Technik
Hauptcampus

HOCHSCHULE TRIER

Module manual for the course Master Interdisciplinary Engineering

Examination regulations 2021

Version 01.00.SoSe2026

23.03.2026

Technik
Hauptcampus

HOCHSCHULE TRIER

Abbreviations

BM	Basic module
CEM	Compulsatory elective module
RM	Required module

Explanations

Basic module	In the Master's degree programme in Electrical Engineering, basic modules must be selected and completed in accordance with the respective examination or subject examination regulations.
Compulsatory elective module	Depending on the degree programme, examinations must be taken in one or more compulsory elective modules. The compulsory elective modules must be selected from the current catalogue of compulsory elective modules.
Required module	Compulsory elective modules must be successfully completed to obtain a degree in a degree programme.

Technik
Hauptcampus

HOCHSCHULE TRIER

General notes

- The timing of the modules can be found in the annexes of the examination regulations or the subject examination regulations.
- The overall grade is calculated in accordance with the examination regulations or subject examination regulations.
- If several alternative exam performances, depending on the number of participants, are specified for a module, the current exam performance for the semester will be announced at the beginning of the course. These are indicated by additions in brackets with reference to the number of participants. In all other cases in which several exam performances are specified for a module, these must be taken in order to successfully pass the module.
- The requirement for the awarding of ECTS credits is the successful completion of the listed exam and study performances. If a module consists of two courses (e.g. a laboratory with the courses Partial Laboratory 1 and Partial Laboratory 2), the ECTS credits shown in the respective courses are not awarded individually, but the sum of the ECTS credits of the associated courses is only awarded when the complete module is passed.
- The examination regulations or subject examination regulations in the currently valid version are legally binding.

Modulliste Kerndisziplin und ergänzende Disziplin im Studiengang Master Interdisziplinäre Ingenieurwissenschaften (Stand: 2026-03-17)

Modulname in deutscher Sprache	module name in english	Lehrsprache D=Deutsch Teaching language D=German	gewählte Vertiefung/Kerndisziplin area of specialisation/core discipline						Brücken-modul	Semester-angabe Semester	Fachbereich Fachrichtung Department	Studienleistung Prüfungsvor-leistung Study performance	Modulverantwortlicher Responsible for the module
Deutsch German	Englisch English	Lehrsprache E=Englisch Teaching language E=english	ET	MB	FZT	MT	GVE	WI	BM	Semester WS/SS	FB FR Department	Studienleistung (SL) Prüfungsvorleistung (PVL) keine none	Name Name
Statistik (M)	Statistics (M)	D	E	E	E	K	E	K		WS	Tech	keine	Bär
Unternehmensökonomik	Operations Research (M)	D	E	E	E	E	E	K		WS	Tech	keine	Kirsten
Qualität und Zuverlässigkeit I	Quality and Reliability I (M)	D	E	E	E	K	E	K		SS	Tech	keine	Bär
Qualität und Zuverlässigkeit II	Quality and Reliability II (M)	D	E	E	E	K	E	K		SS	Tech	keine	Kontermann
Höh. Maschinenelemente	Higher Machine Elements (M)	D	E	K	E	E	E	E		SS	Tech	2 SL	Bossong
Netzintegration Erneuerbarer Energien **)	Electrical Grid Integration of Renewable Energies	D	E	E	E	E	K	E		WS	GVE *)	keine	Bühler
German as foreign language	German as foreign language	D	K	K	K	K	K	K		SS and WS	Tech	keine	Feili
Elektromagnetische Wellen	Electromagnetic waves	D	K	E	E	E	E	E		SS	Tech	keine	Diewald
Wasserstofftechnik	Hydrogen technology	D	E	E	E	E	K	E		SS	GVE *)	keine	Döring
Entrepreneurship	Entrepreneurship	E	E	E	E	E	E	K		SS	Tech	keine	Kontermann, Horn
Deep Learning	Deep Learning	E	K	E	K	K	E	E		WS	Tech	keine	Haffner
Thermodynamik	Thermodynamics (M)	D	E	K	E	E	E	E		WS	Tech	keine	Heinrich
Verbrennungsmotoren I	Internal combustion engines I (M)	D	E	K	K	E	E	E		WS	Tech	keine	Heinrich
Verbrennungsmotoren II	Internal combustion engines II (M)	D	E	K	K	E	E	E		SS	Tech	keine	Heinrich
Wissenschaftliche Methodik	Scientific methods (M)	D	K	K	K	K	K	K		WS	Tech	keine	Heinrich
Werkzeugmaschinen und Produktionsanlagen I	Machine Tools and Production Equipment I (M)	D	E	K	E	E	E	E		WS	Tech	keine	Hofmann-von Kap-herr
Werkzeugmaschinen und Produktionsanlagen II	Machine Tools and Production Equipment II (M)	D	E	K	E	E	E	E		SS	Tech	keine	Hofmann-von Kap-herr
Moderne elektrische Antriebe	Modern electrical drives	D	K	E	E	E	E	E		SS	Tech	keine	Reiland
Gebäude- und Anlagensimulation **)	Building and Plant Simulation	D	E	E	E	E	K	E		SS or WS	GVE *)		Jonas
Neural Interfaces	Neural Interfaces	D und E/D and E	K	E	E	K	E	E		WS	Tech	keine	Koch
~~Electronic Engine Management Systems~~	~~Electronic Engine Managment Systems~~	~~E~~	~~E~~	~~E~~	~~E~~	~~E~~	~~E~~	~~E~~		~~WS~~	~~extern *)~~	~~keine~~	~~König, Vaikumar, HITS~~
Vehicle Dynamics	Vehicle Dynamics	E	E	K	K	E	E	E		SS	extern ***)	keine	König, Ramanthan, HITS
Fahrzeugsicherheit	Vehicle Safety	D und E/D and E	E	K	K	K	E	E		WS	Tech	PVL	König, P.
Strömungslehre (M)	Fluid mechanics (M)	D	E	K	E	E	E	E		SS	Tech	keine	König, S.
Turbomaschinen (M)	Turbomachinery (M)	E	E	K	K	E	E	E		WS	Tech	SL	König, S.
Advanced Cognitive Robotics	Advanced Cognitive Robotics	E	K	E	E	E	E	E		SS or WS	Tech	SL	Lücken
Energie- und Klimamanagement **)	Energy and Climate Management	D	E	E	E	E	K	E		SS	GVE *)	keine	Neumeister
Kraftwerke - Funktion, Simulation, Optimierung **)	Power plants - function, simulation, optimization	D	E	E	E	E	K	E		SS	GVE *)	keine	Neumeister
Energieeffizienz in der Industrie **)	Energy efficiency in industry	D	E	E	E	E	K	E		SS	GVE *)		Neumeister
Industrielle Dekarbonisierung **)	Industrial decarbonization	D	E	E	E	E	K	E		WS	GVE *)	keine	Neumeister
Biomechanical Systems	Biomechanical Systems	D und E/D and E	E	E	E	K	E	E		SS	Tech	keine	Lee
International Marketing	International Marketing	E	E	E	E	E	E	K		SS	WI *)	keine	Kirsten
Programmierung von ERP-Systemen am Beispiel von SAP	Programming of ERP systems using SAP	D und E/D and E	E	E	E	E	E	K		SS	Tech	SL	Rudolph
Modellbasierte optimale Zustandsschätzung	Model-Based Optimal Estimation	D und E/D and E	K	E	E	K	E	E		SS	Tech	keine	Scherer
CAE/Projektmanagement I (M)	CAE/Project Management I (M)	D und E/D and E	E	K	E	E	E	E		SS	Tech	PVL	Schuth
CAE/Projektmanagement II (M)	CAE/Project Management II (M)	D und E/D and E	E	K	E	E	E	E		WS	Tech	keine	Schuth
Optische Messtechnik (M)	Optical metrology (M)	E	E	K	K	E	E	E		SS	Tech	keine	Schuth
Technisches Messen	Technical measurement (M)	D	E	K	E	E	E	E		WS	Tech	keine	Schuth
Singalverarbeitung	Digital Signal Processing	D	K	E	E	E	E	E		SS	Tech	keine	Seidenberg
German Accounting	German Accounting	E	E	E	E	E	E	K		SS	Tech	keine	Kirsten
Wettbewerb u. Innovation	Competition and Innovation (M)	D	E	E	E	E	E	K		SS	Tech	keine	Kirsten
Fertigungstechnik (M)	Manufacturing Processes and their Application (M)	D	E	K	E	E	E	E		WS	Tech	PVL	Wittmann
Finite Elemente Methode (M)	Finite elements method (M)	E	E	K	K	E	E	E		SS	Tech	keine	Kontermann
Schwingungstechnik (M)	Vibration Technology (M)	D	E	K	K	E	E	E		WS	Tech	keine	Wohlers
Energieeffi. Fahrzeuge	Energy-efficient vehicles (M)	D	E	E	K	E	E	E		SS	Tech	keine	Dräger
Fahrzeugantriebe u. Fahrwerke (M)	Vehicle Drivelines and Chassis Technology (M)	D	E	E	K	E	E	E		SS	Tech	keine	Dräger
Verkehrssysteme (M)	Traffic Systems (M)	D und E/D and E	E	E	K	E	E	E		WS	Tech	keine	Dräger
Marketing	Marketing	D und E/D and E	E	E	E	E	E	K		SS	B+L *)	keine	Siegfried
Produktionsplanungssysteme und Logistik	Supply Chain Management	D und E/D and E	E	E	E	E	E	K		SS	B+L *)	keine	Siegfried
Gastechnik in der Energiewende	Gas technology in energy transition	D	E	E	E	E	K	E		WS	GVE *)	keine	Döring
Nichtlineare Systeme und Regelungen	Nonlinear Systems and Control	D	K	E	E	E	E	E		WS	Tech	keine	Scherer
Wirtschaftsprivatrecht	Private Business Law	D	E	E	E	E	E	K		SS	GVE *)	keine	Strotmann
Abgasreinigung und Energieeffizienz	Emission Control and Energy Efficiency	D	E	E	E	E	K	E		WS	GVE *)	keine	Reindorf
Asset Management von Wassernetzen	Asset Management of Water Supply Networks	D	E	E	E	E	K	E		WS	GVE *)	keine	Wilhelm
Microsystems for Life Sciences	Microsystems for Life Sciences	D	K	E	E	K	E	E		SS	Tech	keine	Feili
Internation. Management **)	International management (M)	D	E	E	E	E	E	K		WS	WI *)	keine	Richter
Materialwirtschaft u.Logistik	Materials Management and Logistics (M)	E	E	E	E	K	E	K		WS	Tech	keine	Wittmann
Innovationsmanagement	Innovation management	D oder E	E	E	E	E	E	K		WS	Tech	SL	Wagner (Lehrauftrag)
Systems engineering (M)	Systems engineering (M)	D	K	E	E	E	E	E		WS	Tech	keine	Moser

*) Modul wird nicht vom Fachbereich Technik angeboten. Bitte beim betreffenden Fachbereich selbstständig informieren
**) Modul mit beschränkter Teilnehmerzahl
***) Das Modul wird von einer Universität in Indien angeboten. Die Vorlesungszeiten können abweichen und sind im Vorfeld zu erfragen.

Abkürzungen und Bedeutungen:		**Abbreviations and meanings:**								
GVE	**Gebäude-, Versorgungs- und Engergietechnik**	**Technical building services, Supply Systems and Energy Technology**	https://www.hochschule-trier.de/hauptcampus/bauen-plus-leben/gve/studium/studiengaenge/energiemanagement-meng		**K = Kerndisziplin**		**core discipline**		**Studien-leistung (SL)**	
ET	**Elektrotechnik**	**Electrical Engineering**	https://www.hochschule-trier.de/hauptcampus/technik/studium/master-sg-technik/etmsc		**E = ergänzende Disziplin**		**comple-mentary discipline**		**Prüfungs vorleist ung(PVL)**	
WI	**Wirtschaftsingenieur**	**Industrial Engineering**	https://www.hochschule-trier.de/hauptcampus/technik/studium/master-sg-technik/wimeng							
MB	**Maschinenbau**	**Mechanical Engineering**	https://www.hochschule-trier.de/hauptcampus/technik/studium/master-sg-technik/mbmeng		**UNIWA, Athens, Greece**				https://bmet.uniwa.gr/courses-2/1st-semester/	
MT	**Medizintechnik**	**Medical Engineering**	https://www.hochschule-trier.de/hauptcampus/technik/studium/master-sg-technik/etmsc		**UNIWA, Athens, Greece**				https://bmet.uniwa.gr/courses-2/2nd-semester/	
FZT	**Fahrzeugtechnik**	**Automotive Technology**	https://www.hochschule-trier.de/hauptcampus/technik/studium/master-sg-technik/mbmeng		**UNIWA, Athens, Greece**				https://bmet.uniwa.gr/courses-2/3rd-semester/	

Contents

Advanced Cognitive Robotics		
Content	Lecture: - Basic concepts of Industry 4.0, Cyber-Physical Systems (CPS) and robotics - Fundamentals of mobile robotics, Kinematics and actuators - Introduction to the Robot Operating System (ROS) framework - Perception: sensor technology, sensor data processing and fusion; environment perception - Localization and mapping, motion planning and navigation The lecture topics are accompanied by complementary practical applications as laboratory exercises. These will be implemented using Python and ROS.	
Competency goals	Upon successful completion of the module, students will be able to, 1. Identify application fields of the Industry 4.0 and robotics, 2. Describe the basic components, functionalities and interactions of mobile robotics, 3. use the acquired knowledge to gain an understanding of complex systems in mobile robotics and sensing/perception, 4. develop practical applications of robotics in the lab.	
Teaching form	☒ Lecture	
	☐ Exercise	
	☐ Seminar/seminar exercise	
	☒ Laboratory	
	☐ Project	
Recommended Prerequesites		
Literature	• Further literature will be announced in lecture • Klein, B. Einfuhrung in Python 3. Hanser Verlag, 2021 (optionally, to refresh Python knowledge). • Thrun; Burgard; Fox. Probabilistic Robotics. MIT Press, 2005. • Siciliano, Khatib. Springer Handbook of Robotics - Second Edition. Springer, 2016 (available on demand in case of further interest) • Siegwart; Nourbakhsh, Scaramuzza. Introduction to Autonomous, Mobile Robots - Second Edition. MIT Press, 2011. • Quigley; Gerkey; Smart. Programming Robots with ROS. O Reilly, 2015. • Thrun; Burgard; Fox. Probabilistic Robotics. MIT Press, 2005. • Siciliano, Khatib. Springer Handbook of Robotics - Second Edition. Springer, 2016 (available on demand in case of further interest) • Siegwart; Nourbakhsh, Scaramuzza. Introduction to Autonomous, Mobile Robots - Second Edition. MIT Press, 2011. • Quigley; Gerkey; Smart. Programming Robots with ROS. O Reilly, 2015.	
Study performance	☐ Exercise performance	
	☒ Laboratory performance	
	☐ Term paper	
	☐ Presentation	
	☐ Certificate	
Exam performance	☒ Written exam (in case of high number of participants)	
	☒ Oral exam (in case of low number of participants)	
	☐ Term paper	
	☐ Project paper	
	☒ Laboratory performance	
	☐ Final thesis and oral exam	
	☐ presentation	
	☐ Portfolio	
Usability	Master Electrical Engineering (-Cooperative Study Programme) - (FPO 2024 FPO 2025)	☒ BM
	Master Electrical Engineering - (PO 2019)	☒ BM
	Master Interdisciplinary Engineering - (PO 2021)	☒ CEM
Offer	☐ Winter semester ☐ Summer semester ☒ Irregular	

Workload	Credit points	Contact time	Self-study
	5	60 hours [4 hours per week]	90 hours
Language	English		
Duration of the module	1 Semester		
Approved aids for the exam performance	Will be announced in the lecture		
Lecturer(s)	Mr. Prof. Dr. Volker Lücken		
Responsible(s)	Mr. Prof. Dr. Volker Lücken		
Comment	Fundamental prior knowledge of software development with Python is mandatory. The successful participation in the lab sessions is required. This course is the successor of Industrie 4.0 & IoT / Industry 4.0 & IoT. Please note that the course is seat restricted and requires registration in the first week, with a priorization of Electrical Engineering (M.Sc.) students, and also the EE specialization of Interdisciplinary Engineering (M.Sc.).		
Change date	30.11.2025		

