI-aided Innovative Design and Inventive Problem Solving	
Module ID	WF20211/MME-7365
Level	Bachelor/Master
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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Industrial Production Planning & Leadership	
Module ID	MA
Level	
Course Type	
Hours per Week	2
Credits	2
Host Semester	MA
Examination	Presentation and Written Exam
Location	Campus Offenburg
German name	

Lecturer(s): Mr. Clemens Burgert

Contents:
After completing the course, the students have acquired a fundamental understanding of industrial production planning, value stream mapping and value stream design. Furthermore, the interdependencies of different targets and KPIs in production planning are understood. Hence, lean methods are known and applicable. Change-Management, Leadership methods and leadership insights are also part of the lecture.

Course content:
This lecture provides a comprehensive overview of modern industrial production planning and leadership strategies. Key topics include production and factory planning, material flow optimization, and value stream mapping/design. Students will explore essential production targets and KPIs, as well as methods for production optimization. Lean principles and digital transformation concepts such as Smart Factory and Industry 4.0 are addressed. The course also emphasizes the role of leadership in managing change and implementing effective production strategies, equipping students with both technical and managerial competencies for future industrial challenges.

1. Production Planning
2. Factory Planning
3. Material Flow
4. Value Stream Mapping / Design
5. Change Management
6. Targets Production Planning / KPIs
7. Production Optimization
8. Lean Methods
9. Smart Factory / I4.0
10. Digitalization
11. Leadership Methods

Literature and Downloads:
Produktionsmanagement. Das A-Z wichtiger Methoden und Konzepte für die Produktion von heute
Gabler-Verlag, ISBN-10 3-8349-0235-7

Schlanker Materialfluss mit Lean Production, Kanban und Innovationen
Springer-Verlag, ISBN 978-3-540-79514-8

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Machine Design	
Module ID	M+V0130
Level	Bachelor
Course Type	Lecture and Lab
Hours per Week	4
Credits	5
Examination	Written Exam and Lab Work
Location	Campus Offenburg
German name	Summer semester: Maschinenkonstruktionslehre ; Winter semester: Design 1 (MSE-B 03)

Please note: Machine Design will be replaced in the winter semester by Design 1 (MSE-B 03).
Students cannot take both Machine Design and Basics CAD.

Lecturer(s):

Prof. Dr. Christian Wetzel / Prof. Dr. Pavel Livotov

Prerequisites:

- Mathematics
- Engineering Mechanics I, Statics
- Engineering Mechanics II, Strength of Materials / Elasticity
- Material Science

Objectives and Competences:

- Applied stress, strength and elasticity analysis of machine elements
- Basics of fatigue calculations of different machine elements
- Basics of dynamical problems of machine elements (natural frequencies and balancing)
- Design principles of shafts and bearing systems, especially concerning gear box design

Contents:

- Disassembly of gearbox
- Calculation of gearbox forces and moments
- Stresses and strains, fatigue calculation and operational strength according standard DIN 743
- Bending and torsion of shafts and critical frequencies (natural frequencies)
- Dimensioning of rolling bearings
- Hertzian pressure
- Fatigue calculation of rolling bearings
- Dimensioning of rolling bearings using Machine-Design-Program Kisssoft
- Designing of support systems using rolling bearings
- Journal bearings and lubrication
- Springs

Literature and Downloads:

- Standard DIN 743-1 to 3, December 2012

- Mechanical design : theory and applications / P.R.N. Childs, Dyson School of Design Engineering, Imperial College London, London, United Kingdom
- KissSoft-Manual

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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
German name	Werkstofftechnik Labor; MSE-B 08 Materials Engineering - Lab

Please note: Materials Engineering Lab will be replaced by Materials (MSE-B 08) in the summer semester.

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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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
German name	Mess- und Regelungstechnik

Lecturer(s):

Prof. Dr.-Ing. M.Sc. 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

Winter Semester	Summer Semester	Course Name	Course Type	Credits	Exam Type
	x	Business Information Systems II, Part Business Analytics	Seminar	3	Project Work
x		Decision Analysis	Lecture	3	Written Exam
x	x	Economic Policy	Seminar	6	Term Paper
	x	Global Business Research Project			
x		International Economic Law	Lecture	2	Written Exam
	x	International Financial Management	Lecture		
x		Leadership and Organizational Change	Lecture	3	Oral Exam
x		Strategic management and leadership in a global context	Lecture	3	Oral Exam

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Business Information Systems II, Part 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 these decisions. 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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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 Research Project	
Module or Course ID:	Module BWM-04, Course W1186
Level:	Master
Course Type:	Seminar
Semester Hours per Week:	2
Credits:	3
Host Semester:	BWM 2 (Summer Term)
Examination:	Project Work
Location:	Campus Gengenbach
German name:	

Lecturer(s):

Alexander Gehringer

Requirements:

Fundamentals of International Trade

Objectives and Competences:

Students understand the significance of international trade relations, their causes and effects, by identifying potential solutions in connection with practical problems faced by companies that already operate in international markets or wish to enter foreign markets. They can apply fundamental models for analysing trade theory and trade policy issues to specific business situations. Students also develop the ability to analyse competitors, successfully position companies, and enter foreign markets. They are familiar with the structure and organizational forms of internationally active companies and are proficient in basic models for solving problems related to recruitment and management in an international context. Through project work in small groups, students' methodological as well as social skills are strengthened.

Contents:

- International Business Environment: Globalization, the development of industrialized and developing countries, and political, economic, legal, and cultural differences
- Strategy and Structure of International Business: Methods and tools for analysing markets and competitors, positioning in a global context, expansion strategies—including market entry and strategic alliances
- International Management and Business Operations: Organizational design of multinational, international, and global companies, as well as decision-making processes in R&D, production, and marketing in an international context
- Global Human Resources Management: Strategic issues in recruitment, leadership, and development, as well as the management of expatriates

Literature and Downloads:

- Fatehi, K./ Choi, J. (2019): International Business Management. 2nd edition, Springer International Publishing, Cham.
- Hale, T./ Held, D. (eds.) (2017): Beyond Gridlock. Polity Press, Cambridge.
- Klasen, A. (ed.) (2020): The Handbook of Global Trade Policy. John Wiley & Sons Ltd, Oxford.
- Maylor, H., Blackmon, K., & Huemann, M. (2017). Researching business and management 2nd edition, Red Globe Press, Basingstoke.
- Morschett, D./ Schramm-Klein, H./ Zentes, J. (2015): Strategic International Management. 3. Aufl., Springer Fachmedien, Wiesbaden.
- Saunders, M.N.K./ Lewis, P./ Thornhill, A. (2024): Research Methods for Business Students. 9th edition, Pearson Education Limited, Harlow.