Biomechanical Systems			
Content	The lecture deals with fundamental questions of biomechanics with a focus on the human and cellular mechanical system. Firstly, the basic structure of the human and cellular mechanical system and the physical principles of biomechanics (statics, strength, kinetics) are discussed. Another focus is on the relationship between structure and function. In addition, finite element analysis is used to describe complex biomechanical systems using computer tomography data.		
Competency goals	After successfully completing the module, students will be able to - describe and explain the basic principles of biomechanical systems, - link the physical principles and the biological structure of biomechanical systems, - understand the functional principle of computer tomography and explain its application in biomechanics, - apply finite element analysis to initial examples. As part of the project work, students will also learn how to work with scientific publications and how to deal with more complex issues.		
Teaching form	☒ Lecture		
	☐ Exercise		
	☐ Seminar/seminar exercise		
	☐ Laboratory		
	☒ Project		
Recommended Prerequesites	• Classical and Modern Physics • Special Topics in Physics		
Literature	• Richard, Hans Albert, and Kullmer, Gunter. Biomechanik: Anwendungen mechanischer Prinzipien auf den menschlichen Bewegungsapparat. Deutschland, Springer Fachmedien Wiesbaden, 2020. • Winter, David A.. Biomechanics and Motor Control of Human Movement. Wiley, 2009. • Knudson, Duane. Fundamentals of Biomechanics. USA, Springer US, 2013. • Cytoskeletal Mechanics: Models and Measurements in Cell Mechanics. USA, Cambridge University Press, 2006.		
Study performance	☐ Exercise performance		
	☐ Laboratory performance		
	☐ Term paper		
	☐ Presentation		
	☐ Certificate		
Exam performance	☒ Written exam		
	☐ Oral exam		
	☐ Term paper		
	☒ Project paper		
	☐ Laboratory performance		
	☐ Final thesis and oral exam		
	☐ presentation		
	☐ Portfolio		
Usability	Master Electrical Engineering - (PO 2019)	☒ CEM	
	Master Electrical Engineering (-Cooperative Study Programme) - (FPO 2024 FPO 2025)	☒ CEM	
	Master Interdisciplinary Engineering - (PO 2021)	☒ CEM	
Offer	☐ Winter semester ☒ Summer semester ☐ Irregular		
Workload	Credit points	Contact time	Self-study
	5	60 hours [4 hours per week]	90 hours
Language	German and English		
Duration of the module	1 Semester		
Approved aids for the exam performance	Calculator (not programmable)		
Lecturer(s)	Mrs. Dr. Friederike Lee		
Responsible(s)	Mrs. Dr. Friederike Lee		

Comment	
Change date	02.10.2025

CAE/Project Management I (M)		
Content	Design / CAE /CAD, structures in the company, forms of project organization, project goals in their dependence, milestones and critical path, use of IT for project management of small and medium, practice oriented projects, project organization, phases of the project (concept phase, design phase, elaboration phase) in connection with presentations in PowerPoint, Cooperation and communication in the project, stress, - self, - time management, comparison of the models of time management, performance curve, the 8 biggest time killers, mind-mapping, directives (machine directives, product safety directive, (CE certification), risk analysis, cost responsibility in the project, basics of cost accounting for cost-effective projecting, magic triangle: Quality, time, costs, technical documentation, CAD in application, technical and economic project planning, integrating the Internet in projects, Office Professional in project application, patent research, costing procedures, component optimization, House of Quality, presentation techniques, advanced technical documentation, simultaneous engineering, extended project completion, handover of projects, coordinated project completion, project management closing	
Competency goals	After successful completion of the module, the student will be able to design, schedule and manage innovation projects. He/she moves into the role of both the administrator and the project manager. A variety of software packages are used, such as MS-Project, Excel, Word, CATIA, FEM, simulation software etc. The student knows the project process according to the methods of classical project management with the help of CAE techniques.	
Teaching form	☒ Lecture	
	☐ Exercise	
	☒ Seminar/seminar exercise	
	☐ Laboratory	
	☐ Project	
Recommended Prerequesites		
Literature	• B. Wartman: The Certified Six Sigma Black Belt Primer • Tabellen Buch für Metalltechnik Handwerk und Technik • Grundlagen der Konstruktionslehre Bildungsverlag E1NS ISBN 3- 427- 05303- 2 • Einführung in die DIN-Normen 13. Auflage Teubner-Verlag ISBN 3-519-26301-7 • Technisches Zeichnen 23. Auflage Teubner-Verlag ISBN 3-519-36725-4 • C. N. Madu: House of Quality in a Minute, Fairfield (USA): Chi Publicher, 2000 Hoischen - TZ 32. Auflage Cornelsen-Verlag ISBN 3-464-48009-7 • West Terre Haute (USA): Quality Council of Indiana, 2001 • Schuth, Michael Leitlinie für das Anfertigen von Projekt-, Bachelor- und Masterarbeiten in den MINT-Fächern Shaker Verlag, Aachen, 2020 ISBN: 978-3-8440-7617-2	
Study performance	☒ Exercise performance	
	☐ Laboratory performance	
	☐ Term paper	
	☐ Presentation	
	☐ Certificate	
Exam performance	☒ Written exam	
	☐ Oral exam	
	☐ Term paper	
	☒ Project paper	
	☐ Laboratory performance	
	☐ Final thesis and oral exam	
	☐ presentation	
	☐ Portfolio	
Usability	Master Mechanical Engineering - (PO 2015)	☒ RM
	Master Industrial Engineering - (PO 2015)	☒ RM
	Master Interdisciplinary Engineering - (PO 2021)	☒ CEM

Offer	☐ Winter semester ☒ Summer semester ☐ Irregular		
Workload	Credit points	Contact time	Self-study
	5	60 hours [4 hours per week]	90 hours
Language	German (lecture), English (exercise)		
Duration of the module	1 Semester		
Approved aids for the exam performance	None		
Lecturer(s)	Mr. Prof. Dr.-Ing. Michael Schuth		
Responsible(s)	Mr. Prof. Dr.-Ing. Michael Schuth		
Comment	Literaturempfehlung: Schuth, Michael Leitlinie für das Anfertigen von Projekt-, Bachelor- und Masterarbeiten in den MINT-Fächern Shaker Verlag, Aachen, 2020 ISBN: 978-3-8440-7617-2 none		
Change date	28.02.2026		

CAE/Project Management II (M)		
Content	Design / CAE /CAD, structures in the company, forms of project organization, project goals in their dependence, milestones and critical path, use of IT for project management of small and medium, practiceoriented projects, project organization, phases of the project (concept phase, design phase, elaboration phase) in connection with presentations in PowerPoint, Cooperation and communication in the project, stress, -self, - time management, presentation of the models of time management, performance curve, the 8 biggest time killers, mindmapping, guidelines (Machinery Directive, Product Safety Directive, CE certification) risk analysis, cost responsibility in the project, basics of cost accounting for cost-effective projecting, magic triangle: Quality, time, costs, technical documentation, CAD in application, technical and economic project planning, integrating the Internet in projects, Office Professional in project application, patent research, costing procedures, component optimization, House of Quality, presentation techniques, advanced technical documentation, simultaneous engineering, extended project completion, handover of projects, coordinated project completion, project management, project managementclosing	
Competency goals	The students learn to design, schedule and manage innovation projects by means of case studies and independent project work with the help of extensive use of IT. A variety of software packages are used, such as MS Project, Excel, Word, CATIA, FEM, simulation software, etc. The students learn the project process according to the methods of the classic Project management with the help of CAE techniques.	
Teaching form	☐ Lecture	
	☐ Exercise	
	☒ Seminar/seminar exercise	
	☐ Laboratory	
	☐ Project	
Recommended Prerequesites	• CAE/Project Management I (M)	
Literature	• West Terre Haute (USA): Quality Council of Indiana, 2001 • B. Wartman: The Certified Six Sigma Black Belt Primer • Tabellen Buch für Metalltechnik Handwerk und Technik • Grundlagen der Konstruktionslehre Bildungsverlag E1NS ISBN 3- 427- 05303- 2 • Einführung in die DIN-Normen 13. Auflage Teubner-Verlag ISBN 3-519-26301-7 • Technisches Zeichnen 23. Auflage Teubner-Verlag ISBN 3-519-36725-4 • C. N. Madu: House of Quality in a Minute, Fairfield (USA): Chi Publicher, 2000 Hoischen - TZ 32. Auflage Cornelsen-Verlag ISBN 3-464-48009-7	
Study performance	☐ Exercise performance	
	☐ Laboratory performance	
	☐ Term paper	
	☐ Presentation	
	☐ Certificate	
Exam performance	☐ Written exam	
	☐ Oral exam	
	☐ Term paper	
	☒ Project paper	
	☐ Laboratory performance	
	☐ Final thesis and oral exam	
	☐ presentation	
	☐ Portfolio	
Usability	Master Mechanical Engineering - (PO 2015)	☒ CEM
	Master Interdisciplinary Engineering - (PO 2021)	☒ CEM
	Master Industrial Engineering - (PO 2015)	☒ CEM
Offer	☒ Winter semester ☐ Summer semester ☐ Irregular	

Workload	Credit points	Contact time	Self-study
	5	60 hours [4 hours per week]	90 hours
Language	German (lecture), English (exercise)		
Duration of the module	1 Semester		
Approved aids for the exam performance	None		
Lecturer(s)	Mr. Prof. Dr.-Ing. Michael Schuth		
Responsible(s)	Mr. Prof. Dr.-Ing. Michael Schuth		
Comment	Literaturempfehlung: Schuth, Michael Leitlinie für das Anfertigen von Projekt-, Bachelor- und Masterarbeiten in den MINT-Fächern Shaker Verlag, Aachen, 2020 ISBN: 978-3-8440-7617-2 maximum number of participants 15		
Change date	28.02.2026		

<table>
<tr><th colspan="4">Competition and Innovation</th></tr>
<tr><td>Content</td><td colspan="3"></td></tr>
<tr><td>Competency goals</td><td colspan="3"></td></tr>
<tr><td rowspan="5">Teaching form</td><td colspan="3">☒ Lecture</td></tr>
<tr><td colspan="3">☐ Exercise</td></tr>
<tr><td colspan="3">☐ Seminar/seminar exercise</td></tr>
<tr><td colspan="3">☐ Laboratory</td></tr>
<tr><td colspan="3">☐ Project</td></tr>
<tr><td>Recommended Prerequesites</td><td colspan="3"></td></tr>
<tr><td>Literature</td><td colspan="3">• Fisch, J.H.; Roß, J-M.; Fallstudien zum Innovationsmanagement, Wiesbaden 2009
• Gaubinger, K.; Werani, T.; Rabl, M.; Praxisorientiertes Innovations- und Produktmanagement , Wiesbaden 2009
• Stern, T.; Jaberg, H.; Erfolgreiches Innovationsmanagement. Erfolgsfaktoren - Grundmuster - Fallbeispiele, Wiesbaden 2010
• Porter, Michael E.: Wettbewerbsstrategie: Methoden zur Analyse von Branchen und Konkurrenten, (original: „Competitive Strategy“), 11. Aufl. 2008</td></tr>
<tr><td rowspan="5">Study performance</td><td colspan="3">☐ Exercise performance</td></tr>
<tr><td colspan="3">☐ Laboratory performance</td></tr>
<tr><td colspan="3">☐ Term paper</td></tr>
<tr><td colspan="3">☐ Presentation</td></tr>
<tr><td colspan="3">☐ Certificate</td></tr>
<tr><td rowspan="8">Exam performance</td><td colspan="3">☐ Written exam</td></tr>
<tr><td colspan="3">☐ Oral exam</td></tr>
<tr><td colspan="3">☒ Term paper</td></tr>
<tr><td colspan="3">☐ Project paper</td></tr>
<tr><td colspan="3">☐ Laboratory performance</td></tr>
<tr><td colspan="3">☐ Final thesis and oral exam</td></tr>
<tr><td colspan="3">☒ presentation</td></tr>
<tr><td colspan="3">☐ Portfolio</td></tr>
<tr><td rowspan="3">Usability</td><td>Master Industrial Engineering - (FPO 2027)</td><td>☒ RM</td><td></td></tr>
<tr><td>Master Mechanical Engineering - (FPO 2027)</td><td>☒ CEM</td><td></td></tr>
<tr><td>Master Interdisciplinary Engineering - (PO 2021)</td><td>☒ CEM</td><td></td></tr>
<tr><td>Offer</td><td colspan="3">☐ Winter semester ☒ Summer semester ☐ Irregular</td></tr>
<tr><td>Workload</td><td colspan="3"><table><tr><th>Credit points</th><th>Contact time</th><th>Self-study</th></tr><tr><td>5</td><td>60 hours [4 hours per week]</td><td>90 hours</td></tr></table></td></tr>
<tr><td>Language</td><td colspan="3">German</td></tr>
<tr><td>Duration of the module</td><td colspan="3">1 Semester</td></tr>
<tr><td>Approved aids for the exam performance</td><td colspan="3">None</td></tr>
<tr><td>Lecturer(s)</td><td colspan="3">Mr. Prof. Dr. Björn Kirsten</td></tr>
<tr><td>Responsible(s)</td><td colspan="3">Mr. Prof. Dr. Björn Kirsten</td></tr>
<tr><td>Comment</td><td colspan="3">After completing the module, students will be able to apply basic competition models to entrepreneurial issues, analyse competitive situations of companies and evaluate corporate strategies in terms of their economic sustainability.

Students will be able to assess the importance of innovation management for a company’s success and apply the key tools in business practice. They can evaluate innovations and develop procedures for their realisation.</td></tr>
<tr><td>Change date</td><td colspan="3">08.12.2025</td></tr>
</table>

Deep Learning			
Content	- Basics of Data Preparation Pipeline - Introduction to deep learning and neural networks - Mathematical foundations of deep learning - Architecture of neural networks - Training neural networks - Convolutional Neural Nets (CNNs) - Recurrent neural networks (RNNs) and LSTM - Reinforcement Learning (RL) - Evolutionary algorithms (EA) - Practical application and frameworks		
Competency goals	After completing the module, students should be able to - Understand and explain basic and advanced concepts of deep learning and related fields (such as RL and EA). - Identify and differentiate between different types of neural networks and their applications. - Design, implement and train neural networks, including CNNs, RNNs, and LSTM networks. - Apply reinforcement learning and evolutionary algorithms in practical application scenarios. - Solve complex problems by applying deep learning techniques. - Develop innovative solutions for challenges in various application areas such as image and speech recognition. - Work efficiently with common deep learning frameworks such as TensorFlow or PyTorch. - Use current software tools and libraries to develop and implement deep learning models.		
Teaching form	☒ Lecture		
	☒ Exercise		
	☐ Seminar/seminar exercise		
	☐ Laboratory		
	☐ Project		
Recommended Prerequesites	• Machine Learning		
Literature	• Zhang, Lipton, Li et. al, Dive into Deep Learning, Cambridge University Press, 2023 • Ethem Alpaydin, Machine Learning, MIT Press, 2021 • Nikhil Buduma, Fundamentals of Deep Learning, OReilly, 2022 • Kapoor, Gulli, Pal: Deep Learning with TensorFlow and Keras: Build and deploy supervised, unsupervised, deep, and reinforcement learning models, 3rd Edition • Goodfellow, Bengio & Courville, Deep Learning, MIT Press, 2016 • Christopher Bishop, Hugh Bishop: Deep Learning - Foundations and Conceps, Springer, 2024		
Study performance	☐ Exercise performance		
	☐ Laboratory performance		
	☐ Term paper		
	☐ Presentation		
	☐ Certificate		
Exam performance	☒ Written exam		
	☐ Oral exam		
	☐ Term paper		
	☐ Project paper		
	☐ Laboratory performance		
	☐ Final thesis and oral exam		
	☐ presentation		
	☐ Portfolio		
Usability	Master Electrical Engineering (-Cooperative Study Programme) - (FPO 2024 FPO 2025)	☒ BM	
	Master Interdisciplinary Engineering - (PO 2021)	☒ CEM	
Offer	☒ Winter semester ☐ Summer semester ☐ Irregular		
Workload	Credit points	Contact time	Self-study
	5	60 hours [4 hours per week]	90 hours
Language	English		
Duration of the module	1 Semester		

Approved aids for the exam performance	None
Lecturer(s)	Mr. Prof. Dr. Ernst Georg Haffner
Responsible(s)	Mr. Prof. Dr. Ernst Georg Haffner
Comment	Points for the exam can be earned as part of the exercises
Change date	19.02.2026

Digital Signal Processing			
Content	Discrete Stochastic Processes Linear Signal Models Nonparametric Specrtal Estimation Optimal Linear Filters Algorithms and Structures for Optimal Filtering Least Squares Filtering Parametric Spectral Estimation Adaptive Filters Array signal processing Radar signal processing, SAR, ISAR System identification		
Competency goals	The students • can explain the differences between classical and stochastic signal processing, • The students are able to select suitable methods and algorithms for various applications in digital signal processing, • can evaluate the different methods in terms of their performance and computational effort, • can develop new systems, forexample, for medical devices, measuring instruments and radar technology devices, • are able to analyze unknown systems and to model		
Teaching form	☒ Lecture		
	☐ Exercise		
	☐ Seminar/seminar exercise		
	☐ Laboratory		
	☐ Project		
Recommended Prerequesites			
Literature	• Spectral Analysis of Signals, P.Stoica, R. Moses • Probability, Random Variables and Stochastic Processes, A. Papoulis, S.Unnikrishna Pillai		
Study performance	☐ Exercise performance		
	☐ Laboratory performance		
	☐ Term paper		
	☐ Presentation		
	☐ Certificate		
Exam performance	☒ Written exam		
	☐ Oral exam		
	☐ Term paper		
	☐ Project paper		
	☐ Laboratory performance		
	☐ Final thesis and oral exam		
	☐ presentation		
	☐ Portfolio		
Usability	Master Electrical Engineering - (PO 2019)	☒ BM	
	Master Electrical Engineering (-Cooperative Study Programme) - (FPO 2024 FPO 2025)	☒ BM	
	Master Interdisciplinary Engineering - (PO 2021)	☒ CEM	
Offer	☐ Winter semester ☒ Summer semester ☐ Irregular		
Workload	Credit points	Contact time	Self-study
	5	60 hours [4 hours per week]	90 hours
Language	German		
Duration of the module	1 Semester		
Approved aids for the exam performance	None		
Lecturer(s)	Mr. Prof. Dr. Elmar Seidenberg		
Responsible(s)	Mr. Prof. Dr. Elmar Seidenberg		
Comment			
Change date	08.12.2025		

Electromagnetic Waves			
Content			
Competency goals			
Teaching form	☒ Lecture		
	☒ Exercise		
	☐ Seminar/seminar exercise		
	☐ Laboratory		
	☐ Project		
Recommended Prerequesites			
Literature	• Georg: Elektromagnetische Wellen • Pehl: Mikrowellentechnik		
Study performance	☐ Exercise performance		
	☐ Laboratory performance		
	☐ Term paper		
	☐ Presentation		
	☐ Certificate		
Exam performance	☒ Written exam		
	☐ Oral exam		
	☐ Term paper		
	☐ Project paper		
	☐ Laboratory performance		
	☐ Final thesis and oral exam		
	☐ presentation		
	☐ Portfolio		
Usability	Master Electrical Engineering (-Cooperative Study Programme) - (FPO 2024 FPO 2025)	☒ BM	
	Master Interdisciplinary Engineering - (PO 2021)	☒ CEM	
Offer	☐ Winter semester ☒ Summer semester ☐ Irregular		
Workload	Credit points	Contact time	Self-study
	5	60 hours [4 hours per week]	90 hours
Language	German		
Duration of the module	1 Semester		
Approved aids for the exam performance	None		
Lecturer(s)	Mr. Prof. Dr. Andreas Richard Diewald		
Responsible(s)	Mr. Prof. Dr. Andreas Richard Diewald		
Comment			
Change date	08.01.2026		

Electronic Engine Management Systems			
Content	CHAPTER I: FUNDAMENTALS OF AUTOMOTIVE ELECTRONICS Microprocessor architecture, open and closed loop control strategies, PID control, Look up tables, introduction to modern control strategies like Fuzzy logic and adaptive control. A/D and D/ A controllers. CHAPTER II: SENSORS Types - Mass Air flow, Manifold Absolute Pressure, Temperature, Speed, EGO, Knock, and Crankshaft Position-Hall Effect-Principle of operation, construction, material and characteristics. CHAPTER III: SI ENGINE MANAGEMENT Mono point, Multi point and Direct injection systems - Principles and Features, Bosch injection systems- L-Jetronic and LH -Jetronic- Layout and working, Open loop control and Lambda loop control in injection. CHAPTER IV: CI ENGINE MANAGEMENT Fuel injection system parameters affecting combustion, noise and emissions in CI engines. Inline injection pump, Rotary pump and injector - Construction and principle of operation, Electronically controlled Unit Injection system. Layout of the common rail fuel injection system. CHAPTER V: IGNITION SYSTEMS AND ENGi NE MAPPING Ignition fundamentals, Types of solid-state ignition systems, High energy ignition distributors, Electronic spark timing and control. Combined ignition and fuel management systems. Digital control techniques - Dwell angle, Ignition timing and Injection duration calculation.		
Competency goals	Familiarize with automotive instruments and sensors Gain knowledge about the measurement of engine parameters by using sensors Attain knowledge on the working of Electronic Ignition System Attain the Principles of Digital Control systems and its applications Familiarize with the concept of Engine mapping		
Teaching form	☒ Lecture		
	☐ Exercise		
	☐ Seminar/seminar exercise		
	☐ Laboratory		
	☐ Project		
Recommended Prerequesites			
Literature			
Study performance	☐ Exercise performance		
	☐ Laboratory performance		
	☐ Term paper		
	☐ Presentation		
	☐ Certificate		
Exam performance	☒ Written exam		
	☐ Oral exam		
	☐ Term paper		
	☐ Project paper		
	☐ Laboratory performance		
	☐ Final thesis and oral exam		
	☐ presentation		
	☐ Portfolio		
Usability	Master Interdisciplinary Engineering - (PO 2021)		☒ CEM
Offer	☒ Winter semester ☐ Summer semester ☐ Irregular		
Workload	Credit points	Contact time	Self-study
	5	60 hours [4 hours per week]	90 hours
Language	English		
Duration of the module	1 Semester		
Approved aids for the exam performance	None		
Lecturer(s)	Mr. Prof. Dr. M. Jaikumar		

Responsible(s)	Mr. Prof. Dr.-Ing. Peter König
Comment	pure online module
Change date	30.11.2025

Energy-efficient Vehicles (M)			
Content	Expected developments in the global vehicle population, primary energy resources and CO2 emissions are presented. The results are based on a comparison of the current and future climate development, current and future legislation, and fuel costs. Comparison of different efficiency indicators. Influence of the design parameters of a vehicle on energy efficiency. Efficiency and emissions, energy chains: well-to-wheel and future fuel options, trends and potentials in powertrains Efficiency. Battery electric vehicles and hybrid drives, efficiency potential of auxiliary drives. Potentials for minimizing driving resistance and lightweight construction, influences of vehicle operation and driving style, predictive operating strategies and driver assistance systems, presentation and assessment of realized concepts and vehicles.		
Competency goals	Upon successful completion of the module, students will know the importance of energy efficiency as well as reduction of CO2-emissions for future transport. They can evaluate the efficiency of vehicles and can assess the effectiveness of efficiency-improving measures in the different energy conversion processes along the chain from fuel production to driving.		
Teaching form	☒ Lecture		
	☒ Exercise		
	☐ Seminar/seminar exercise		
	☐ Laboratory		
	☐ Project		
Recommended Prerequesites			
Literature	• Hybridfahrzeuge - Ein alternatives Antriebssystem für die Zukunft Hofmann, Peter, 2014, Springer-Verlag Wien, ISBN 978-3-7091-1779-8 • Handbuch Lithium-Ionen-Batterien Korthauer, R., Springer-Verlag Berlin Heidelberg 2013, ISBN 978-3-642-30652-5978-3-7091-1779-8 • Vorlesungsskripte mit Bezug auf umfangreiche Fachliteratur		
Study performance	☐ Exercise performance		
	☐ Laboratory performance		
	☐ Term paper		
	☐ Presentation		
	☐ Certificate		
Exam performance	☒ Written exam		
	☐ Oral exam		
	☐ Term paper		
	☐ Project paper		
	☐ Laboratory performance		
	☐ Final thesis and oral exam		
	☐ presentation		
	☐ Portfolio		
Usability	Master Mechanical Engineering - (PO 2015)	☒ CEM	
	Master Electrical Engineering - (PO 2019)	☒ CEM	
	Master Electrical Engineering (-Cooperative Study Programme) - (FPO 2024 FPO 2025)	☒ CEM	
	Master Interdisciplinary Engineering - (PO 2021)	☒ CEM	
	Master Industrial Engineering - (PO 2015)	☒ CEM	
Offer	☐ Winter semester ☒ Summer semester ☐ Irregular		
Workload	Credit points	Contact time	Self-study
	5	60 hours [4 hours per week]	90 hours
Language	German		
Duration of the module	1 Semester		
Approved aids for the exam performance	Calculator (not programmable)		
Lecturer(s)	Mr. Prof. Dr. Florian Dräger		
Responsible(s)	Mr. Prof. Dr. Florian Dräger		

Comment	German
Change date	22.01.2026

Engineering Measurement (M)	
Content	0.1 Interferometry 0.2 Thermography 0.3 Strip projection 0.4 Voltage optics 0.5 Shearography 0.6 Correlation 0.7 Holography 0.8 Light microscopy 0.9 Method for the investigation of fluid flows 0.9.1 Laser Doppler Anemometry 0.9.2 Laser 2Focus Anemometry 0.9.3 Surface Pattern Image Velocimetry 0.9.4 Particle Image Velocimetry 0.10 Terahertz 0.11 3D laser scanning 0.12 Laser vibrometry 0.13 White light interferometry 1. Light and optics 1.1 Properties of light 1.2 The wave-particle duality of light 1.3 Diffraction 1.4 Reflection 1.5 Refraction 1.6 Total reflection 2. Polarization 2.1 Polarization types 2.1.1 Linear polarized light 2.1.2 Non-polarized light 2.1.3 Circular and elliptical polarized light 2.1.4 Calculation basis 2.2 Polarizers 2.2.1 Polarization by dichroism 2.2.2 Polarization by birefringence 2.2.3 Polarization by reflection 2.2.4 Polarization by scattering 3. Optical components 3.1 Lenses 3.1.1 Imaging error 3.2 Mirror 3.3 Prisms 3.3.1 Reflection prisms 3.3.2 Reversing prisms and reversing systems 3.4 Beam splitter 3.4.1 Geometric beam splitter 0.1 Interferometry 0.2 Thermography 0.3 Strip projection 0.4 Voltage optics 0.5 Shearography 0.6 Correlation 0.7 Holography 0.8 Light microscopy 0.9 Method for the investigation of fluid flows 0.9.1 Laser Doppler Anemometry 0.9.2 Laser 2Focus Anemometry 0.9.3 Surface Pattern Image Velocimetry 0.9.4 Particle Image Velocimetry 0.10 Terahertz 0.11 3D laser scanning 0.12 Laser vibrometry 0.13 White light interferometry 1. Light and optics 1.1 Properties of light 1.2 The wave-particle duality of light 1.3 Diffraction 1.4 Reflection 1.5 Refraction 1.6 Total reflection 2. Polarization 2.1 Polarization types 2.1.1 Linear polarized light 2.1.2 Non-polarized light

Kompetenzziele	2.2.1 Polarization by dichroism 2.2.2 Polarization by birefringence 2.2.3 Polarization by reflection 2.2.4 Polarization by scattering 3. Optical components 3.1 Lenses 3.1.1 Imaging error 3.2 Mirror 3.3 Prisms 3.3.1 Reflection prisms 3.3.2 Reversing prisms and reversing systems 3.4 Beam splitter 3.4.1 Geometric beam splitter 3.4.2 Physical beam splitter 3.4.3 Periodic beam splitter7 3.5 Grasping optical components 3.5.1 Frame types 3.5.3 Centering optics 3.6 Gl¨aser images 3.7 Fiberglass 3.7.1 Types fibers 3.7.2 Fiber optic cable guiding 4 Introduction to Laser Technology 4.1Basics of Laser Technology 4.1.1 Interference and beating 4.2 Coh¨arence 4.2.1 Measurement of the temporal coh¨arence 4.2.2 Measurement of the spatial coh¨arence 5. The laser 5.1 The laser principle 5.2 Excitation forms 8 5.3 Interaction of photons and atoms 5.3.1 Shock 1. type 5.3.2 Shock 2. type 5.3.3 Absorption of a photon 5.3.4 Ionization of an atom 5.3.5 Metastable states 5.3.6 Spontaneous emission of photons 5.3.7 Induced emission of a photon 6. Lasers and laser systems 6.1 Operating principle 6.2 Structure 6.3 Active medium 6.3.1 Solid state laser 6.3.2 Gas laser 6.3.3 Semiconductor laser 6.3.4 Fluid aser 6.3.5 Dye laser 6.4 Free-electron laser 6.5 The resonator 6.6 The energy supply (excitation) 6.6.1 Gas discharge (electrical excitation) 6.6.2 Light sources 6.6.3 Chemical 6.7 Operating modes 6.8 Various laser 6.8.1 The He-Ne laser 6.8.2 The argon laser 6.8.3 The ruby laser 6.8.4 The Nd:YAG laser (neodymium in yttrium aluminum garnet) 6.8.5 The laser diode 6.8.6 The titanium sapphire laser 6.9 TEM modes 6.9 Properties and application possibilities 6.10 State of current research 6.11 State of the art 6.11.1 Laser in the industry 6.11.2 Laser in research and science 6.11.3 Laser in communication 6.11.4 Laser in medicine 6.11.5 Lasers in military and space technology 6.12 Application examples 7. General information on area-wide testing and measuring methods 8. Basics of the interferometric measurement technique

Kompetenzziele	9. Holography 9.1 The principle of holography 9.2 Holographic interferometry 9.3 Application examples 10. Basics of Speckle Measurement 1 11. Shearography 11.1 Basics of the optical structure of shearography 11.2 Mechanics of shearography 11.3 Structure and mode of action of various shear elements 11.4 Importance of illumination and observation direction for shearogram evaluation 11.5 Determination of the out-of-plane strain 11.6 Real-Time Shearography 11.7 Application of Sherography in Quality Assurance and Component Optimization 11.8 Determination of in-plane strain by means of shearography 11.9 Theoretical consideration of a topped tension rod 11.10 Setup and method for pure in-plane strain measurement 11.11 Determination of the pure in-plane strain on different models 11.12 Pure in-plane strain measurement on the topped tension rod 11.13 Out-of-plane tilt measurement in different shear directions 11.14 General overview of the shearographic measurement parameters 11.15 Measuring ranges of shearography 11.16 Applications of shearography 11.16.1 Automatic inspection equipment 11.16.2 Portable testing systems 12. computer-aided recording and evaluation of shearograms (ESPSI, TV-shearography) 12.1 Digital image processing of interference images 12.2 Combined phase shift and shear device 13. Computer-aided recording and evaluation of holograms (ESPI, TV holography) 13.1 Speckle Interferometry 13.2 TV holography system concept 13.4 Examples 13.4.1 In-plane deformation measurement 13.4.2 Out-of-plane deformation measurement using the example of a gas spring ball cup 13.4.3 Out-of-plane deformation measurement 13.4.4 Comparison of out-of-plane ESPI and ESPSI 13.4.5 Industrial ESPI measuring device 14. Stress optical methods 14.1 Voltage optics 14.1.1 Isochromats and isoclinics 14.1.2 Separation of isochromats and isoclinics 14.1.3 Mechanical basics 14.1.4 The basic stress-optical equation 14.1.5 Experimental setup at the FH Trier 14.1.6 Test evaluation 14.2 PhotoStress process 14.2.1 Physical basics
Competency goals	After successful completion of the module, the students are able to solve simple practical problems on their own due to their newly acquired theoretical knowledge in physical measurement technology. The lecture material is supplemented by experiments in the laboratory in small groups. The student is able to determine the appropriate measurement procedure for the respective task. He knows the application areas and the restrictions of the respective measurement methods
Teaching form	☒ Lecture
	☒ Exercise
	☐ Seminar/seminar exercise
	☐ Laboratory
	☐ Project
Recommended Prerequesites	