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

Lecturer(s):

Prerequisites:

Basics in Business Administration

Objectives of the Course:

Contents:

Institutions and actors in international financial management (multinational corporations, financial intermediaries, public institutions, others)

International external financing instruments: debt financing, equity financing, mezzanine financing

International internal financing, in particular cash pooling, transfer pricing, and asset-liability management

Country and geopolitical risks, exchange rate and interest rate risks

Use and valuation of derivative financial instruments

Development of hedging strategies

Literature and Downloads:

- Hill, C. W. L. (2022). International Business: Competing in the Global Marketplace. Vereinigtes Königreich: McGraw Hill.
- Hull, J. (2021). Options, Futures, and Other Derivatives. (11th ed.). Pearson International. https://elibrary.pearson.de/book/99.150005/9781292410623
- Marinov, M. A., Marinova, S. T., Larimo, J. A., & Leposky, T. (2019). International business and emerging economy firms.: (Universal issues and the Chinese perspective): Vol. I. Palgrave Macmillan.
- Moffett, M., Eiteman, D. & Stonehill, A. (2020). Fundamentals of Multinational Finance. (6th ed.). Pearson International. https://elibrary.pearson.de/book/99.150005/9781292215273
- Thummuluri Siddaiah. (2025). International Financial Management: An Analytical Framework, 2nd Edition by Pearson. Pearson India.

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International Financial Management	
Module or Course ID:	Module BWM-03, Course W1183
Level:	Master
Course Type:	Lecture
Semester Hours per Week:	2
Credits:	3
Host Semester:	BWM 2 (Summer Term)
Examination:	Written Exam (60 minutes)
Location:	Campus Gengenbach
German name:	

Lecturer(s):

Prof. Dr. Stephan Schmidt-Tank

Requirements:

Basic knowledge of double-entry bookkeeping and financial statement preparation. Basic knowledge of financial mathematics, basic knowledge of private law, particularly commercial and corporate law, as well as national tax law.

Objectives and Competences:

Students develop a comprehensive understanding of the business activities of multinational companies and the challenges associated with the cross-border financing of these business activities. Building on this foundation, the framework, key players, and mechanisms of international financial management are covered. Subsequently, students learn how to apply selected instruments of international external financing (e.g., Euromarket loans, cross-border leasing, venture capital, etc.) and cross-border internal financing (such as cross-border cash and asset-liability management). Using case studies as examples, students learn how to use these instruments effectively. Against the backdrop of the specific risks associated with cross-border financing, students also learn about the specific characteristics of country- and geopolitical risks, as well as exchange rate and interest rate risks. On this basis, students will be equipped to evaluate traditional and modern hedging instruments (e.g., derivative financial instruments such as interest rate swaps, credit default swaps, futures, etc.), use them effectively, and develop appropriate hedging strategies for internationally active companies.

Contents:

- Institutions and actors in international financial management (multinational corporations, financial intermediaries, public institutions, others)
- International external financing instruments: debt financing, equity financing, mezzanine financing
- International internal financing, particularly cash pooling, transfer pricing, and asset-liability management
- Country and geopolitical risks, exchange rate and interest rate risks
- Use and valuation of derivative financial instruments
- Development of hedging strategies

Literature and Downloads:

- Hill, C. W. L. (2022). International Business: Competing in the Global Marketplace. Vereinigtes Königreich: McGraw Hill.
- Hull, J. (2021). Options, Futures, and Other Derivatives. (11th ed.). Pearson International. https://elibrary.pearson.de/book/99.150005/9781292410623
- Marinov, M. A., Marinova, S. T., Larimo, J. A., & Leposky, T. (2019). International business and emerging economy firms.: (Universal issues and the Chinese perspective): Vol. I. Palgrave Macmillan.
- Moffett, M., Eiteman, D. & Stonehill, A. (2020). Fundamentals of Multinational Finance. (6th ed.). Pearson International. https://elibrary.pearson.de/book/99.150005/9781292215273
- Thummuluri Siddaiah. (2025). International Financial Management: An Analytical Framework, 2nd Edition by Pearson. Pearson India.

Leadership and Organizational Change	
Module ID	WPM-05
Level	Master
Course Type	Lecture
Hours per Week	2
Credits	3
Host Semester	WP
Examination	Oral Exam
Location	Gengenbach
German Name	Leadership and Organizational Change

Lecturer(s):

Prof. Dr. Landkammer

Prerequisites:

Previous knowledge should include contents comparable to: Module Positive Psychology and Self-Empowerment, Module Coaching Basics, Module Research Methods and Diagnostics

Objectives of the Course:

Upon completion of the modules “Leadership and Organizational Change” and “Strategic management and leadership in a global context”...

- students will have a sound understanding of the theoretical foundations and practical application of strategy and leadership in organizations.
- students will be able to analyze and critically evaluate complex challenges in the field of leadership and organizational change.
- students will be able to apply psychological theories and models of leadership and organizational change to practical situations.
- students will understand the strategic context for practical decision-making and, building on this, will be able to professionally communicate planned changes and support their implementation, taking into account the intercultural and global context.

Contents:

The course is structured as follows:

- Psychological theories and research findings on leadership and organizational change
- Leadership as a personal trait, group process, and cross-group process
- Challenges and drivers of organizational change
- Leadership in organizational change: Changing who ‘we’ are and the social identity approach
- Coaching as a leadership tool

Literature and Downloads:

- Ambrosat, S. und Grünwald, C. (2023). Auf dem Weg zu einer zukunftssicheren Organisation: Foresight im Personalwesen und in der Organisationsentwicklung. Strategic HR Review, 22(5), S. 169-173.
- Bruch, H., Krummaker, S., Vogel, B. (2012). Leadership – Best Practices und Trends. Springer Gabler, Wiesbaden.

- Ford, J., Ford, L., Polin, B. (2021) Führung bei der Umsetzung von Veränderungen: Funktionen, Quellen und erforderliche Vielfalt. In Journal of Change Management. Band 21, 2021, Seiten 87-119.
- Kels, P., Kocher, P-Y., Decker, V. M. et. al. (2024): Die erneuerungsfähige Organisation. In Zeitschrift Führung und Organisation Heft 2/2024, S. 120-124
- Miedlich, H. (2022). Erfolgreich Führen in Transformationsprozessen. Berlin, Springer.

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Strategic management and leadership in a global context	
Module ID	WPM-05
Level	Master
Course Type	Lecture
Hours per Week	2
Credits	3
Host Semester	WP
Examination	Oral Exam
Location	Gengenbach
German Name	Strategisches Management und Führung im globalen Kontext

Lecturer(s):

Prof. Dr.Schmidt-Tank

Prerequisites:

Previous knowledge should include contents comparable to: Module Positive Psychology and Self-Empowerment, Module Coaching Basics, Module Research Methods and Diagnostics

Objectives of the Course:

Upon completion of the modules “Leadership and Organizational Change” and “Strategic management and leadership in a global context”...

- students will have a sound understanding of the theoretical foundations and practical application of strategy and leadership in organizations.
- students will be able to analyze and critically evaluate complex challenges in the field of leadership and organizational change.
- students will be able to apply psychological theories and models of leadership and organizational change to practical situations.
- students will understand the strategic context for practical decision-making and, building on this, will be able to professionally communicate planned changes and support their implementation, taking into account the intercultural and global context.

Contents:

The course is structured as follows:

- Analysis of the relationship between strategic planning, management, and leadership in international public and nonprofit organizations
- Management system approach to the development, adoption, administration, and management of a strategic plan
- Strategic context for practical decision-making for international public and nonprofit organizations
- Practical decision-making under complex and uncertain conditions
- International perspectives on strategic planning, management, and leadership

Literature and Downloads:

- Bea, F., X., Haas, J., (2024). Strategisches Management. 11., überarbeitete Auflage. UVK, München.