<table>
<tr><td>Literature</td><td colspan="3">

Michael Schuth, Wassili Buerakov
Handbuch Optische Messtechnik
Hanser Verlag 2017
ISBN: 978-3-446-43634-3
eBook-ISBN: 978-3-446-43661-9
Neumann/ Schröder: Bauelemente der Optik, Hanser Verlag., 1992, 6. Auflage, ISBN: 3-446-17036-7
Rajpal S. Sirohi, Fook Siong Chau: Optical Methods of Measurements Wholefield Techniques Inc., 1999 ISBN: 0-8247-6003-4
A.W. Koch, M.W. Rupprecht, O. Toedter, G. Häusler: Optische Messtechnik an technischen Oberflächen, Expert Verlag., 1998 ISBN: 3-8169-1372-5
Gottfried Schröder: Technische Optik, Vogel Verlag, 1990, 7. Auflage ISBN: 3-8023-067-x
Pramod K. Rastogi
Optical Measurement Techniques and Applications
Arthech House, Inc., 1997
ISBN: 0-89006-516-0
Grund, K.; Salm, R.: Systeme für die Endoskopie
Medizintechnik: Verfahren - Systeme - Informationsverarbeitung, Hrsg. Kramme, R.
3. überarbeitete Auflage, Berlin Heidelberg, Springer Verlag, 2007, S. 347-366
Physik Journal 8 (2009) Nr. 3 ©
2009 Wiley-VCH Verlag GmbH & Co. KGaA
Weinheim
Horst Kuchling
Taschenbuch der Physik
18. Auflage, Leipzigverlag 2004
H. Haferkorn: Optik
Johann Am

</td></tr>
<tr><td rowspan="5">Study performance</td><td colspan="3">☐ Exercise performance</td></tr>
<tr><td colspan="3">☐ Laboratory performance</td></tr>
<tr><td colspan="3">☐ Term paper</td></tr>
<tr><td colspan="3">☐ Presentation</td></tr>
<tr><td colspan="3">☐ Certificate</td></tr>
<tr><td rowspan="8">Exam performance</td><td colspan="3">☒ Written exam</td></tr>
<tr><td colspan="3">☐ Oral exam</td></tr>
<tr><td colspan="3">☐ Term paper</td></tr>
<tr><td colspan="3">☐ Project paper</td></tr>
<tr><td colspan="3">☐ Laboratory performance</td></tr>
<tr><td colspan="3">☐ Final thesis and oral exam</td></tr>
<tr><td colspan="3">☐ presentation</td></tr>
<tr><td colspan="3">☐ Portfolio</td></tr>
<tr><td rowspan="3">Usability</td><td>Master Mechanical Engineering - (PO 2015)</td><td>☒ RM</td></tr>
<tr><td>Master Interdisciplinary Engineering - (PO 2021)</td><td>☒ CEM</td></tr>
<tr><td>Master Industrial Engineering - (PO 2015)</td><td>☒ CEM</td></tr>
<tr><td>Offer</td><td colspan="3">☒ Winter semester ☐ Summer semester ☐ Irregular</td></tr>
<tr><td>Workload</td><td colspan="3">
<table>
<tr><th>Credit points</th><th>Contact time</th><th>Self-study</th></tr>
<tr><td>5</td><td>60 hours [4 hours per week]</td><td>90 hours</td></tr>
</table>
</td></tr>
<tr><td>Language</td><td colspan="3">German</td></tr>
<tr><td>Duration of the module</td><td colspan="3">1 Semester</td></tr>
<tr><td>Approved aids for the exam performance</td><td colspan="3">None</td></tr>
<tr><td>Lecturer(s)</td><td colspan="3">Mr. Prof. Dr.-Ing. Michael Schuth</td></tr>
<tr><td>Responsible(s)</td><td colspan="3">Mr. Prof. Dr.-Ing. Michael Schuth</td></tr>
<tr><td>Comment</td><td colspan="3">Overview TM - Bibliography see last book entry</td></tr>
<tr><td>Change date</td><td colspan="3">28.02.2026</td></tr>
</table>

Entrepreneurship			
Content	Introduction Recognizing opportunities Business models Business planning Choice of legal form Market entry and marketing mix Business growth Exit		
Competency goals	Students acquire fundamental knowledge of the process of starting a business and the key aspects of business management. They are able to systematically analyze business ideas and develop them into a structured business plan. Furthermore, students gain an understanding of practical requirements of entrepreneurship and apply theoretical concepts through case-based examples. They learn how to prepare a business plan for different audiences and how to present business concepts convincingly to potential investors.		
Teaching form	☒ Lecture		
	☐ Exercise		
	☐ Seminar/seminar exercise		
	☐ Laboratory		
	☐ Project		
Recommended Prerequesites			
Literature	• Entrepreneurship Dietmar Grichnik / Malte Brettel / Christian Koropp / René Mauer		
Study performance	☐ Exercise performance		
	☐ Laboratory performance		
	☐ Term paper		
	☐ Presentation		
	☐ Certificate		
Exam performance	☐ Written exam		
	☐ Oral exam		
	☐ Term paper		
	☒ Project paper		
	☐ Laboratory performance		
	☐ Final thesis and oral exam		
	☒ presentation		
	☐ Portfolio		
Usability	Master Interdisciplinary Engineering - (PO 2021)		☒ CEM
Offer	☐ Winter semester ☒ Summer semester ☐ Irregular		
Workload	Credit points	Contact time	Self-study
	5	60 hours [4 hours per week]	90 hours
Language	English		
Duration of the module	1 Semester		
Approved aids for the exam performance	Will be announced in the lecture		
Lecturer(s)	Mr. Dieter Horn		
Responsible(s)	Mr. Prof. Dr. Christian Kontermann		
Comment	Core discipline WI		
Change date	11.03.2026		

Finite Elements Method (M)				
Content	- Basic theory of the Finite Element Analysis - Consideration of nonlinear material behaviour (Cyclic Plasticity) - Modelling Strategies for Contact Problems - FEM-based Fracture Mechanics			
Competency goals	- The students apply numerical FEM simulation methods on the basis of the theoretical fundamentals - They are able to analyze complex problems for structural systems based on numerical FEA simulation tools			
Teaching form	☒ Lecture			
	☒ Exercise			
	☐ Seminar/seminar exercise			
	☐ Laboratory			
	☐ Project			
Recommended Prerequesites				
Literature	• Schumacher, A.: Optimierung mechanischer Strukturen, Springer • Vorlesungsskript/Foliensatz • Rust, W.: Nichtlineare Finite-Elemente-Berechnungen, Vieweg + Teubner • Matthek, C.: Design in der Natur, Rombach • Betten, J.: Finite Elemente für Ingenieure 1 und 2, Springer • U. Stelzmann/C. Groth/G. Müller: FEM für Praktiker, Band 2, Expert-Verlag • Bathe, K.-J.: Finite-Elemente-Methoden, Springer			
Study performance	☐ Exercise performance			
	☐ Laboratory performance			
	☐ Term paper			
	☐ Presentation			
	☐ Certificate			
Exam performance	☐ Written exam			
	☐ Oral exam			
	☐ Term paper			
	☒ Project paper			
	☐ Laboratory performance			
	☐ Final thesis and oral exam			
	☐ presentation			
	☐ Portfolio			
Usability	Master Industrial Engineering - (PO 2015)	☒ RM		
	Master Mechanical Engineering - (PO 2015)	☒ RM		
	Master Mechanical Engineering - (FPO 2027)	☒ RM		
	Master Industrial Engineering - (FPO 2027)	☒ CEM		
	Master Interdisciplinary Engineering - (PO 2021)	☒ CEM		
Offer	☐ Winter semester ☒ Summer semester ☐ Irregular			
Workload	Credit points	Contact time	Self-study	
	5	60 hours [4 hours per week]	90 hours	
Language	English			
Duration of the module	1 Semester			
Approved aids for the exam performance	None			
Lecturer(s)	Mr. Prof. Dr. Christian Kontermann			
Responsible(s)	Mr. Prof. Dr. Christian Kontermann			
Comment	None			
Change date	08.12.2025			

Fluid Mechanics (M)			
Content	Introduction to tensor calculus, basic equations of fluid mechanics in general form (differential and integral), vortex flows, potential flows, basics of turbulence modeling, introduction to flow simulation		
Competency goals	After successfully completing the module, students will be able to - Apply the basic equations of fluid mechanics in their general form to new applications and simplify them accordingly. - Evaluate the results of flow simulations. - design flow simulations using commercial CFD software.		
Teaching form	☒ Lecture		
	☒ Exercise		
	☐ Seminar/seminar exercise		
	☐ Laboratory		
	☐ Project		
Recommended Prerequesites	• Fluid mechanics		
Literature	• Strömungslehre (Spurk, Springer Verlag) • Strömungslehre (Schade, de Gruyter Verlag) • Fluid Mechanics (White, Verlag: McGraw-Hill) • Numerische Strömungsmechanik (Ferziger/Peric, Springer Verlag) • Vorlesungsunterlagen		
Study performance	☐ Exercise performance		
	☐ Laboratory performance		
	☐ Term paper		
	☐ Presentation		
	☐ Certificate		
Exam performance	☒ Written exam		
	☐ Oral exam		
	☐ Term paper		
	☒ Project paper		
	☐ Laboratory performance		
	☐ Final thesis and oral exam		
	☐ presentation		
	☐ Portfolio		
Usability	Master Mechanical Engineering - (PO 2015)	☒ RM	
	Master Interdisciplinary Engineering - (PO 2021)	☒ CEM	
	Master Industrial Engineering - (PO 2015)	☒ CEM	
Offer	☐ Winter semester ☒ Summer semester ☐ Irregular		
Workload	Credit points	Contact time	Self-study
	5	60 hours [4 hours per week]	90 hours
Language	German		
Duration of the module	1 Semester		
Approved aids for the exam performance	Will be announced in the lecture		
Lecturer(s)	Mr. Prof. Dr. Sven König		
Responsible(s)	Mr. Prof. Dr. Sven König		
Comment			
Change date	10.02.2026		

German Accounting			
Content	- Statutory regulations on the keeping of of books and the preparation of the annual financial statements - Principles of proper bookkeeping and accounting - Fundamentals of accounting technique and double-entry bookkeeping - Accounting treatment of business transactions in commercial, financial and industrial enterprises - Accounting entries for preparing the annual financial statements (balance sheet and profit and loss account)		
Competency goals	After successful participation, students - understand the main principles and rules; - can apply these principles and rules; - understand the mapping of economic decisions in financial accounting and are familiar with the techniques of double-entry bookkeeping - can explain the difference between business transactions that do not affect profit or loss and those that do, and can book the corresponding business transactions; and - have an understanding of various accounting problems.		
Teaching form	☒ Lecture		
	☐ Exercise		
	☐ Seminar/seminar exercise		
	☐ Laboratory		
	☐ Project		
Recommended Prerequesites			
Literature	• Brösel, Gerrit/Freichel, Christoph/Mindermann Torsten: German Accounting - A Guide for Students and Professionals, Berlin - ESV, 2022 (2nd, revised and updated edition) • Nothelfer, Robert: Financial Accounting, Introduction to German GAAP with exercises, 2017.		
Study performance	☐ Exercise performance		
	☐ Laboratory performance		
	☐ Term paper		
	☐ Presentation		
	☐ Certificate		
Exam performance	☒ Written exam		
	☐ Oral exam		
	☐ Term paper		
	☐ Project paper		
	☐ Laboratory performance		
	☐ Final thesis and oral exam		
	☐ presentation		
	☐ Portfolio		
Usability	Master Interdisciplinary Engineering - (PO 2021)		☒ CEM
Offer	☐ Winter semester ☒ Summer semester ☐ Irregular		
Workload	Credit points	Contact time	Self-study
	5	60 hours [4 hours per week]	90 hours
Language	English		
Duration of the module	1 Semester		
Approved aids for the exam performance	Calculator (not programmable)		
Lecturer(s)	Mr. Prof. Dr. Björn Kirsten		
Responsible(s)	Mr. Prof. Dr. Björn Kirsten		
Comment	module core discipline industrial engineering		
Change date	08.12.2025		

German as Foreign Language			
Content			
Competency goals	The course is aimed at acquiring and developing written and oral communication skills and is guided by the requirements of the Common European Framework of Reference for Languages (CEFR). We will listen to audio texts introducing various new word ˙elds, structures and idioms based on the authentic reading. Students will practice their oral and written communication skills in simple everyday situations as well as reading and listening to texts on topics related to everyday life. In addition, comprehension strategies are practiced. We will talk a lot, but of course we will also practice grammar. Writing and listening are also part of language acquisition.		
Teaching form	☒ Lecture		
	☒ Exercise		
	☐ Seminar/seminar exercise		
	☐ Laboratory		
	☐ Project		
Recommended Prerequesites			
Literature	• wird in der Veranstaltung bekanntgegeben		
Study performance	☐ Exercise performance		
	☐ Laboratory performance		
	☐ Term paper		
	☐ Presentation		
	☐ Certificate		
Exam performance	☒ Written exam		
	☐ Oral exam		
	☐ Term paper		
	☐ Project paper		
	☐ Laboratory performance		
	☐ Final thesis and oral exam		
	☐ presentation		
	☐ Portfolio		
Usability	Master Interdisciplinary Engineering - (PO 2021)	☒ CEM	
Offer	☒ Winter semester ☒ Summer semester ☐ Irregular		
Workload	Credit points: 5	Contact time: 60 hours [4 hours per week]	Self-study: 90 hours
Language	German		
Duration of the module	1 Semester		
Approved aids for the exam performance	None		
Lecturer(s)	N. N.		
Responsible(s)	Mr. Prof. Dr.-Ing. Dara Feili		
Comment	The lecture can only be recognized once as a compulsory elective module in accordance with the examination regulations. A maximum of 5 ECTS credits can be earned. The prerequisite for the awarding of ECTS points is the successful completion of the listed exam and study performances. Prerequisite for taking the exam performance: Attendance is compulsory; a maximum of three absences will be tolerated. Module for all core disciplines		
Change date	20.11.2025		

Higher Machine Elements (M)			
Content	Gear drives with optimized involute toothing (profile shifting, helical toothing); compensating clutches; shiftable clutches; automatically shifting clutches (overload clutch, centrifugal clutch, freewheel), load distribution problems in moving systems (multi-motor drive; load distribution to several outputs); multi-stage gearboxes; optimization of the transmission ratio when coupling motor and driven machine; power adjustment		
Competency goals	After successful completion of the module, students are able to understand, design, construct and dimension machine elements in complex interaction. In doing so, facts outside of classical mechanics (e.g. from of thermodynamics) are used.		
Teaching form	☒ Lecture		
	☒ Exercise		
	☐ Seminar/seminar exercise		
	☐ Laboratory		
	☐ Project		
Recommended Prerequesites			
Literature	• Hinzen, H.: Maschinenelemente 1 (5. Auflage); De Gruyter Oldenbourg, Berlin/Boston, 2022 • Hinzen, H.: Maschinenelemente 2 (5. Auflage); De Gruyter Oldenbourg, Berlin/Boston, 2022 • Hinzen, H.: Maschinenelemente 3 (3. Auflage); De Gruyter Oldenbourg, Berlin/Boston, 2022 • ergänzende Aufgabensammlung auf den Internetseiten des De Gruyter Verlags		
Study performance	☒ Exercise performance		
	☐ Laboratory performance		
	☐ Term paper		
	☐ Presentation		
	☐ Certificate		
Note on study performance	The study performance is a prerequisite for taking the exam		
Exam performance	☒ Written exam		
	☐ Oral exam		
	☐ Term paper		
	☐ Project paper		
	☐ Laboratory performance		
	☐ Final thesis and oral exam		
	☐ presentation		
	☐ Portfolio		
Usability	Master Mechanical Engineering - (PO 2015)	☒ CEM	
	Master Interdisciplinary Engineering - (PO 2021)	☒ CEM	
	Master Industrial Engineering - (PO 2015)	☒ CEM	
Offer	☐ Winter semester ☒ Summer semester ☐ Irregular		
Workload	Credit points	Contact time	Self-study
	5	60 hours [4 hours per week]	90 hours
Language	German		
Duration of the module	1 Semester		
Approved aids for the exam performance	Will be announced in the lecture		
Lecturer(s)	Mr. Prof. Dr.-Ing. Heiko Michael Bossong		
Responsible(s)	Mr. Prof. Dr.-Ing. Heiko Michael Bossong		
Comment			
Change date	02.10.2025		