- Helmold, M., (2022). Leadership. Agile, virtuelle und globale Führungskonzepte in Zeiten von neuen Megatrends. Springer Gabler, Wiesbaden.
- Lehner-Telič, E., (2023). Systemische Führung von interkulturell-virtuellen Teams 1. Haufe, Freiburg
- Schühly, A., M., (2022). Cultural Influences on the Process of Strategic Management. Using Scenario Planning for Decision Making in Multinational Corporations. Springer, Cham.

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3.2 Department of Electrical Engineering, Medical Engineering and Computer Science

Course List

Winter Semester	Summer Semester	Course Name	Course Type	Credits	Exam Type
	x	Advanced Channel Coding with ab	Lecture	3	Written Exam
	x	Advanced Digital Signal Processing	Lecture	4	Written Exam
		Advanced Digital Signal Processing Lab	Lab	1	Lab Work
x		Automotive Radar	Lecture	3	Written Exam
	x	Computer Vision	Lecture + Lab	5	Written Exam + Lab Work
	x	Development and Introduction of Medical Devices	Lecture	1	Written Exam
x		Digital Communications with Lab	Lecture + Lab	3	Written Exam
x		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		Information Theory and Coding	Lecture	3	Written Exam
x		Internet of Things	Lecture	3	Written Exam
x		Object Oriented Software Development	Lecture	3	Written Exam
x		Object Oriented Software Development Lab	Lab	2	Lab Work
	x	Object Oriented Modeling (UML)	Lecture	3	Written Exam
x		Parallel Computing	Lecture	2	Oral Exam
x		Practical Work Parallel Computing	Lab	3	Lab Work
	x	Methods and Applications of Artificial Intelligence	Lecture	3	Written Exam
	x	Artificial Intelligence Lab	Lab	2	Lab Work
	x	Language Technologies and Compilers	Lecture	2	Oral Exam
	x	Language Technologies and Compilers Lab	Lab	3	Lab Work
x		Statistical Signal Processing and Information Theory	Lecture	2	Written Exam

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Advanced Channel Coding with Lab	
Module ID	CME-06/ EMI406
Level	Master
Course Type	Lecture + Lab
Hours per Week	3
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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Advanced Digital Signal Processing	
Module ID	CME-07/ EMI414
Level	Master
Course Type	Lecture
Hours per Week	4
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 Digital Signal Processing (DSP) Lab	
Module ID:	CME-07/ EMI415
Level:	Master
Course Type:	Lab
Semester Hours per Week:	1
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:

"User's Guides" for the Experiments

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Automotive Radar	
Module ID:	CME-12/EMI442
Level:	Bachelor + Master
Course Type:	Lecture
Semester Hours per Week:	2
Credits:	3
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

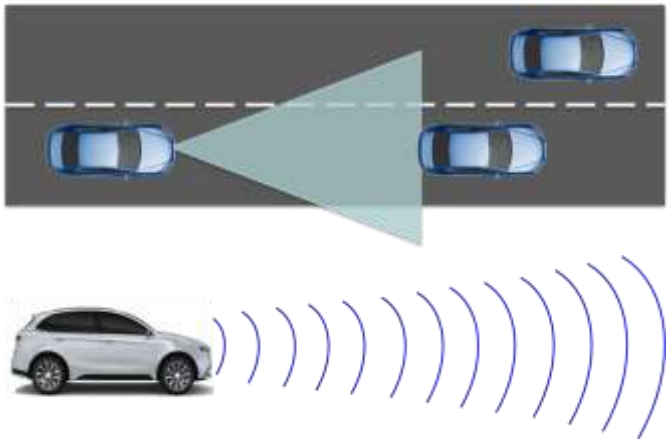
Objectives and Competences:

- 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 Vision	
Module ID	EIM-15/ EMI407
Level	Master
Course Type	Lecture and Lab
Hours per Week	4
Credits	5
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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Development and Introduction of Medical Devices	
Module ID	MT-M1/EMI2531
Level	Master
Course Type	Lecture
Hours per Week	1
Credits	1
Host Semester	MT-M1
Examination	Written Exam
Location	Offenburg
German name	Entwicklung und Einführung von Medizinprodukten

Lecturer(s):

Dr. Osypka

Prerequisites:

Experience in organizing projects (project work, bachelor's thesis), knowledge of project management

Objectives of the Course:

Contents:

From product idea to patient application:

- Idea collection, generation, patents
- Requirements/specifications
- Development, various phases, V-model
- Production handover
- Approval, regulatory affairs, clinical studies, literature comparisons
- Product management
- Marketing, business case
- Field service/sales, export
- Application in hospitals, on patients
- Post-market surveillance, obligations as a medical device manufacturer
- QM system, essential for a medical technology company

Bonus: Many examples from the interesting and current fields of cardiology, cardiac surgery, and neurophysiology

Literature and Downloads:

- Erich Wintermantel und Suk-Woo Ha: Medizintechnik: LifeScience Engineering, Springer, 2009.
- Tino Schubert und Tobias Vogelmann (Hrsg.): Market Access inder Medizintechnik, Spriner, 2019.

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Digital Communications with Lab	
Module ID:	CME-06/ EMI404
Level:	Master
Course Type:	Lecture + Lab
Semester Hours per Week:	3
Credits:	3
Host Semester:	CME1
Examination:	Written Exam + Lab Work
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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Signals and Systems	
Module ID:	CME-01/ 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:	EIM-15/ EMI2205 (Lecture) EIM-15/ EMI2206 (Lab)
Level:	Master
Course Type:	Lecture and Lab
Semester Hours per Week:	2.0 and 2.0
Credits:	2 and 3
Host Semester:	EIM2
Examination:	Written Exam and Lab Work
Location:	Campus Offenburg
German name:	Embedded und industrielle Netzwerke

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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Information Theory and Coding	
Module ID	CME-01/ 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-12/EMI419
Level	Master
Course Type	Lecture
Hours per Week	2
Credits	3
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.

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Object Orientated Software Development	
Module ID	CME-05 / EMI400
Level	Master
Course Type	Lecture
Hours per Week	2
Credits	3
Host Semester	
Examination	Written Exam
Location	Campus Offenburg

Lecturer(s):

Prof. Dr. Kreilos

Prerequisites:

Basic knowledge of mathematics for engineers, in particular complex numbers
Basic knowledge of communications engineering and signal theory
Basic knowledge in signal processing
Basic knowledge in high-frequency techniques but not strictly required

Objectives of the Course:

After attending this lecture, students will Know the syntax of C++.Understand the fundamental concepts of C++.Create C++ programs in astructured way.Apply a design-recipe for thecreation of functions and programs.Know the principles of object-oriented programming.Know basic object-oriented design patterns and choose theappropriate design-pattern for a task. Use an integrated development environment to write C++ programs. Create C++ programs that solve a given problem.Write classes in C++, including operator overloading, inheritance and use of polymorphic classes.Apply a design-recipe for the creation of functions and programs.Apply the principles of object-oriented programming.Choose the appropriate design-pattern for a task.

Contents:

Introduction to programming in C++
Classes and Objects
Relationships between classes: composition, aggregation, inheritance
Polymorphism
Abstract classes and interfaces
Unit Testing
Design Patterns in C++

Literature and Downloads:

- Bjarne Stroustrup ”Programming: Principles and Practice Using C++
- ”Lippman, Lajoie and Moo ”C++ Primer”
- Scott Meyers „Effective C++
- ”Scott Meyers „Effective Modern C++
- ”Gamma, Helm, Johnson, Vlissides: ”Design Patterns: Elements of Reusable Object-Oriented Software

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Object Orientated Software Development Lab	
Module ID	CME-05 /EMI401
Level	Master
Course Type	Lab
Hours per Week	2
Credits	2
Host Semester	
Examination	Lab Work
Location	Campus Offenburg

Lecturer(s):

Prof Dr Kreilos

Prerequisites:

Basic knowledge of mathematics for engineers, in particular complex numbers
Basic knowledge of communications engineering and signal theory
Basic knowledge in signal processing
Basic knowledge in high-frequency techniques but not strictly required

Objectives of the Course:

Contents:

The lab class is conducted in parallel to the lecture and supports anindependent in-depth study of the learning content. Students will write C++programs containing all concepts covered in the lecture.

Literature and Downloads:

- Bjarne Stroustrup ”Programming: Principles and Practice Using C++
- ”Lippman, Lajoie and Moo ”C++ Primer”
- Scott Meyers „Effective C++
- ”Scott Meyers „Effective Modern C++
- ”Gamma, Helm, Johnson, Vlissides: ”Design Patterns: Elements of Reusable Object-Oriented Software

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Object Oriented Modeling (UML)	
Module ID	CME-05 /EMI402
Level	Master
Course Type	Lecture
Hours per Week	2
Credits	3
Host Semester	
Examination	Written Exam
Location	Campus Offenburg

Lecturer(s):

Prof Dr Lauer

Prerequisites:

Objectives of the Course:

Contents:

1. Introduction
2. Object Oriented Analysis
2.1. Use Case
2.2. Class + Object
2.3. Activity
2.4. State
2.5. Sequence
2.6. Analysis Patterns
3. Object Oriented Design
3.1. Architecture
3.2. Package
3.3. Component
3.4. Design Patterns
3.5. Anti Patterns

Literature and Downloads:

- Brett D. McLaughlin; Gary Pollice; David West, Head first object-oriented analysis and design : [a brain-friendly guide to OOA@D], 2007
- Grady Booch, Object-oriented analysis and design with applications, 2007
- Martin Fowler: UML Distilled: A Brief Guide to the Standard Object Modeling Language, Addison-Wesley, 2004
- Bernd Oestereich, Analyse und Design mit der UML 2.5 : objektorientierte Softwareentwicklung, 2012
- Bernd Oestereich, Developing software with UML: Object-Oriented Analysis and Design in Practice, Addison-Wesley, 2001

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Parallel Computing	
Module ID	INFM-05 /EMI2112
Level	Master
Course Type	Lecture
Hours per Week	2
Credits	2
Host Semester	
Examination	Oral Exam
Location	Campus Offenburg
German name	Parallel Computing

Lecturer(s):

Prof. Dr. Lauer

Prerequisites:
Lecture and practical course Software Engineering 1
Lecture and practical course Enterprise Applications

Objectives of the Course:
Successful participants know the content of the IT architect profession and its role in companies.
They have mastered methods for organising complex software structures into manageable units.
Using samples and basic architectures, students will have acquired the skills to solve common problems when designing a system architecture.

Contents:
The lecture deals with parallel algorithms and their programming both on standard multi-core computers and on specialised hardware (GPUs). After deepening the basic knowledge of concurrent programming (multithreading), advanced synchronisation mechanisms are covered. Using various examples, participants are introduced to the theory and practice of parallel algorithms. The possibilities and limitations of accelerating programs through parallelisation will also be discussed.

Topics:
Parallelism and concurrency (hardware and software aspects)
Thread safety and synchronisation (competition and cooperation, race conditions, deadlocks, atomic operations, barriers, etc.)
Structure of (partially) parallelised applications: Tasks vs. threads, thread pools, executor framework, fork/join framework
Parallel computing models (PRAM architecture, SIMD vs. MIMD, memory models)
Parallel algorithms (array scan, merge sort, quicksort, edit distance, parallel maximum, parallel prefix sum, parallel merging)
Analysing parallel algorithms: Time complexity, processor complexity, work complexity, work optimality
Possibilities and limits of acceleration through parallelisation (Amdahl's law, Gustafson's law)
Massively parallel architectures and their programming using the example of GPUs (graphics cards)

Literature and Downloads:

- Oechsle, R., Parallele und verteilte Anwendungen in Java, 3. Auflage, Hanser 2011
- Goetz, B. et al., Java Concurrency in Practice, Addison-Wesley Longman, 2006

- Cook, S., CUDA Programming: A Developer's Guide to Parallel Computing with GPUs, Morgan Kaufman, 2012
- Kirk, D., Hwu, W., Programming Massively Parallel Processors, Morgan Kaufman, 2010

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Practical Work Parallel Computing	
Module ID	INFM-05 /EMI2113
Level	Master
Course Type	Lab
Hours per Week	2
Credits	3
Host Semester	
Examination	Lab Work
Location	Campus Offenburg
German name	Praktikum Parallel Computing

Lecturer(s):

Prof. Dr. Lauer

Prerequisites:

Objectives of the Course:

Contents:

Design and implementation of parallel algorithms and synchronisation mechanisms

- on standard hardware in a common programming language (Java)

- on special hardware (GPUs) using a specific parallel programming model (CUDA)

Literature and Downloads:

- Oechsle, R., Parallele und verteilte Anwendungen in Java, 3. Auflage, Hanser 2011
- Goetz, B. et al., Java Concurrency in Practice, Addison-Wesley Longman, 2006
- Cook, S., CUDA Programming: A Developer's Guide to Parallel Computing with GPUs, Morgan Kaufman, 2012
- Kirk, D., Hwu, W., Programming Massively Parallel Processors, Morgan Kaufman, 2010

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Methods and Applications of Artificial Intelligence	
Module ID	EIM-19 / EM2257
Level	Master
Course Type	Lecture
Hours per Week	2
Credits	3
Host Semester	
Examination	Written Exam
Location	Campus Offenburg
German name	Methoden und Anwendungen der Künstlichen Intelligenz

Lecturer(s):

Prof. Dr. Christian Reich

Prerequisites:
Mathematical basics of linear algebra (especially matrix and vector calculus), probability calculus and, at best, numerical methods.
Experience in at least one programming language (preferably Python, alternatively Matlab or C/C++).
Lectures in the field of signal processing and/or information theory

Objectives of the Course:
Familiarisation with and application of basic methods and fields of application in the field of artificial intelligence.

Contents:
Familiarisation with basic methods (e.g. artificial neural networks) and applications (e.g. image processing and processing of sensor data) of artificial intelligence and data analysis.