Innovation management			
Content	Global competition for the development of new products and technologies requires well-thought-out innovation management for the development and refinement of products and services. Winning or maintaining market share, including employees! That is why the state and companies themselves promote innovation. In the lecture of the same name, students are familiarized with the conditions that must be met for companies to become or remain innovative, flexible, and agile.		
Competency goals	Knowledge and understanding: Explain basic concepts, theories, and models of innovation management, identify key tools and methods of innovation management, and explain their areas of application. Application and analysis: Apply innovation management methods to practical problems, analyze innovation processes in companies, and identify potential for improvement. Evaluation and design: Selecting suitable instruments to support innovation projects and using them in a well-founded manner, actively shaping and supporting innovation activities in companies. Communication and teamwork: Presenting and discussing results from innovation projects in a structured manner, working cooperatively on innovation-related issues in interdisciplinary teams.		
Teaching form	☒ Lecture		
	☒ Exercise		
	☐ Seminar/seminar exercise		
	☐ Laboratory		
	☐ Project		
Recommended Prerequesites			
Literature			
Study performance	☐ Exercise performance		
	☐ Laboratory performance		
	☒ Term paper		
	☐ Presentation		
	☐ Certificate		
Exam performance	☐ Written exam		
	☒ Oral exam		
	☐ Term paper		
	☐ Project paper		
	☐ Laboratory performance		
	☐ Final thesis and oral exam		
	☐ presentation		
	☐ Portfolio		
Usability	Master Interdisciplinary Engineering - (PO 2021)	☒ CEM	
	Master Electrical Engineering (-Cooperative Study Programme) - (FPO 2024 FPO 2025)	☒ CEM	
	Master Electrical Engineering - (PO 2019)	☒ CEM	
	Master Mechanical Engineering - (PO 2015)	☒ CEM	
Offer	☒ Winter semester ☐ Summer semester ☐ Irregular		
Workload	Credit points	Contact time	Self-study
	5	60 hours [4 hours per week]	90 hours
Language	German or English		
Duration of the module	1 Semester		
Approved aids for the exam performance	Will be announced in the lecture		
Lecturer(s)	wechselnde Patentanwälte		
Responsible(s)	Mr. Prof. Dr.-Ing. Klaus Peter Koch, Mr. Prof. Dr. Christian Kontermann		
Comment			
Change date	26.02.2026		

<table>
<tr><th colspan="4">Internal Combustion Engines I (M)</th></tr>
<tr><td>Content</td><td colspan="3">The following topics are covered in the VBM I lecture: Introduction (engine categories, two- and four-stroke processes, fuels and emissions), essential parameters, applied thermodynamics and operating
procedures (ideal processes, perfect engine, real process, loss sharing), combustion and charge cycling, components and component groups, engine and engine dynamics, exhaust gas aftertreatment, and the use of the engine, charge</td></tr>
<tr><td>Competency goals</td><td colspan="3">The students learn in depth the basics of combustion engines and their essential components as well as the influence of the operating mode with regard to pollutant formation and fuel consumption. After
completing the module, they will be able to perform scientific calculations and estimations. On the basis of the results, they will be able to analyze and assess problems as well as to develop alternative
solutions, design operating modes.</td></tr>
<tr><td rowspan="5">Teaching form</td><td colspan="3">☒ Lecture</td></tr>
<tr><td colspan="3">☐ Exercise</td></tr>
<tr><td colspan="3">☐ Seminar/seminar exercise</td></tr>
<tr><td colspan="3">☐ Laboratory</td></tr>
<tr><td colspan="3">☐ Project</td></tr>
<tr><td>Recommended Prerequesites</td><td colspan="3"></td></tr>
<tr><td>Literature</td><td colspan="3">• Grundlagen und Technologien des Ottomotors (Eichlseder, Klüting, Piok, Springer Verlag)
• Aufladung von Verbrennungsmotoren (Pucher, Zinner, Springer Verlag)
• Handbuch Verbrennungsmotoren (van Basshuysen, Schäfer, Springer Vieweg Verlag)
• Verbrennungsmotoren Lehrbuch (Merker, Schwarz, Stisch,Otto,Teubner Verlag)
• Vorlesungsskript VBM I (Heinrich) und Klausurensammlung</td></tr>
<tr><td rowspan="5">Study performance</td><td colspan="3">☐ Exercise performance</td></tr>
<tr><td colspan="3">☐ Laboratory performance</td></tr>
<tr><td colspan="3">☐ Term paper</td></tr>
<tr><td colspan="3">☐ Presentation</td></tr>
<tr><td colspan="3">☐ Certificate</td></tr>
<tr><td rowspan="8">Exam performance</td><td colspan="3">☒ Written exam</td></tr>
<tr><td colspan="3">☐ Oral exam</td></tr>
<tr><td colspan="3">☐ Term paper</td></tr>
<tr><td colspan="3">☐ Project paper</td></tr>
<tr><td colspan="3">☐ Laboratory performance</td></tr>
<tr><td colspan="3">☐ Final thesis and oral exam</td></tr>
<tr><td colspan="3">☐ presentation</td></tr>
<tr><td colspan="3">☐ Portfolio</td></tr>
<tr><td rowspan="4">Usability</td><td>Master Mechanical Engineering - General Mechanical Engineering (PO 2015)</td><td>☒ CEM</td></tr>
<tr><td>Master Mechanical Engineering - Automotive Engineering (PO 2015)</td><td>☒ RM</td></tr>
<tr><td>Master Interdisciplinary Engineering - (PO 2021)</td><td>☒ CEM</td></tr>
<tr><td>Master Industrial Engineering - (PO 2015)</td><td>☒ CEM</td></tr>
<tr><td>Offer</td><td colspan="3">☒ Winter semester ☐ Summer semester ☐ Irregular</td></tr>
<tr><td>Workload</td><td colspan="3"><table><tr><th>Credit points</th><th>Contact time</th><th>Self-study</th></tr><tr><td>5</td><td>60 hours [4 hours per week]</td><td>90 hours</td></tr></table></td></tr>
<tr><td>Language</td><td colspan="3">German</td></tr>
<tr><td>Duration of the module</td><td colspan="3">1 Semester</td></tr>
<tr><td>Approved aids for the exam performance</td><td colspan="3">None</td></tr>
<tr><td>Lecturer(s)</td><td colspan="3">Mr. Prof. Dr.-Ing. Christoph Heinrich</td></tr>
<tr><td>Responsible(s)</td><td colspan="3">Mr. Prof. Dr.-Ing. Christoph Heinrich, N. N.</td></tr>
<tr><td>Comment</td><td colspan="3"></td></tr>
<tr><td>Change date</td><td colspan="3">02.10.2025</td></tr>
</table>

Internal Combustion Engines II (M)			
Content	This course builds on the lecture VBM I in connection with the continuing engine laboratory. In new learning forms (learning teams), the students are to work on and present scientific questions on selected, innovative topics of engine technology. Integrated in the course, the students have to participate in the engine laboratory. In this course, students are familiarized with modern engine testing methods. In particular, fuel consumption, power and exhaust gas measurements are to be carried out under variation of certain parameters. Furthermore, an introduction to the one-dimensional modeling is given to process simulation takes place.		
Competency goals	After completion of the module, the students are able to analyze, evaluate and present scientific questions in the field of combustion engines. They know the essential measurement methods for power, consumption and exhaust gas measurements and are able to perform evaluations on their own. They are able to evaluate measurement results and to compare them with simulation results as well as to develop their own experiments for technical development issues. In this way, they improve their self-competence with regard to the development of technical solutions, here specifically using the example of the internal combustion engine. By working together in learning teams, the social competence is also improved tence further expanded.		
Teaching form	☒ Lecture		
	☐ Exercise		
	☒ Seminar/seminar exercise		
	☒ Laboratory		
	☐ Project		
Recommended Prerequesites			
Literature	• Aufladung von Verbrennungsmotoren (Pucher, Zinner, Springer Verlag) • Grundlagen und Technologien des Ottomotors (Eichlseder, Klüting, Piok, Springer Verlag) • Handbuch Verbrennungsmotoren (van Basshuysen, Schäfer, Springer Vieweg Verlag) • Verbrennungsmotoren Lehrbuch (Merker, Schwarz, Stisch, Otto,Teubner Verlag)		
Study performance	☐ Exercise performance		
	☐ Laboratory performance		
	☐ Term paper		
	☐ Presentation		
	☐ Certificate		
Exam performance	☐ Written exam		
	☒ Oral exam		
	☐ Term paper		
	☒ Project paper		
	☐ Laboratory performance		
	☐ Final thesis and oral exam		
	☐ presentation		
	☐ Portfolio		
Usability	Master Mechanical Engineering - (PO 2015)	☒ CEM	
	Master Interdisciplinary Engineering - (PO 2021)	☒ CEM	
	Master Industrial Engineering - (PO 2015)	☒ CEM	
Offer	☐ Winter semester ☒ Summer semester ☐ Irregular		
Workload	Credit points	Contact time	Self-study
	5	60 hours [4 hours per week]	90 hours
Language	German		
Duration of the module	1 Semester		
Approved aids for the exam performance	None		
Lecturer(s)	Mr. Prof. Dr.-Ing. Christoph Heinrich		
Responsible(s)	Mr. Prof. Dr.-Ing. Christoph Heinrich, N. N.		
Comment			

Change date	02.10.2025

International Management (M)			
Content	Students learn about key issues such as “Basics of international Management”, “Globalisation and International linkages”, “International strategy formulation and implementation”, “Role of culture/Managing across cultures”, “Motivation/Leadership across cultures”, “International Human resource selection and development across cultures” and “Entry strategies and organisational structures”.		
Competency goals	Students will be able to compare individual business practices of selected cultures and assess their reaction to their own behavior. They will be able to develop concepts for the internationalization of a company on the basis of international management.		
Teaching form	☒ Lecture		
	☐ Exercise		
	☐ Seminar/seminar exercise		
	☐ Laboratory		
	☐ Project		
Recommended Prerequesites			
Literature	• Deresky and Miller „International Management: Managing across borders and cultures“ 978-1292430362 Doh et al „International Management: Culture, Strategy and Behaviour“ ISBN13: 9781266061318 • Vorlesungsunterlagen		
Study performance	☐ Exercise performance		
	☐ Laboratory performance		
	☐ Term paper		
	☐ Presentation		
	☐ Certificate		
Exam performance	☒ Written exam		
	☐ Oral exam		
	☐ Term paper		
	☐ Project paper		
	☐ Laboratory performance		
	☐ Final thesis and oral exam		
	☐ presentation		
	☐ Portfolio		
Usability	Master Industrial Engineering - (PO 2015)	☒ RM	
	Master Mechanical Engineering - (PO 2015)	☒ CEM	
	Master Interdisciplinary Engineering - (PO 2021)	☒ CEM	
	Master Industrial Engineering - (FPO 2027)	☒ RM	
	Master Mechanical Engineering - (FPO 2027)	☒ CEM	
Offer	☒ Winter semester ☐ Summer semester ☐ Irregular		
Workload	Credit points	Contact time	Self-study
	5	60 hours [4 hours per week]	90 hours
Language	English		
Duration of the module	1 Semester		
Approved aids for the exam performance	None		
Lecturer(s)	Mr. Prof. Dr. Tobias Richter		
Responsible(s)	Mr. Prof. Dr. Björn Kirsten		
Comment	Block event		
Change date	17.12.2025		

International Marketing			
Content	Decisions whether to internationalize Decisions which markets to enter: global marketing research Decisions which markets to enter: market selection process Decisions in t erms of market entry strategies: intermediate modes Decisions in terms of market entry strategies: hierarchical modes Decisions with regard to the global marketing mix: product issues Decisions with regard to the global marketing mix: promotion issues Decisions with regard to the global marketing mix: price issues Decisions with regard to the global marketing mix: distribution issues Decisions with regard to implementing and coordinat ing: organization Decisions with regard to implementing and coordinat ing: negotiations Decisions with regard to implementing and coordinat ing: control		
Competency goals	Students know basic elements of international marketing with practical relevance for decision making in international and global market environments. Students can apply these concepts for the solution of examples of international marketing. Students can translate international marketing into major conceptual building blocks [e.g. strategic versus tactical decision -making in global marketing), can come up with adequate market evaluations and find decent solutions for particular target markets and world regions. Students have successfully applied self-contained learning strategies and have maintained motivation to achieve results.		
Teaching form	☒ Lecture		
	☐ Exercise		
	☐ Seminar/seminar exercise		
	☐ Laboratory		
	☐ Project		
Recommended Prerequesites			
Literature	• Keegan, W. & Green, M. [latest ed): Global Marketing. Harlow: Prentice Hall.		
Study performance	☐ Exercise performance		
	☐ Laboratory performance		
	☐ Term paper		
	☐ Presentation		
	☐ Certificate		
Exam performance	☒ Written exam		
	☐ Oral exam		
	☐ Term paper		
	☐ Project paper		
	☐ Laboratory performance		
	☐ Final thesis and oral exam		
	☐ presentation		
	☐ Portfolio		
Usability	Master Interdisciplinary Engineering - (PO 2021)		☒ CEM
Offer	☐ Winter semester ☒ Summer semester ☐ Irregular		
Workload	Credit points	Contact time	Self-study
	5	60 hours [4 hours per week]	90 hours
Language	English		
Duration of the module	1 Semester		
Approved aids for the exam performance	None		
Lecturer(s)	Mr. Prof. Dr. Christian Kontermann		
Responsible(s)	Mr. Prof. Dr. Christian Kontermann		
Comment	Module for core discipline industrial engineering		
Change date	19.01.2026		

Machine Tools and Production Lines I (M)		
Content	Please note: The language of this lecture is German, no English translation will be provided! The language of the exam for this lecture is also German, all your answers must also be given in German! If you are not able to follow the lecture in German at Master level, please choose another lecture which is held in English. - Introduction to machine tools and production equipment - Frames, frame components, foundations - Geometric and thermal machine behavior - Slideways and plain bearings, hydrostatic, hydrodynamic and aerostatic plain bearings, magnetic bearings - Rolling guides and bearings, spindle bearing systems, seals, covers - Motors, feed drives - Gearboxes for machine tools and production equipment - Equipment and components of machine tools - Clamping of workpieces and clamping devices for machine tools - Machine acceptance, measurement and protective devices on machine tools - Noise behavior of machine tools and production equipment - Coordinate systems - Cutting machine tools with geometrically determined cutting edge: Fräsen	
Competency goals	After successful completion of the module, students will be able - to describe the boundary conditions for the use of machine tools in the industrial environment. - recognize and compare the design, construction and basic types of machine tools. - derive the requirements for machine tools according to the situation. - Discuss basic machine tool types and basic production equipment types and evaluate them according to their intended use. - Select suitable machine tools for solving a manufacturing task. - Evaluate the use of machine tools and production equipment in the modern manufacturing process. - the use of machine tools and production equipment in production the following table shows the results of the evaluation and transfe to similar systems.	
Teaching form	☒ Lecture	
	☐ Exercise	
	☐ Seminar/seminar exercise	
	☐ Laboratory	
	☐ Project	
Recommended Prerequesites		
Literature	• Vorlesungsunterlagen, Skript • Literaturempfehlung: Weck/Brecher, ”Werkzeugmaschinen”, Band 1-5 (in der Bibliothek mehrfach vorhanden)	
Study performance	☐ Exercise performance	
	☐ Laboratory performance	
	☐ Term paper	
	☐ Presentation	
	☐ Certificate	
Exam performance	☒ Written exam	
	☐ Oral exam	
	☐ Term paper	
	☐ Project paper	
	☐ Laboratory performance	
	☐ Final thesis and oral exam	
	☐ presentation	
	☐ Portfolio	
Usability	Master Industrial Engineering - (PO 2015)	☒ RM
	Master Mechanical Engineering - Automotive Engineering (PO 2015)	☒ CEM
	Master Mechanical Engineering - General Mechanical Engineering (PO 2015)	☒ RM
	Master Interdisciplinary Engineering - (PO 2021)	☒ CEM
Offer	☒ Winter semester ☐ Summer semester ☐ Irregular	