Literature and Downloads:

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Artificial Intelligence Lab	
Module ID	EIM-19 / EMI2258
Level	Master
Course Type	Lab
Hours per Week	2
Credits	2
Host Semester	
Examination	Lab Work
Location	Campus Offenburg
German name	Labor Künstliche Intelligenz

Lecturer(s):

Prof. Dr. Christian Reich

Prerequisites:
Mathematical basics of linear algebra (especially matrix and vector calculus), probability calculus and, at best, numerical methods.
Experience in at least one programming language (preferably Python, alternatively Matlab or C/C++).
Lectures in the field of signal processing and/or information theory

Objectives of the Course:
Familiarisation with and application of basic methods and fields of application in the field of artificial intelligence.

Contents:
Apply basic methods (e.g. artificial neural networks) and applications (e.g. image processing and processing of sensor data) of artificial intelligence and data analysis.

Literature and Downloads:

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Language Technologies and Compilers	
Module ID	INFM-01 / EMI2128
Level	Master
Course Type	Lecture
Hours per Week	2
Credits	2
Host Semester	
Examination	Oral Exam
Location	Campus Offenburg
German name	Sprachtechnologien und Compiler

Lecturer(s):

Prof. Dr. Wehr

Prerequisites:

Programming skills in Java

Objectives of the Course:

Successful participants will be able to

- assess the possibilities and limitations of the AI approaches covered
- apply the AI approaches covered to practical research tasks
- prepare the results of their research work in writing for a specialist audience

Contents:

Literature and Downloads:

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Language Technologies and Compilers Lab	
Module ID	INFM-01 / EMI2129
Level	Master
Course Type	Lab
Hours per Week	2
Credits	3
Host Semester	
Examination	Lab Work
Location	Campus Offenburg
German name	Praktikum Sprachtechnologien und Compiler

Lecturer(s):

Prof. Dr. Wehr

Prerequisites:

Programming skills in Java

Objectives of the Course:

Successful participants will be able to

- assess the possibilities and limitations of the AI approaches covered
- apply the AI approaches covered to practical research tasks
- prepare the results of their research work in writing for a specialist audience

Contents:

Literature and Downloads:

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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

Winter Semester	Summer Semester	Course Name	Course Type	Credits	Exam Type
x		Anonymity and Surveillance	Lecture	4	Written Exam
x		Anonymity and Surveillance	Seminar	2	Project Work
	x	Data Analysis for Risk and Security Management	Lecture	6	Written Exam
	x	Data Mining	Lecture	3	Written Exam
	x	Data Mining Lab	Lab	3	Report
	x	Database Systems	Lecture	2	Written Exam
	x	Database Systems Lab	Lab	1	Lab Work
x		Ethics		3	Presentation
	x	Interactive Distributed Applications	Lecture + Lab	5	Written Exam
x		Law		3	Written Exam
x		Media Ethics + Media Aesthetics Lab[4]	Seminar + Lab	5	Presentation, practical work + Lab Work
	x	Mobile Security	Lecture	3	Written Exam
	x	Mobile Security Lab	Lab	3	Report
x		Multimedia Databases[5]	Lecture	2	Written Exam
x		Next Generation Internet	Lecture	3	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		Strategic Risk and Crisis Management	Lecture + Seminar	6	Presentation + Project Work

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[4] The modules “Intercultural Media Design” and “Intercultural Media Design Lab” are no longer offered and have been replaced by the modules “Media Ethics” and “Media Aesthetics Lab” from winter term 2024/2025 on.

[5] The modules “Multimedia Databases” and “Next Generation Internet” share an exam and must be taken together in the same semester.

Anonymity and Surveillance	
Module ID	ENITS-04/ M1105
Level	Master
Course Type	Lecture
Hours per Week	2
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; (htps://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	
Module ID	ENITS-04/ M1106
Level	Master
Course Type	Seminar
Hours per Week	2
Credits	2
Host Semester	ENITS
Examination	Project Work
Location	Campus Offenburg

Lecturer(s): Prof. Dr. Daniel Hammer

Prerequisites:

Computer networks and network security, Applied Crypt- Analysis

Objectives of the Course:

Contents:

- Impact of anonymous Internet usage

Literature and Downloads:

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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	4
Credits	6
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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Database Systems	
Module ID	CME-09/ M+I401
Level	Master
Course Type	Lecture
Hours per Week	2
Credits	2
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-09/ 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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Ethics and 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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Interactive Distributed Applications	
Module ID:	CME-08/ M400 & M406
Level:	Master
Course Type:	Lecture + Lab
Semester Hours per Week:	5
Credits:	5
Host Semester:	CME3
Examination:	Written Exam, Lab Work
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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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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Media Ethics/Media Aesthetics Lab	
Module ID	CME-03/M403 & M404
Level	Master
Course Type	Seminar + Lab
Hours per Week	4
Credits	5 ECTS
Examination	Presentation and practical work/Lab work
Location	Campus Offenburg

Lecturer(s):

Prerequisites:

Objectives and Competences:

Contents:

Literature and Downloads:

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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 Databases	
Module ID	CME-13/ M405
Level	Master
Course Type	Lecture
Hours per Week	2
Credits	2
Host Semester	CME3
Examination	Written Examination
Location	Campus Offenburg

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

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.

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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- 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-13/M408
Level	Master
Course Type	Lecture
Hours per Week	2
Credits	3
Host Semester	CME3
Examination	Written Exam
Location	Campus Offenburg

Please note: This course must be taken together with the other component of module CME-13: "Multimedia Databases".

Lecturer(s):

Prof. Dr. Schmidt

Prerequisites:

Objectives of the Course:

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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Strategic Risk and Crisis Management	
Module ID	ENITS-07
Level	Master
Course Type	Seminar
Hours per Week	4
Credits	6
Examination	Written exam, presentation + project work
Location	Campus Offenburg

Lecturer(s):

Prof. Dr. Dirk Drechsler

Prerequisites:

Recommended knowledge and courses:

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

Objectives and Competences:

Risk and security management in terms of quality and quantity is becoming more important with increasing digitalization on the one hand and acute threats to the global security situation on the other hand.
After successful participation in the course students will 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:

Literature and Downloads:

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3.4 Department of Mechanical and Process Engineering

Course List Master in Renewable Energy and Data Engineering

Winter Semester	Summer Semester	Course Name	Course Type	Credits	Exam Type
x		Database Systems	Lecture + Lab	2	Term Paper + Presentation
x		Energy Data Engineering 1	Lecture + Lab	4	Term Paper + Presentation
	x	Energy Data Engineering 2	Lecture + Lab	4	Term Paper + Presentation
x		Energy Economics	Lecture + Practical Work	4	Oral Exam + Term Paper
x		Battery and Hydrogen Technologies	Lecture + Lab	4	Written Exam
	x	Energy Usage in Industrial Processes	Lecture + Seminar	4	Written Exam
	x	Grid Operation, Analysis, Planning and Communication	Lecture + Lab	4	Written Exam+ Lab Work
x		Industrial Energy Management	Lecture	2	Written Exam
	x	Operations Research in Energy Economics	Lecture	4	Written Exam
x		Power Plants and Power Systems with Lab	Lecture + Lab	6	Written Exam
	x	Renewable Energy Systems	Lecture + Lab	4	
x		Solar Technologies[6]	Lecture	4	Written Exam

Course List Master in Process Engineering and Master in Biotechnology

Winter Semester	Summer Semester	Course Name	Course Type	Credits	Exam Type
x	x	German Culture and Society	Lecture	3	Term Paper
x		Multiphase Flows (MPE-13)	Lecture	2	Written Exam
x		Regulatory Affairs and Safety in Biotechnology (MBT-12)	Lecture	2	Written Exam
x		Process Control Engineering (MBT-12)	Lecture	2	Written Exam
x		Biotechnical Conversion Processes (MBT-13)	Lecture	2	Written Exam
x		Biobased Industries (MBT-13)	Lecture	2	Written Exam
x		Bioperspectives and Bioethics (MBT-14)	Lecture	2	Written Exam
x		Tools to manage Environmental Affairs	Lecture + Lab	3	Lab Work

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[6] This module does not take place in the winter semester 26/27!

Database Systems	
Module ID	RED-04
Level	Master
Course Type	Lecture + Lab
Hours per Week	2
Credits	2
Examination	Term Paper + Project
Location	Campus Offenburg

Lecturer(s):
Jörg Bausch

Prerequisites:
Basic programming knowledge, statistics

Objectives and Competences:

Successful participants:

- Have acquired knowledge about various database technologies,
- Master the database language SQL and understand the design philosophy.
- They can abstractly model databases and implement them into the relational model while adhering to recognized quality criteria.
- Are familiar with the common interfaces between databases and programming languages
- and they are able to handle timeseries databases

Contents:

- Relational database technologies and products
- Data modeling (ER model and Relational database model)
- Normal forms
- Structured Query Language (SQL)
- Data Control/Definition/Manipulation Language
- Transactions
- Interfaces to database systems
- Time series database systems (basics)

Literature and Downloads:

Elvis C. Foster; Shripad Godbole (2016): Database Systems: A Pragmatic
Approach, ISBN-13 (pbk): 978-1-4842-1192-2, ISBN-13 (electronic): 978-1-4842-1191-5, DOI 10.1007/978-1 4842-1191-5
Shefali Naik (2014); Concepts of database management system; Delhi : Pearson; ISBN 9789332537231, 9332537232; Nummer 1892760444 (K10Plus-Nummer)
Mike Fleckenstein, Lorraine Fellows (2018): Modern Data Strategy; Springer International Publishing AG; Druck ISBN 9783319689920, E-Book ISBN 9783319689937
Saake, Gunter; Heuer, Andreas; Sattler, Kai-Uwe (2018): Datenbanken – Konzepte und Sprachen. 6. Aufl. Frechen: mitp.
Elmasri, Ramez A.; Navathe, Shamkant B.; Shafir, Angelika (2011): Grundlagen von Datenbanksystemen. Bachelorausg., 3., aktualisierte Aufl., [Nachdr.]. München: Pearson Studium (IT - Informatik).

Kemper, Alfons Heinrich; Eickler, André (2015): Datenbanksysteme. Eine Einführung. 10., erweiterte und aktualisierte Auflage. Berlin, Boston: De Gruyter Studium.

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Energy Data Engineering 1	
Module ID	RED-04/M+V3049
Level	Master
Course Type	Lecture + Lab
Hours per Week	4
Credits	4
Examination	Term Paper + Presentation
Location	Campus Offenburg

Lecturer(s):

Prof. Dr. Manuel Lämmle

Prerequisites:

Objectives of the Course:

Contents:

- Data Mining Terminology and concepts
- Data Mining process models
- Exploratory Data Analysis
- Descriptive Statistics
- Classification and Regression Models (Decision Trees, Random Forest, K-nearest neighbours, Naive Bayes, ...)
- Model Evaluation and Comparison
- Clustering
- Linear Regression
- Time Series Analysis

Literature and Downloads:

- Reddy, T. Agami, Applied data analysis and modeling for energy engineers and scientists; Springer Science & Business Media, 2011
- Witten, I. H. and Hall, M. A., Data mining: Practical machine learning tools and techniques, 3rd ed. Burlington, MA: Morgan Kaufmann, 2011
- Han, J., Kamber, M., and Pei, J., Data Mining: Concepts and Techniques, 3rd ed. Burlington: Elsevier Science, 2011
- Hastie, T., Tibshirani, R., and Friedman, J. H., The elements of statistical learning: Data mining, inference, and prediction, 2nd ed. Springer series in statistics. New York: Springer, 2009
- Alpaydın, E., Maschinelles Lernen. München: Oldenbourg, 2008.

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Energy Economics	
Module ID	RED-03
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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Battery and Hydrogen Technologies	
Module ID	RED-01/M+V2053
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 battery and hydrogen technologies for energy conversion, storage and transport. They have a specifically high understanding of lithium-ion batteries, polymer electrolyte membrane fuel cells, and alkaline electrolysers. On the fundamental level, they know the thermodynamic and kinetic working principles of electrochemical cells as well as the physical properties of hydrogen as chemical energy carrier. On the technology level, the students know the setup and design principles of different energy storage systems, including their properties in terms of efficiency, durability and energy density. 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 and sustainability of energy storage technologies and understand the future trends in research and development.

Contents:

1. Introduction and history: Why energy storage? / Classification of energy storage technologies / History / Electrochemical energy storage and conversion
2. Battery technology: Overview and properties of batteries / Lithium-ion battery technology / Battery system technology
3. Hydrogen, electrolysers and fuel cells: Hydrogen as energy carrier / Overview and properties of fuel cells and electrolysers / Alkaline water electrolysis / Polymer electrolyte membrane fuel cell
4. Stationary applications: Backup power / Renewable energy storage / Industry-scale storage / Grid-scale storage / Power-to-X, electro fuels and hydrogen economy
5. Mobile applications: Past, present and future of electric vehicles / Electric vehicle technologies / Sustainability / Vehicle-to-grid

Literature and Downloads:

Wolfgang Bessler, *Lecture notes*

Reiner Korthauer, *Lithium-ion batteries: Basics and applications, Springer 2018*

Ryan O'Hayre, Suk-Won Cha, Whitney Colella, Fritz B. Prinz, *Fuel cell fundamentals, Wiley 2016*

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Energy Usage in Industrial Processes	
Module ID	RED-02
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): TBD

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	
Level	Bachelor and Master
Course Type	Lecture
Hours per Week	2
Credits	3
Examination	Oral Exam
Location	Campus Offenburg

Lecturer(s):

Mr. Brian Emard

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 Operation, Analysis, Planning and Communication	
Module ID	RED-05/M+V3052
Level	Master
Course Type	Lecture and Lab
Hours per Week	4
Credits	4
Examination	Written Exam + Lab Work
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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Industrial Energy Management	
Module ID	RED-07
Level	Master
Course Type	Lecture
Hours per Week	
Credits	2
Examination	Written Exam
Location	Campus Offenburg

Lecturer(s):

Prof. Dr. Jürgen Joseph

Prerequisites:

Objectives and Competences:

Students shall get an overview of Energy use and requirements for energy in industry