Workload	Credit points	Contact time	Self-study
	5	60 hours [4 hours per week]	90 hours
Language	German		
Duration of the module	1 Semester		
Approved aids for the exam performance	None		
Lecturer(s)	Mr. Prof. Dr.-Ing. Karl Hofmann-von Kap-herr		
Responsible(s)	Mr. Prof. Dr.-Ing. Karl Hofmann-von Kap-herr		
Comment	Please note: The language of this lecture is German, no English translation will be provided! The language of the exam for this lecture is also German, all your answers must also be given in German! If you are not able to follow the lecture in German at Master level, please choose another lecture which is held in English.		
Change date	26.01.2026		

Machine Tools and Production Lines II (M)		
Content	Please note: The language of this lecture is German, no English translation will be provided! The language of the exam for this lecture is also German, all your answers must also be given in German! If you are not able to follow the lecture in German at Master level, please choose another lecture which is held in English. - Cutting machines with geometrically determined cutting edge: turning, drilling - Cutting machines with geometrically indeterminate cutting edge: grinding machines, honing and lapping machines - Colants and lubricants on machine tools - Forming machines, Cutting machine tools - Spark erosion machines, water jet cutting machines - Multi-machine systems, hybrid machine tool concepts - Measuring devices, transmission elements, position measuring systems and control systems - Acceptance of machine tools - Low-noise machine design - Systems for process monitoring - Numerical controls, NC programming - Robots and manipulators - Laser machine	
Competency goals	Upon successful completion of the module, students will be able to describe the boundary conditions for the use of machine tools in the industrial environment. - recognize and compare the design, construction and basic types of machine tools. - derive the requirements for machine tools according to the situation. - Discuss basic machine tool types and basic production equipment types and evaluate them according to their intended use. - Select suitable machine tools for solving a manufacturing task. - Evaluate the use of machine tools and production equipment in the modern manufacturing process. - Evaluate the use of machine tools and production equipment in the production environment and to transfer to similar systems.	
Teaching form	☒ Lecture	
	☐ Exercise	
	☐ Seminar/seminar exercise	
	☐ Laboratory	
	☐ Project	
Recommended Prerequesites	• Machine Tools and Production Lines I (M)	
Literature	• Literaturempfehlung: Weck/Brecher, "Werkzeugmaschinen", Band 1-5 (in der Bibliothek mehrfach vorhanden) • Vorlesungsunterlagen, Skript	
Study performance	☐ Exercise performance	
	☐ Laboratory performance	
	☐ Term paper	
	☐ Presentation	
	☐ Certificate	
Exam performance	☒ Written exam	
	☐ Oral exam	
	☐ Term paper	
	☐ Project paper	
	☐ Laboratory performance	
	☐ Final thesis and oral exam	
	☐ presentation	
	☐ Portfolio	
Usability	Master Mechanical Engineering - General Mechanical Engineering (PO 2015)	☒ RM
	Master Mechanical Engineering - Automotive Engineering (PO 2015)	☒ CEM
	Master Industrial Engineering - (PO 2015)	☒ RM
	Master Interdisciplinary Engineering - (PO 2021)	☒ CEM
Offer	☐ Winter semester ☒ Summer semester ☐ Irregular	

Workload	Credit points	Contact time	Self-study
	5	60 hours [4 hours per week]	90 hours
Language	German		
Duration of the module	1 Semester		
Approved aids for the exam performance	None		
Lecturer(s)	Mr. Prof. Dr.-Ing. Karl Hofmann-von Kap-herr		
Responsible(s)	Mr. Prof. Dr.-Ing. Karl Hofmann-von Kap-herr		
Comment	Please note: The language of this lecture is German, no English translation will be provided! The language of the exam for this lecture is also German, all your answers must also be given in German! If you are not able to follow the lecture in German at Master level, please choose another lecture which is held in English.		
Change date	26.01.2026		

Manufacturing Processes and their Application (M)			
Content	-Product Life Cycle - New Product Introduction Process - Selected process sequences of advanced technologies (SMD Placement, Assembly, Test, Cable Production, Composite Component Production.....) - Planning and execution of manufacturing plants - Quality management tools (process FMEA, TQM, 7Q)		
Competency goals	In addition to the choice of process and the process design of the industrial production process, the process flows and their integration into the overall enterprise are decisive for the competitiveness of the enterprise. Selected process flows, their optimal design, planning and execution of industrial plants are in the center of the approach. The target is to present the technical challenges and to teach quality management methods to cope with them in the design phase and production process. The students understand the manufacturing processes of complex products, their dependence and the possibility to influence them preventively. They are able to apply the learned processes and methods to other manufacturing problems.		
Teaching form	☒ Lecture		
	☐ Exercise		
	☐ Seminar/seminar exercise		
	☐ Laboratory		
	☐ Project		
Recommended Prerequesites			
Literature	• Wittmann,A, Skript Fertigungstechnik II, Fertigung elektr. Baugruppen, Einführung neuer Produkte, 2010 • Grundig, Claus, Fabrikplanung, Hanser Verlag, 2009 • Aggteleky, Bela, Fabrikplanung, Hanser Verlag München 1970		
Study performance	☐ Exercise performance		
	☒ Laboratory performance		
	☐ Term paper		
	☐ Presentation		
	☐ Certificate		
Note on study performance	The study performance is a prerequisite for taking the exam		
Exam performance	☒ Written exam		
	☐ Oral exam		
	☐ Term paper		
	☐ Project paper		
	☐ Laboratory performance		
	☐ Final thesis and oral exam		
	☐ presentation		
	☐ Portfolio		
Usability	Master Mechanical Engineering - General Mechanical Engineering (PO 2015)	☒ RM	
	Master Mechanical Engineering - Automotive Engineering (PO 2015)	☒ CEM	
	Master Industrial Engineering - (PO 2015)	☒ RM	
	Master Interdisciplinary Engineering - (PO 2021)	☒ CEM	
Offer	☒ Winter semester ☐ Summer semester ☐ Irregular		
Workload	Credit points	Contact time	Self-study
	5	60 hours [4 hours per week]	90 hours
Language	German		
Duration of the module	1 Semester		
Approved aids for the exam performance	None		
Lecturer(s)	Mr. Prof. Dr. Armin Wittmann		
Responsible(s)	Mr. Prof. Dr. Armin Wittmann		

Comment	The module includes a total of 6 appointments in two different laboratories, in which the students can put into practice the theoretical knowledge they have acquired.(course work laboratory work).
Change date	08.12.2025

Master Interdisciplinary Project			
Content	The interdisciplinary project contains subject matter from at least two disciplines. The further definition of the content depends on the assigned topic. If possible, the interdisciplinary project is to be worked on in a team. Interdisciplinary projects are typically offered by all professors.		
Competency goals	After successful completion of the module, students will be able to • analyze methodically through the accomplishment of qualified scientific interdisciplinary tasks, the content of which is oriented to the profile of the later professional activity, • develop solutions in the area of technical/informatic qualification, • compare approaches to solutions using scientific working methods, • independently analyze and solve problems, • to publish scientific papers on the work carried out. • Area-specific and cross-area discussions, where appropriate, in the self-organized team.		
Teaching form	☐ Lecture		
	☐ Exercise		
	☐ Seminar/seminar exercise		
	☐ Laboratory		
	☐ Project		
Recommended Prerequesites			
Literature	• - Wissenschaftliches Schreiben und Abschlussarbeit in Natur- und Ingenieurwissenschaften, Andreas Hirsch-Weber, Stefan Scherer, UTB Verlag - Entsprechend dem Thema		
Study performance	☐ Exercise performance		
	☐ Laboratory performance		
	☐ Term paper		
	☐ Presentation		
	☐ Certificate		
Exam performance	☐ Written exam		
	☐ Oral exam		
	☐ Term paper		
	☒ Project paper		
	☐ Laboratory performance		
	☐ Final thesis and oral exam		
	☐ presentation		
	☐ Portfolio		
Usability	Master Interdisciplinary Engineering - (PO 2021)		☒ RM
Offer	☒ Winter semester ☒ Summer semester ☐ Irregular		
Workload	Credit points	Contact time	Self-study
	10	0 hours [0 hours per week]	300 hours
Language	German and English		
Duration of the module	1 Semester		
Approved aids for the exam performance	None		
Lecturer(s)	Alle Professorinnen und Professoren des Fachbereichs Technik		
Responsible(s)	Mr. Prof. Dr. Christian Kontermann		
Comment			
Change date	26.06.2025		

Master Interdisciplinary Seminar			
Content	The content of the interdisciplinary seminar is determined at the beginning of the semester. The selection of topics will be based on an interdisciplinary approach. Treatment of a complex topic emphasized. Within the seminar, each participant will (for example) give 2 presentations of 12 minutes each followed by a discussion in the group. In addition, a 4-page scientific paper will be written on the topic. (These requirements may vary depending on lecturer)		
Competency goals	Upon successful completion of the module, students will be able to, • systematically and purposefully identify scientific literature and publications, including those in English and related fields, by appropriate means, • Analyze and evaluate the contents of current, application-oriented and theoretical methods with regard to their relevance to the research question, • to elaborate and present the core of the content, • prepare professional presentations and present them in a convincg maner, • Discussions on scientific topics in the interdisciplinary discourse to be moderated.		
Teaching form	☐ Lecture		
	☐ Exercise		
	☒ Seminar/seminar exercise		
	☐ Laboratory		
	☐ Project		
Recommended Prerequesites			
Literature	• - Wissenschaftliches Schreiben und Abschlussarbeit in Natur- und Ingenieurwissenschaften, Andreas Hirsch-Weber, Stefan Scherer, UTB Verlag - Entsprechend dem vergebenen Thema		
Study performance	☐ Exercise performance		
	☐ Laboratory performance		
	☐ Term paper		
	☐ Presentation		
	☐ Certificate		
Exam performance	☐ Written exam		
	☐ Oral exam		
	☒ Term paper		
	☐ Project paper		
	☐ Laboratory performance		
	☐ Final thesis and oral exam		
	☒ presentation		
	☐ Portfolio		
Usability	Master Interdisciplinary Engineering - (PO 2021)		☒ RM
Offer	☒ Winter semester ☒ Summer semester ☐ Irregular		
Workload	Credit points	Contact time	Self-study
	5	30 hours [2 hours per week]	120 hours
Language	German and English		
Duration of the module	1 Semester		
Approved aids for the exam performance	None		
Lecturer(s)	Alle Professorinnen und Professoren des Fachbereichs Technik		
Responsible(s)	Mr. Prof. Dr. Volker Lücken		
Comment			
Change date	04.03.2025		

Master Thesis - Final Thesis			
Content	The content of the master thesis has an interdisciplinary character. This means that contents of different disciplines are integrated in the thesis. The further content depends on the assigned topic.		
Competency goals	Upon successful completion of the module, students will be able to, • to methodically analyze and develop scientific questions through the accomplishment of qualified development tasks, the content of which is oriented towards the profile of the later interdisciplinary professional activity. • to develop solutions in the field of engineering / informatics qualification, • with scientific/technical/informatic working methods compare and select solutions and justify the selection. • to recognize the framework of professional action in a situation appropriate and cross-situational manner and to reflect on decisions in a responsible and ethical manner. • to analyze and solve problems independently and to acquire new knowledge and skills on their own. • to write technical papers on the work carried out. Students will be able to present and discuss theoretical and methodological issues in front of and with experts in the field, to present and justify their work with sound reasoning.		
Teaching form	☐ Lecture		
	☐ Exercise		
	☐ Seminar/seminar exercise		
	☐ Laboratory		
	☐ Project		
Recommended Prerequesites			
Literature	• - Wissenschaftliches Schreiben und Abschlussarbeit in Natur- und Ingenieurwissenschaften, Andreas Hirsch-Weber, Stefan Scherer, UTB Verlag - Entsprechend dem Thema der Arbeit		
Study performance	☐ Exercise performance		
	☐ Laboratory performance		
	☐ Term paper		
	☐ Presentation		
	☐ Certificate		
Exam performance	☐ Written exam		
	☒ Oral exam		
	☒ Term paper		
	☐ Project paper		
	☐ Laboratory performance		
	☐ Final thesis and oral exam		
	☐ presentation		
	☐ Portfolio		
Usability	Master Interdisciplinary Engineering - (PO 2021)		☒ RM
Offer	☒ Winter semester ☒ Summer semester ☐ Irregular		
Workload	Credit points	Contact time	Self-study
	30	0 hours [0 hours per week]	900 hours
Language	German and English		
Duration of the module	1 Semester		
Approved aids for the exam performance	None		
Lecturer(s)	Alle Professorinnen und Professoren des Fachbereichs Technik		
Responsible(s)	Mr. Prof. Dr. Elmar Seidenberg		
Comment			
Change date	04.03.2025		

Material Management and Logistics (M)			
Content	Competitive vertical integration and procurement Instruments of materials management, production planning and control Approaches to lead time reduction and supply chain management. planning methods		
Competency goals	After successful participation, students will know the basics of materials management and understand the instruments of materials management and supply chain management, including logistics in virtual company networks. The students know the basics of strategic planning within materials management and internal logistics. The students know advantages and disadvantages of different product structures, bill of material structures and numbering systems. The students know the procurement process and material planning procedures. The students understand the different warehouse and supply systems and their advantages and disadvantages.		
Teaching form	☒ Lecture		
	☐ Exercise		
	☐ Seminar/seminar exercise		
	☐ Laboratory		
	☐ Project		
Recommended Prerequesites			
Literature	• Becker, Thorsten, Prozesse in der Produktion und Supply Chain, Springer-Verlag, 2008 • Templemeier, Horst, Material-Logistik, 7. Auflage, Springer Verlag, 2008 • Härder, Jürgen „Betriebswirtschaft für Ingenieure“, 4. Auflage, Hanser Verlag, 2010 • Corsten, Hans „Produktionswirtschaft“, 11. Auflage, Oldenbourg Verlag, 2007 • Homburg, Christian, „Quantitative Betriebswirtschaftslehre“, Gabler Verlag, 3. Auflage, 2000 • Wiendahl, Hans-Peter, Betriebsorganisation, 6. Auflage, Hanser Verlag, 2008		
Study performance	☐ Exercise performance		
	☐ Laboratory performance		
	☐ Term paper		
	☐ Presentation		
	☒ Certificate		
Note on study performance	The study performance is a prerequisite for taking the exam		
Exam performance	☒ Written exam		
	☐ Oral exam		
	☐ Term paper		
	☐ Project paper		
	☐ Laboratory performance		
	☐ Final thesis and oral exam		
	☐ presentation		
	☐ Portfolio		
Usability	Master Industrial Engineering - (PO 2015)	☒ RM	
	Master Mechanical Engineering - (PO 2015)	☒ CEM	
	Master Interdisciplinary Engineering - (PO 2021)	☒ CEM	
Offer	☒ Winter semester ☐ Summer semester ☐ Irregular		
Workload	Credit points	Contact time	Self-study
	5	60 hours [4 hours per week]	90 hours
Language	English		
Duration of the module	1 Semester		
Approved aids for the exam performance	None		
Lecturer(s)	Mr. Prof. Dr. Armin Wittmann		
Responsible(s)	Mr. Prof. Dr. Armin Wittmann		
Comment	For the successful participation in the excursion in the context of the lecture the students receive a test certificate at the end of the course.		
Change date	09.12.2025		

Microsystems for Life Sciences			
Content			
Competency goals			
Teaching form	☒ Lecture		
	☐ Exercise		
	☐ Seminar/seminar exercise		
	☐ Laboratory		
	☐ Project		
Recommended Prerequesites			
Literature	• M. Madou: Fundamentals of Microfabrication • Albert Folch: Introduction to BioMEMS		
Study performance	☐ Exercise performance		
	☐ Laboratory performance		
	☐ Term paper		
	☐ Presentation		
	☐ Certificate		
Exam performance	☒ Written exam		
	☐ Oral exam		
	☐ Term paper		
	☐ Project paper		
	☐ Laboratory performance		
	☐ Final thesis and oral exam		
	☐ presentation		
	☐ Portfolio		
Usability	Master Electrical Engineering (-Cooperative Study Programme) - (FPO 2024 FPO 2025)	☒ BM	
	Master Interdisciplinary Engineering - (PO 2021)	☒ CEM	
Offer	☐ Winter semester ☒ Summer semester ☐ Irregular		
Workload	Credit points	Contact time	Self-study
	5	60 hours [4 hours per week]	90 hours
Language	German		
Duration of the module	1 Semester		
Approved aids for the exam performance	None		
Lecturer(s)	Mr. Prof. Dr.-Ing. Dara Feili		
Responsible(s)	Mr. Prof. Dr.-Ing. Dara Feili		
Comment			
Change date	09.12.2025		

Model-Based Optimal Estimation			
Content	Basics of deterministic observers - Luenberger observer - Nonlinear observers Fundamentals of stochastic processes - Random variables and probability space - Expected values and moments - Bayes' theorem - Correlation and covariance - Power density spectra - Brownian processes Applications - Kalman filter as a stochastic optimal filter method - Extended Kalman filter for non-linear problems - Application examples from practice		
Competency goals	This course enables students to understand important methods of state estimation in theory and practice. The strong connection between theory and application should also enable students to perform transfer work in the very broad field of stochastic signal processing. Students will be able to simulatively analyze individual tasks of optimal state observation from different fields of application (medical technology, automotive engineering, automation, navigation, etc.). They can design optimal state estimation methods for linear and non-linear systems and verify them with simulation. They are able to document and present their results in an appropriate form (good scientific practice).		
Teaching form	☒ Lecture		
	☐ Exercise		
	☐ Seminar/seminar exercise		
	☐ Laboratory		
	☐ Project		
Recommended Prerequesites	• Analysis 1 • Analysis 2 • •		
Literature	• "Estimationstheorie I + II", Loffeld • "Stochastic models, estimation, and control I-III", P.S.Maybeck • "Applied optimal Estimation", A.Gelb		
Study performance	☐ Exercise performance		
	☐ Laboratory performance		
	☐ Term paper		
	☐ Presentation		
	☐ Certificate		
Exam performance	☐ Written exam		
	☒ Oral exam		
	☐ Term paper		
	☒ Project paper		
	☐ Laboratory performance		
	☐ Final thesis and oral exam		
	☐ presentation		
	☐ Portfolio		
Usability	Master Electrical Engineering - (PO 2019)	☒ CEM	
	Master Electrical Engineering (-Cooperative Study Programme) - (FPO 2024 FPO 2025)	☒ CEM	
	Master Interdisciplinary Engineering - (PO 2021)	☒ CEM	
Offer	☐ Winter semester ☒ Summer semester ☐ Irregular		
Workload	Credit points	Contact time	Self-study
	5	60 hours [4 hours per week]	90 hours
Language	German and English		
Duration of the module	1 Semester		

Approved aids for the exam performance	None
Lecturer(s)	Mr. Prof. Dr. Matthias Scherer
Responsible(s)	Mr. Prof. Dr. Matthias Scherer
Comment	
Change date	08.12.2025

Modern Electric Drives			
Content	Topics covered: o Dimensioning of transformers and transient processes in transformers o Surge short circuit in synchronous generators o Slot harmonics in the induction machine o Transient behavior of the induction machine o Field-oriented control of the induction machine o Field-oriented control of the permanent magnetized synchronous machine o Calculation of linear drives, including end effects		
Competency goals	After successfully completing the module, students will understand the dynamic properties of electric drives and be able to reproduce various situations with the help of simulation tools. They have knowledge of the basic mathematical methods for analyzing dynamic problems. Furthermore, they will be able to carry out calculations of magnetic circuits for both static and dynamic problems using an FEM program.		
Teaching form	☒ Lecture		
	☒ Exercise		
	☐ Seminar/seminar exercise		
	☐ Laboratory		
	☐ Project		
Recommended Prerequesites			
Literature	• Dierk Schröder: Elektrische Antriebstechnik - Regelung von Antriebssystemen • Dieter Gerling: Electrical Machines		
Study performance	☐ Exercise performance		
	☐ Laboratory performance		
	☐ Term paper		
	☐ Presentation		
	☐ Certificate		
Exam performance	☐ Written exam		
	☒ Oral exam		
	☐ Term paper		
	☐ Project paper		
	☐ Laboratory performance		
	☐ Final thesis and oral exam		
	☐ presentation		
	☐ Portfolio		
Usability	Master Electrical Engineering (-Cooperative Study Programme) - (FPO 2024 FPO 2025)	☒ BM	
	Master Interdisciplinary Engineering - (PO 2021)	☒ CEM	
Offer	☐ Winter semester ☒ Summer semester ☐ Irregular		
Workload	Credit points: 5	Contact time: 60 hours [4 hours per week]	Self-study: 90 hours
Language	German		
Duration of the module	1 Semester		
Approved aids for the exam performance	None		
Lecturer(s)	Mr. Prof. Dr. Nikolaus Reiland		
Responsible(s)	Mr. Prof. Dr. Nikolaus Reiland		
Comment			
Change date	16.12.2025		

Neural Interfaces			
Content	Modeling of electrophysiological processes at the cell membrane, here the electrochemical processes at the cell membrane are discussed in detail. These describe the behavior of the ion channels during the generation of an action potential and the nonlinear behavior for the generation of action potentials. In the field of recording signals, the following topics are dealt with: study of amplifier technology, electrodes, electrophysiology, Modeling of the signal transmission of (amplifier noise, noise coupling, microphonics), Optimization of the measuring equipment (amplifiers, cables, arrangements), fields of application of medical technology: -EKG / EEG (stationary and long-term examinations, wellness) -impedance tomography -Neurodiagnostics - Active implants		
Competency goals	Upon successful completion of the module, students will be able to • describe the origin of electrophysiological signals, • explain the formation of resting potentials and action potentials, • describe the propagation of action potentials on nerve fibers, • Calculate the modeling of electrophysiological signals. The students master the design and selection of measurement amplifiers and are able to select methods for the reduction of disturbances. Furthermore, they are able to implement selected methods in an application-oriented manner in the field of electrodiagnostics. Through the elaboration of technical topics in the context of the module, the students are able, in the sense of lifelong learning, to work out new topics independently (key qualification).		
Teaching form	☒ Lecture		
	☒ Exercise		
	☐ Seminar/seminar exercise		
	☐ Laboratory		
	☐ Project		
Recommended Prerequesites			
Literature	• Origin of the Resting Potential; Nassir H. Sabah, IEEE Engineering in medizine and biology.		
Study performance	☐ Exercise performance		
	☐ Laboratory performance		
	☐ Term paper		
	☐ Presentation		
	☐ Certificate		
Exam performance	☐ Written exam		
	☒ Oral exam		
	☒ Term paper		
	☐ Project paper		
	☐ Laboratory performance		
	☐ Final thesis and oral exam		
	☐ presentation		
	☐ Portfolio		
Usability	Master Electrical Engineering (-Cooperative Study Programme) - (FPO 2024 FPO 2025)	☒ BM	
	Master Interdisciplinary Engineering - (PO 2021)	☒ CEM	
Offer	☒ Winter semester ☐ Summer semester ☐ Irregular		
Workload	Credit points	Contact time	Self-study
	5	60 hours [4 hours per week]	90 hours
Language	German and English		
Duration of the module	1 Semester		
Approved aids for the exam performance	None		
Lecturer(s)	Mr. Prof. Dr.-Ing. Klaus Peter Koch		
Responsible(s)	Mr. Prof. Dr.-Ing. Klaus Peter Koch		
Comment	This module replaces the module ”Medical Systems 2” in the Master’s programme.		

Change date	20.11.2025

Nonlinear Systems and Control		
Content	Nonlinear systems - Introduction to the properties of nonlinear systems - Analytical and non-analytical nonlinear systems - Rest positions and stability criteria of nonlinear systems - Analysis of nonlinear systems in the phase diagram Nonlinear controls - Analysis of variable-structure controls - Sliding-mode controllers - Optimal controls - Linearization at the operating point - Gain scheduling - Exact linearization - Flatness-based controls	
Competency goals	Students know the different types of non-linear systems. They are able to differentiate between non-linear properties based on tasks from different fields of application. They are proficient in working with 2D phase diagrams. They will be able to linearize analytical nonlinear systems at the operating point and use gain scheduling techniques. They can use Lie-algebra to linearize input-affine, non-linear systems precisely and design controls. They will be able to simulatively analyze specific practical tasks. They will have mastered formal controller design using the methods presented in the course with professional simulation tools (Matlab/Simulink). They are able to document and present their results in an appropriate form (good scientific practice).	
Teaching form	☒ Lecture	
	☐ Exercise	
	☐ Seminar/seminar exercise	
	☐ Laboratory	
	☐ Project	
Recommended Prerequesites	• Analysis 1 • Analysis 2 • Control engineering •	
Literature	• Applied Nonlinear Control, Slotine, Li, • nichtlineare Regelungen, Adamy • Nichtlineare Regelungen I+II, Föllinger	
Study performance	☐ Exercise performance	
	☐ Laboratory performance	
	☐ Term paper	
	☐ Presentation	
	☐ Certificate	
Exam performance	☒ Written exam	
	☐ Oral exam	
	☐ Term paper	
	☐ Project paper	
	☐ Laboratory performance	
	☐ Final thesis and oral exam	
	☐ presentation	
	☐ Portfolio	
Usability	Master Electrical Engineering (-Cooperative Study Programme) - (FPO 2024 FPO 2025)	☒ BM
	Master Interdisciplinary Engineering - (PO 2021)	☒ CEM
Offer	☒ Winter semester ☐ Summer semester ☐ Irregular	
Workload	Credit points: 5	Contact time: 60 hours [4 hours per week]	Self-study: 90 hours
Language	German	
Duration of the module	1 Semester	

Approved aids for the exam performance	None
Lecturer(s)	Mr. Prof. Dr. Matthias Scherer
Responsible(s)	Mr. Prof. Dr. Matthias Scherer
Comment	
Change date	19.02.2026

Operations Research (M)			
Content	Preferences, demand, labor supply, profit maximization, production optimization, factor demand, suply of gods, general equilibrium, money, welfare, externalities in production, internalization, risk sharing, insurance, moral hazard, optimal incentive systems.		
Competency goals	Upon successful completion of the module, students will have a good understanding of market economics. They will be able to see firms as cooperative organizations that are surrounded by and adapt to competitive markets. Participants will learn to construct axiomatic models and to deduce empirical hypotheses from them, to discuss them, to evaluate them, and to develop them, criticize and, if necessary, discard.		
Teaching form	☒ Lecture		
	☐ Exercise		
	☐ Seminar/seminar exercise		
	☐ Laboratory		
	☐ Project		
Recommended Prerequesites			
Literature	• Bonart/Bär, Quantitative BWL Bd. II, 2018		
Study performance	☐ Exercise performance		
	☐ Laboratory performance		
	☐ Term paper		
	☐ Presentation		
	☐ Certificate		
Exam performance	☒ Written exam		
	☐ Oral exam		
	☐ Term paper		
	☐ Project paper		
	☐ Laboratory performance		
	☐ Final thesis and oral exam		
	☒ presentation		
	☐ Portfolio		
Usability	Master Industrial Engineering - (PO 2015)	☒ RM	
	Master Mechanical Engineering - (PO 2015)	☒ CEM	
	Master Interdisciplinary Engineering - (PO 2021)	☒ CEM	
Offer	☒ Winter semester ☐ Summer semester ☐ Irregular		
Workload	Credit points	Contact time	Self-study
	5	60 hours [4 hours per week]	90 hours
Language	German		
Duration of the module	1 Semester		
Approved aids for the exam performance	Calculator (not programmable)		
Lecturer(s)	Mr. Prof. Dr. Björn Kirsten		
Responsible(s)	Mr. Prof. Dr. Björn Kirsten		
Comment			
Change date	25.06.2025		

Programming of ERP Systems Using the Example of SAP®-S/4HANA®	
Content	- Quick start SAP-ERP MM and PP - The programming language ABAP, screens, internal tables, Open SQL©, data modeler, function blocks
Competency goals	After successful completion of the module, students will be able to operate the GUI. They have knowledge of object-oriented programming in ABAP Objects©, GUI programming, database programming and recursive programming. They can structure relational data models.
Teaching form	☒ Lecture
	☒ Exercise
	☐ Seminar/seminar exercise
	☐ Laboratory
	☐ Project
Recommended Prerequesites	
Literature	• Karl-Heinz Kühnhauser, Thorsten Franz; Einstieg in ABAP • Horst Keller, Sascha Krüger; ABAP Objects; ISBN 978-3-89842-358-8 • Andreas Blumenthal, Horst Keller; ABAP - Fortgeschrittene Techniken und Tools, Band 2; ISBN 978-3-8362-2072-9 • Horst Keller, Wolf Hagen Thümmel; ABAP-Programmierrichtlinien; ISBN 978-3-8362-2090-3
Study performance	☒ Exercise performance
	☒ Laboratory performance
	☐ Term paper
	☐ Presentation
	☐ Certificate
Note on study performance	The study performance is a prerequisite for taking the exam
Exam performance	☐ Written exam
	☐ Oral exam
	☒ Term paper
	☐ Project paper
	☒ Laboratory performance
	☐ Final thesis and oral exam
	☒ presentation
	☐ Portfolio
Usability	Master Electrical Engineering - (PO 2019) ☒ CEM
	Master Mechanical Engineering - (PO 2015) ☒ CEM
	Master Industrial Engineering - (PO 2015) ☒ CEM
	Master Electrical Engineering (-Cooperative Study Programme) - (FPO 2024 FPO 2025) ☒ CEM
	Master Interdisciplinary Engineering - (PO 2021) ☒ CEM
Offer	☐ Winter semester ☒ Summer semester ☐ Irregular
Workload	Credit points: 5 / Contact time: 60 hours [4 hours per week] / Self-study: 90 hours
Language	German and English
Duration of the module	1 Semester
Approved aids for the exam performance	None
Lecturer(s)	Mr. Prof. Dr. Fritz Nikolai Rudolph
Responsible(s)	Mr. Prof. Dr. Fritz Nikolai Rudolph
Comment	None None
Change date	19.02.2026

Quality and Reliability I (M)			
Content	Concept of quality, questionnaire, ordinal data, contingency matrix, stochastic independence, rank correlation coefficient of qualitative data, conception of test statistics, standard normal distribution, Chi2 test, applications, forced switching experiment, test statistics, concept of reliability, assumption control, lifetime distributions, lifetime tests with complete and censored data, system function and reliability of technical systems, applications in access reliability analysis.		
Competency goals	Upon successful completion of the module, the students have acquired the competence to apply the statistical methods of quality and reliability analysis and control in industrial practice. They are able to design and evaluate uncensored and censored lifetime tests and to make statements about the reliability of the tested component, assembly or product. You are able to determine the reliability of a technical system from the reliability of the individual components. They are able to create questionnaires for the measurement of quality or the perception of quality on their own, to evaluate them statistically and thus to answer practical questions in this field context to answer.		
Teaching form	☒ Lecture		
	☐ Exercise		
	☐ Seminar/seminar exercise		
	☐ Laboratory		
	☐ Project		
Recommended Prerequesites			
Literature	• Bonart/Bär, Quantitative BWL Bd. III, 2020 bzw. Skript • Bertsche, Bernd/Lechner, Gisbert: Zuverlässigkeit im Fahrzeug- und Maschinenbau, 2004		
Study performance	☐ Exercise performance		
	☐ Laboratory performance		
	☐ Term paper		
	☐ Presentation		
	☐ Certificate		
Exam performance	☒ Written exam		
	☐ Oral exam		
	☐ Term paper		
	☐ Project paper		
	☐ Laboratory performance		
	☐ Final thesis and oral exam		
	☐ presentation		
	☐ Portfolio		
Usability	Master Industrial Engineering - (PO 2015)	☒ RM	
	Master Mechanical Engineering - (PO 2015)	☒ CEM	
	Master Interdisciplinary Engineering - (PO 2021)	☒ CEM	
Offer	☐ Winter semester ☒ Summer semester ☐ Irregular		
Workload	Credit points	Contact time	Self-study
	5	60 hours [4 hours per week]	90 hours
Language	German		
Duration of the module	1 Semester		
Approved aids for the exam performance	None		
Lecturer(s)	Mr. Prof. Dr. Jürgen Bär		
Responsible(s)	Mr. Prof. Dr. Jürgen Bär		
Comment	None None		
Change date	02.10.2025		