Contents:

- Introduction to Energy market and Energy Consulting in Germany - Topics, Demand, Practical Examples
- Costs of energy in Germany and Europe, Energy Management Systems (ISO 50001, Energy audits…), Demand Side Management
- Electricity production in Europe, European power markets, price development and price building (taxes and levies), merit order principle, energy transition (solar, wind, geothermal),
- Natural gas in Europe, European gas exchanges, price development and price building (taxes and levies), energy transition (green gas, hydrogen)
- Procurement strategies for different types of companies, PPAs Corporate Social Responsibility Directive CSRD, Corporate Carbon Footprint, Product carbon footprint, German and European Sustainability Goals
- Q + A

Literature and Downloads:

Paper / slides from lecturer

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Operations Research in Energy Economics	
Module ID	RED-03/M+V3038
Level	Master
Course Type	Lecture
Hours per Week	4
Credits	4
Examination	Written Exam
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 Plants and Power Systems	
Module ID	RED-01
Level	Master
Course Type	Lecture and Lab
Hours per Week	6
Credits	6
Examination	Written Exam 90 minutes and practical work
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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Renewable Energy Systems	
Module ID	RED-02/EMI2602
Level	Master
Course Type	Lecture and Lab
Hours per Week	4
Credits	4
Examination	Written Exam 90 minutes Lab Work
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-05
Level	Master
Course Type	Lecture
Hours per Week	4
Credits	4
Examination	Written Exam
Location	Campus Offenburg

PLEASE NOTE THAT THIS LECTURE DOES NOT TAKE PLACE IN THE WINTER SEMESTER 26/27.

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

Lecturer(s): Mr Winklbauer

Prerequisites:

Objectives of the Course:

Students understand the environmental management requirements of running a facility in modern industrialized societies. The students get to know examples of how the management of the environmental legal compliance, the environmental performance, the environmental risks , the effects on biodiversity and the environmental communication with stakeholders can be implemented in practice.

Type of course, didactics:

Seminar, presentations and essays (topics handed out at beginning of term)

Contents:

- Developing the basic attitude, skills and principles of operation, result orientated and activity-based indicators to manage environmental affairs, Initiatives and standards
- Managing legal compliance with indicators, threshold compliance with indicators and statutory requirement compliance with indicators
- Environmental risk assessment and ecological evaluation, assessment of production sites, with examples
- Developing a risk assessment questionnaire and an indicator out of it
- Ecology: Evaluation of production sites, influences on ecosystems, biodiversity management, eco account, environmental benchmarking, environmental policy and strategy, enhancement of environmental performance
- Communication: Regular, external and internal; tools, in case of accident, obtain and convert a permit, realization of industrial projects, lobbying

Literature:

- W. Nobel, R. Kostka-Rick, K. Müller, W. Winkelbauer: Biomonitoring im Rahmen der Ökosystembewertung eines Automobil-Produktionsstandortes. Teil 1: Konzeption, Biomonitoring von Lacklösemittel-Immissionen mit Höheren Pflanzen Biomonitoring as a part of an ecological assessment of a automotive manufacturing site.Part 1: Biomonitoring effects of airborne organic solvents using higher plants; Gefahrstoffe - Reinhaltung der Luft;, 2010 vol. 9, pp. 384-398
- W. Nobel, R. Kostka-Rick, K. Müller, W. Winkelbauer: Biomonitoring im Rahmen der Ökosystembewertung eines Automobil-Produktionsstandortes. Teil 2: Erfassung der

Metallanreicherung mit Standardisierten Graskulturen; Part 2: Metal accumulation in standardized grass exposure; Gefahrstoffe - Reinhaltung der Luft;, 2010 vol. 9, pp. 384-398

- H. Bartholmeß, K. Müller, W. Nobel, W. Winkelbauer; Biomonitoring im Rahmen der Ökosystembewertung eines Automobil-Produktionsstandortes. Teil 3: Dokumentation der Luftgüte mit Flechtenkar-tierungen und Messung des Stickstoffeintrages mit Hilfe von Passivsamm-lern; Biomonitoring as a part of an ecological assessment of an automotive man-ufacturing site. Part 3: Documentation of air quality with lichen mappings and measure-ments of the nitrogen impact with diffusive samplers; Gefahrstoffe - Reinhaltung der Luft;, 2011 vol. 7/8, pp. 339-346
- • J. Nielinger, W.-J. Kost , W.Nobel,K. Müller, W. Winkelbauer; Teil 4: Mikro- und lokalklimatische Untersuchung Wirkung und Einflussnahme auf das Umfeld; Biomonitoring as a part of an ecological assessment of a automotive manufacturing site. Part 4: Research into micro- and local climate, effect and influence on surroundings; ; Gefahrstoffe - Reinhaltung der Luft;, 2012 vol. 4, pp. 124-129
- •
- Baumbach, G.; Göttlicher, R.; Winkelbauer, W.: Einfluss von Inversionen auf die Schadgasverteilung über einer Kleinstadt im Naturpark Schönbuch (The influence of inversions on the gaseous pollutants dispersion above a small town at the Schönbuch Nature Park); Staub, Reinhaltung der Luft; no. 44, 1985 vol. 7/8, pp. 365-368
- Stomeyer, S.A.; Winkelbauer, W. et al: Dichlormethane utilized by an anaerobic mixed culture - acetogenesis and methanogenesis; Biodegradation vol. 2, 1991, pp. 129-137; abstract: www.ncbi.nlm.nih.gov/pubmed/1368154
- Kärst, H.; Winkelbauer, W.: Das Abfallwirtschaftskonzept Rastatt - Auswahl und Zusammenarbeit mit externen und internen Partnern …; Umweltwirtschaftsforum vol. 8/2, pp.16-20
- Kostka-Rick, R.; Winkelbauer, W. et al: Biomonitoring im Rahmen der Ökosystembewertung eines Automobil-Produktionsstandorts, parts 1 to 4; Gefahrstoffe Reinhaltung der Luft; no. 70, 2010 vol. 9, 2010, pp. 384-389;
- no. 71, 2011 vol. 5, pp. 231-238; no. 71, 2011 vol. 7/8, pp. 339-346, and no. 72, 2012 vol. 4, pp. 127-130
- Kahlo, T.: Lüderitz, V.; Winkelbauer, W.; Müller, K.: Entwicklung und Umsetzung einer Methode zur Erst- und Wiederholungsbewertung der Umweltauswirkungen eines Automobilstandortes; Wasser und Abfall, 2010 vol. 11, pp. 38-42

Downloads:

- Federal Immission Control Act (Bundes-Immissionsschutzgesetz, BImSchG), sections 53 to 58d:
- German Law Archive, http://germanlawarchive.iuscomp.org/?p=315 (in English)
- Federal Water Act (Wasserhaushaltsgesetz, WHG), sections 64 to 66;
- German Law Archive, http://germanlawarchive.iuscomp.org/?p=326 (in English)
- Closed Substance Cycle Waste Management Act (Kreislaufwirtschafts- und Abfallgesetz, KrW-/AbfG),
- sections 54 and 55; German Law Archive, http://germanlawarchive.iuscomp.org/?p=303 (in English)
- Global Reporting Initiative, GRI: www.globalreporting.org/standards/Pages/default.aspx
- European Integration Pollution Prevention Control Bureau, EIPPCB: http://eippcb.jrc.ec.europa.eu/reference
- International Organization for Standardization, ISO: www.iso.org/iso/home.html, https://en.wikipedia.org/wiki/International_Organization_for_Standardization

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The Language Center ("Sprachenzentrum") at Offenburg University provides a range of language modules every semester, both for credits and as extracurricular modules. Our offer typically includes:

- Specialised English language classes
- German language classes (complete beginners (A1) to advanced (C1))
- French, Spanish, Polish and Japanese.
- A cultural studies module taught in English, German Culture and Society, which is open to students from all disciplines and levels.

The levels offered for French, Spanish and Japanese can differ, but usually include beginners' modules. Polish is always offered as a beginners' module. Some classes are put on for specific degree courses, which is indicated in the "Degree Course" column. Exchange students should please enquire beforehand if they can join them. The email of the Language Center is sprachenzentrum@hs-offenburg.de .

The proficiency levels behind the names of

- **English modules** denote the **entry** requirement, i.e. for most modules, students should have an existing B2 or C1 level in English. For example, if you have an existing B2 level, you should join a B2 module.
- **All other language** modules denote the expected **outcome** proficiency, i.e. if you are a beginner in German, French or Spanish, choose the lowest level, otherwise choose the level that continues from your existing proficiency, e.g. if you have an existing A2 level in German, choose German B1.1 as your module.

You can change levels in the beginning of the term.

"Blockkurs" – This is a compact and intensive module that covers the same content as a semester-long module, but in a shorter time frame of one or two weeks with classes every day. Due to the registration process and the application times, usually only exchange students who stay a complete academic year can join these "Blockkurs" modules in February and/or March. Modules in February are allocated to the autumn term and modules in March are allocated to the summer term.

The most current list of the modules as well as descriptions are on the webpage of the Language Centre: Language Center: Hochschule Offenburg (hs-offenburg.de)

ECTS TABLE FOR LANGUAGE COURSES

All language modules follow the same format of either 2 hours per week and 3 ECTS or 4 hours per week and 5 ECTS.

Please note that **attendance in language modules is compulsory.** Examinations usually include an oral and a written exam, which a few exceptions. You will receive all necessary information at the beginning of the module.

Module	Hours per week (SWS)	Corresponding ECTS
Any language	2	3
Any language	4	5

HOCH SCHULE OFFEN BURG

Language modules

WINTERSEMESTER 2026/2027

More current Information can be found on our Website.

English (Campus Offenburg)	***Hours per week***	***Degree course***	***Teacher***	***Time***	***Room***	***Exam***
Advanced English C1	2	alle	David Potter	WED 14:00	A111	K60+oral exam
Technisches Englisch B2	2	alle	Ingrid Graham	WED 15:45	A111	K60+oral exam
Technisches Englisch B2	2	UT	Kevin Parr	FRI 8:00	A111	Presentation
German Culture and Society	2	all	Brian Emard	WED or THU (TBD)	A111	Presentation

English (Campus Gengenbach)	***Hours per week***	***Degree course***	***Teacher***	***Time***	***Room***	***Exam***
Business English B2 For BW	4	BW1 / Group A	Emilia Ippolito	FRI 09:45+11:35	GK2.03	1050 PA+Presentation
Business English B2 For BW	4	BW1 / Group B	Philippa Dart-Cleiß	FRI 09:45+11:35	GK1.09	1050 PA+Presentation
Business English B2 For BW	4	BW1 / Group C	David Potter	FRI 09:45+11:35	GK1.10	1050 PA+Presentation

Business English B2 for IML	4	IML3/ Gruppe A	Kevin Parr	WED 09:45 + 11:35	TBD	5
Business English B2 for IML	4	IML3/ Gruppe B	Philippa Dart-Cleiß	WED 09:45 + 11.35	GK1.09	5
Business English B2	2	Bachelor WI,WIN,WP	Philippa Dart-Cleiß	WED 14:00	GK2.03	7260/7160/7030/ Practical Work

French (Campus Offenburg)	***Hours per week***	***Degree course***	***Teacher***	***Time***	***Room***	
French A1.1	2	all	Marie-Ch. Nicaud	TUE 14:00	A111	K60+oral exam
French A2.1	2	all	Marie-Ch. Nicaud	TUE 15:45	A111	K60+oral exam

Spanish (Campus Offenburg)	***Hours per week***	***Degree course***	***Teacher***	***Time***	***Room***	
Spanish A1.1	2	all	Bolaños Carrasco, Patricia	TUE 14:00	A112	K60+oral exam
Spanish A2.1	2	all	Bolaños Carrasco, Patricia	TUE 15:45	A112	K60+oral exam
new Business Spanish B1	2	all	Bolaños Carrasco, Patricia	WED 14:00	E412	K60+oral exam

German *(Campus Offenburg)*	***Hours per week***	***Degree course***	***Teacher***	***Time***		
German A1.1	4	all	Anika Meckesheimer	WED 14:00+15:45	E311	K90+oral exam
German A1.2	4	all		WED 14:00+15:45	A112	K90+oral exam
German A2.1	4	all	Christiane Mielke	WED 14:00+15:45	A301	K90+oral exam
German A2.2	4	all	Katarzyna Breuer	WED 14:00+15:45	A310	K90+oral exam
German B1.1	4	all	Julia Almert	WED 14:00+15:45	A111	K90+oral exam
German B2.1	4	all	Christine Maurer	WED 14:00+15:45	A111a	K90+oral exam
German B2.2	4	all	Lina Pelz	WED 14:00+15:45	A311	K90+oral exam
German C1.1	4	all	Birgitta Fruttiger	WED 14:00+15:45		K90+oral exam

German (Campus Gengenbach)	***Hours per week***	***Degree course***	***Teacher***	***Time***		
German Language I (A1.1)	4	IBC	Susanne Ramm-Weber	TUE 11:35+14:00		K90+oral exam
German Language III (A2.1)	4	IBC	Lina Pelz	MON 14:00+15:45		K90+oral exam
German Language V (B1.1)	4	IBC	Julia Almert	TUE 11:35 + 14:00		K90+oral exam

Other languages (Campus Offenburg)	***Hours per week***	***Degree course***	***Teacher***	***Time***		
Japanese I	2	all	Nanami Kanosue	Blockkurs 21.09.-26.09.2026; 9:00-14:30		K60
Japanese II	2	all	Nanami Kanosue	Blockkurs 15.02.2027-20.02.2027; 9:00-14:30		K60
Chinese I	2	all	Chengqi Song	FRI 11:35	A111	K60
Polish A1.1	2	all	Katarzyna Breuer	FRI 11:35	A111	3

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SUMMER TERM 2027

At the time of publication, the program is not complete. We typically offer:

- English-language classes at B2 level for students in technical or business degrees,
- German Classes from A1 to C1,
- select courses in Japanese, Chinese, French, Spanish and Polish, primarily at beginner and intermediate levels.

Please enquire beforehand if you have any specific questions or requirements.

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