Quality and Reliability II (M)				
Content	- Basics and overview of reliability and quality problems. - Group-based development of solution approaches for potential quality problems - Overview and theoretical principles of problem-solving techniques, root cause analysis and error prevention - Exemplary, practical application of the theories learned			
Competency goals	After successfully completing the module, students will be able to demonstrate basic working methods and tools for solving quality problems. Students know the essential theoretical background and have systematically practiced their application.			
Teaching form	☒ Lecture			
	☐ Exercise			
	☐ Seminar/seminar exercise			
	☐ Laboratory			
	☒ Project			
Recommended Prerequesites				
Literature	• Masing: Handbuch Qualitätsmanagement			
Study performance	☐ Exercise performance			
	☐ Laboratory performance			
	☐ Term paper			
	☐ Presentation			
	☐ Certificate			
Exam performance	☐ Written exam			
	☐ Oral exam			
	☐ Term paper			
	☒ Project paper			
	☐ Laboratory performance			
	☐ Final thesis and oral exam			
	☐ presentation			
	☐ Portfolio			
Usability	Master Industrial Engineering - (PO 2015)	☒ RM		
	Master Mechanical Engineering - (PO 2015)	☒ CEM		
	Master Interdisciplinary Engineering - (PO 2021)	☒ CEM		
Offer	☐ Winter semester ☒ Summer semester ☐ Irregular			
Workload	Credit points	Contact time	Self-study	
	5	60 hours [4 hours per week]	90 hours	
Language	German			
Duration of the module	1 Semester			
Approved aids for the exam performance	None			
Lecturer(s)	Mr. Prof. Dr. Christian Kontermann			
Responsible(s)	Mr. Prof. Dr. Christian Kontermann			
Comment	None			
Change date	02.10.2025			

Scientific Methods (M)			
Content	The basics and rules of scientific work are taught and trained. Instructions are given on how to conduct literature, state of the art and patent searches including the use of stock and online libraries as well as data bank searches. In addition, the procedure for conducting expe- rimental research will be presented and the preparation of scientific papers will be discussed publications and presentations.		
Competency goals	After successful completion of the module, students will be able to apply the basics of scientific work and master the necessary tools. They are able to research, analyze and evaluate the state of the art on a given topic and cite it correctly in their own scientific work. They gain confidence in the preparation of scientific publications and the presentation of research results. They are trained in critical thinking and questioning of already published findings.		
Teaching form	☒ Lecture		
	☐ Exercise		
	☒ Seminar/seminar exercise		
	☐ Laboratory		
	☐ Project		
Recommended Prerequesites			
Literature	• Hering, H.; Hering, L..: Technische Berichte, Springer Vieweg Verlag, 7. Auflage, (erhältlich als E-Book über die Bibliothel der Hochschule Trier) • Vorlesungsunterlagen		
Study performance	☐ Exercise performance		
	☐ Laboratory performance		
	☐ Term paper		
	☐ Presentation		
	☐ Certificate		
Exam performance	☐ Written exam		
	☐ Oral exam		
	☒ Term paper		
	☐ Project paper		
	☐ Laboratory performance		
	☐ Final thesis and oral exam		
	☐ presentation		
	☐ Portfolio		
Usability	Master Mechanical Engineering - (PO 2015)	☒ RM	
	Master Interdisciplinary Engineering - (PO 2021)	☒ CEM	
Offer	☒ Winter semester ☐ Summer semester ☐ Irregular		
Workload	Credit points: 5	Contact time: 60 hours [4 hours per week]	Self-study: 90 hours
Language	German		
Duration of the module	1 Semester		
Approved aids for the exam performance	None		
Lecturer(s)	Mr. Prof. Dr.-Ing. Christoph Heinrich		
Responsible(s)	Mr. Prof. Dr.-Ing. Christoph Heinrich		
Comment			
Change date	02.10.2025		

Statistics (M)			
Content	Expected value, variance, covariance, correlation coefficient, linear and nonlinear regression, coefficient of determination, stochastics, distribution functions, test statistics, applications in the field of quality and accessibility and reliability		
Competency goals	Upon successful completion of the module, participants will be able to solve practical decision-making problems of the industrial enterprise using statistical methods and solve them.		
Teaching form	☒ Lecture		
	☐ Exercise		
	☐ Seminar/seminar exercise		
	☐ Laboratory		
	☐ Project		
Recommended Prerequesites			
Literature	• Bonart/Bär, Quantitative BWL Bd. I, 2018		
Study performance	☐ Exercise performance		
	☐ Laboratory performance		
	☐ Term paper		
	☐ Presentation		
	☐ Certificate		
Exam performance	☒ Written exam		
	☐ Oral exam		
	☐ Term paper		
	☐ Project paper		
	☐ Laboratory performance		
	☐ Final thesis and oral exam		
	☐ presentation		
	☐ Portfolio		
Usability	Master Mechanical Engineering - (PO 2015)	☒ CEM	
	Master Interdisciplinary Engineering - (PO 2021)	☒ CEM	
	Master Electrical Engineering (-Cooperative Study Programme) - (FPO 2024 FPO 2025)	☒ CEM	
	Master Electrical Engineering - (PO 2019)	☒ CEM	
Offer	☒ Winter semester ☐ Summer semester ☐ Irregular		
Workload	Credit points	Contact time	Self-study
	5	60 hours [4 hours per week]	90 hours
Language	German		
Duration of the module	1 Semester		
Approved aids for the exam performance	None		
Lecturer(s)	Mr. Prof. Dr. Jürgen Bär		
Responsible(s)	Mr. Prof. Dr. Jürgen Bär		
Comment	None None		
Change date	26.02.2026		

Systems Engineering			
Content			
Competency goals			
Teaching form	☒ Lecture		
	☐ Exercise		
	☐ Seminar/seminar exercise		
	☐ Laboratory		
	☐ Project		
Recommended Prerequesites			
Literature	• R. Haberfellener u.a.: SystemsEngineering.Verlag Orel-Füssli, A, Kossiakoff: Systems Engineering. Wiley-Verlag,		
Study performance	☐ Exercise performance		
	☐ Laboratory performance		
	☐ Term paper		
	☒ Presentation		
	☐ Certificate		
Exam performance	☐ Written exam		
	☐ Oral exam		
	☐ Term paper		
	☐ Project paper		
	☐ Laboratory performance		
	☐ Final thesis and oral exam		
	☒ presentation		
	☐ Portfolio		
Usability	Master Electrical Engineering (-Cooperative Study Programme) - (FPO 2024 FPO 2025)	☒ BM	
	Master Interdisciplinary Engineering - (PO 2021)	☒ CEM	
	Master Electrical Engineering - (PO 2019)	☒ CEM	
Offer	☒ Winter semester ☐ Summer semester ☐ Irregular		
Workload	Credit points	Contact time	Self-study
	5	60 hours [4 hours per week]	90 hours
Language	German		
Duration of the module	1 Semester		
Approved aids for the exam performance	Will be announced in the lecture		
Lecturer(s)	Mr. Prof. Dr. Hubert Moser		
Responsible(s)	Mr. Prof. Dr. Hubert Moser		
Comment			
Change date	26.02.2026		

Technology of Optical Measurement (M)	
Content	Repetition of chapters 1-14 lecture TMESS (focus) 15.1 Thermography 15.1.1 Physical basics of infrared light 15.1.2 The nature of thermal radiation 15.1.3 Transmission path 15.1.4 Optics for the thermal infrared 15.1.5 Camera technology 15.1.6 Application in the industry 15.1.7 Projects carried out in the Laboratory for Optical Metrology 15.2 Pyrometry 15.3 Fiber optic temperature measurement 16. 3 D laser scanner 16.1 Basic principle of triangulation 16.1.1 Laser triangulation 16.2 Slime flight - condition 16.3 Calculated determination from detector point to measuring point 16.3.1 Influencing factors of laser triangulation 16.3.2 Beam path of the laser 16.3.3 Properties of the object surface 16.3.4 Imaging error 16.3.5 Detector and signal evaluation 16.3.6 Atmospheric conditions 16.4 Various systems for digitization 16.4.1 Point laser 16.4.2 Line laser 16.5 Laser triangulation in running production 17. Strip projection 17.1 Introduction 17.2 Basics of fringe projection 17.3 Foreword 17.4 Coded light approach 17.5 Calibration of the sensor 17.6 Reference marks 17.6.1 Reference mark assignment 17.6.2 Ring coding 17.6.3 Uncoded reference marks 17.6.4 Automatic identification of uncoded circular areas 17.7 Transformation process 17.7.1 Helmert transformation 17.7.2 Spatial backward section for transformation 17.8 Further processing of the obtained data 17.9 Application examples 18 Correlation 1 Introduction 2 Triangulation 2.1 Camera 2.2 Camera 2.3 Determine the real point 2.4 Real factors 2.5 Calibration 3 Image correlation 3.1 Image mapping based on gray values 3.1.1 Gray value matrix 3.1.2 Amplification factors 3.1.3 Correlation (mathematical) 3.1.4 Correlation of the images 3.1.5 Example 3.2 Least squares method 3.2.1 Extension of the cross correlation 3.2.2 Compensation in m-direction 3.2.3 Compensation in n-direction 3.2.4 Advanced formula 4 theory and practice 4.1 Triangulation 4.2 Image correlation 5 Q-400 correlation system 5.1 Q-400 5.1.1 Cameras 5.1.2 Auxiliary devices 5.2 Istra 4D

Kompetenzziele	6.2 Calibration 6.3 Measuring procedure 6.3.1 Structure 6.3.2 Data acquisition 6.3 Evaluation 6.3.1 Deformation 6.3.1.1 Deformation - total 6.3.1.2 Deformation in X direction 6.3.1.3 Deformation in Y-direction 6.3.1.3 Deformation in Z direction 6.3.2 Distortion (voltage) 7 FEM analysis 74 7.1 Boundary conditions 7.1.1 Networking 7.1.2 Storage 7.1.3 Loads 7.2 Evaluation 7.2.1 Deformation 7.3.2 Voltage 82 19. coordinate determination method 19.1 Photogrammetry in its basic features 19.2 Central projection 19.2.1 Fields of application of photogrammetry 20. Investigations of fluid flows 20.1 Laser Doppler Anemometry (LDA) 20.2 Laser 2Focus Anemometer (L2FA) 20.3 Laser Induced Fluorescence (LIF) 20.4 Surface Pattern Image Velocimetry (Surface Pattern Velocimetry) 20.5 Particle Image Velocimetry 20.6 Laser speckle anemometry 21. Measuring vibrations 21.1 Laser vibrometry 21.2 Other optical methods for measuring vibrations 22. Terahertz 22.1 Fundamentals of Terahertz Technology 21.2 THz radiation detection 21.3 Application of terahertz measurement technology 21.4 Terahertz gap 23. White light interferometry 23.1 Basics 23.2 Application of white light interferometry 23.2.1 Coherence radar 23.3 Measurement examples
Competency goals	The students learn the theoretical basics, the structure and function of optical measuring instruments and how to use them in the laboratory on selected objects. They will be able to judge which optical measuring method is best suited for which measuring task and will be able to evaluate the measurement results.
Teaching form	☒ Lecture
	☐ Exercise
	☐ Seminar/seminar exercise
	☒ Laboratory
	☐ Project
Recommended Prerequesites	
Literature	• Neumann/ Schröder: Bauelemente der Optik, Hanser Verlag., 1992, 6. Auflage, ISBN: 3-446-17036-7 • Rajpal S. Sirohi, Fook Siong Chau: Optical Methods of Measurements Wholefield Techniques Inc., 1999 ISBN: 0-8247-6003-4 • A.W. Koch, M.W. Rupprecht, O. Toedter, G. Häusler: Optische Messtechnik an technischen Oberflächen, Expert Verlag., 1998 ISBN: 3-8169-1372-5 • Gottfried Schröder: Technische Optik, Vogel Verlag, 1990, 7. Auflage ISBN: 3-8023-067-x • Opt. MT - Literaturverzeichnis (ab Kapitel 15: Thermografie) • Frank Bernhard: Technische Temperaturmessung Springer Verlag, ISBN: 3-540-62672-7 • Pramod K. Rastogi: Optical Measurement Techniques and Applications Arthech House, Inc., 1997, ISBN: 0-89006-516-0 • Michael Schuth, Wassili Buerakov Handbuch Optische Messtechnik Hanser Verlag 2017 ISBN: 978-3-446-43634-3 eBook-ISBN: 978-3-446-43661-9
Study performance	☐ Exercise performance

	☐ Laboratory performance	
	☐ Term paper	
	☐ Presentation	
	☐ Certificate	
Exam performance	☒ Written exam	
	☐ Oral exam	
	☐ Term paper	
	☐ Project paper	
	☐ Laboratory performance	
	☐ Final thesis and oral exam	
	☐ presentation	
	☐ Portfolio	
Usability	Master Mechanical Engineering - (PO 2015)	☒ CEM
	Master Interdisciplinary Engineering - (PO 2021)	☒ CEM
	Master Industrial Engineering - (PO 2015)	☒ CEM
Offer	☐ Winter semester ☒ Summer semester ☐ Irregular	

Workload	Credit points	Contact time	Self-study
	5	60 hours [4 hours per week]	90 hours

Language	English
Duration of the module	1 Semester
Approved aids for the exam performance	None
Lecturer(s)	Mr. Prof. Dr.-Ing. Michael Schuth
Responsible(s)	Mr. Prof. Dr.-Ing. Michael Schuth
Comment	OM overview - bibliography see last book entry
Change date	28.02.2026

Thermodynamics (M)			
Content	Exergy and anergy, exergetic efficiency, real power plant processes, gas mixtures, mixing processes of humid air, h,x-diagram (Mollier), straight line of mixtures, combustion, determination of calorific value, irreversibility of combustion processes, heat transfer: Three dimensional heat conduction, heat transfer (free and forced convection), heat transfer coefficients, heat radiation (absorption, reflection, heat transfer, Transmission)		
Competency goals	After completion of the module, the students are able to solve thermodynamic problems from the mentioned topics analytically on their own, if necessary with the help of relevant literature. Furthermore, they are able to analyze real processes with respect to their exergetic efficiency. Furthermore, they are able to classify real processes with respect to their irreversibility and to optimize the process sequences.		
Teaching form	☒ Lecture		
	☐ Exercise		
	☐ Seminar/seminar exercise		
	☐ Laboratory		
	☐ Project		
Recommended Prerequesites			
Literature	• Technische Thermodynamik (Cerbe, Wilhelms, Hanser Verlag) • Vorlesungsskript Thermodynamik (Heinrich) und Klausurensammlung • Thermodynamik (Baehr, Springer Verlag)		
Study performance	☐ Exercise performance		
	☐ Laboratory performance		
	☐ Term paper		
	☐ Presentation		
	☐ Certificate		
Exam performance	☒ Written exam		
	☐ Oral exam		
	☐ Term paper		
	☐ Project paper		
	☐ Laboratory performance		
	☐ Final thesis and oral exam		
	☐ presentation		
	☐ Portfolio		
Usability	Master Mechanical Engineering - (PO 2015)	☒ RM	
	Master Interdisciplinary Engineering - (PO 2021)	☒ CEM	
	Master Industrial Engineering - (PO 2015)	☒ CEM	
Offer	☒ Winter semester ☐ Summer semester ☐ Irregular		
Workload	Credit points	Contact time	Self-study
	5	60 hours [4 hours per week]	90 hours
Language	German		
Duration of the module	1 Semester		
Approved aids for the exam performance	None		
Lecturer(s)			
Responsible(s)	Mr. Prof. Dr.-Ing. Christoph Heinrich		
Comment			
Change date	09.10.2025		

Traffic Systems (M)			
Content	Current and future developments in the various modes of passenger transport are discussed. Solutions to ensure future-oriented and environmentally compatible mobility will be presented. The seminar will be linked with current research work on the development of energy efficient vehicles for passenger transport as well as with the development of new vehicles with research on psychological influences in traffic.		
Competency goals	Upon successful completion of the module, students are able to scientifically investigate a specific problem within the field of passenger mobility. They are familiar with the key components and current developments of various passenger transport systems and can critically assess their relevance in light of societal, technological, and environmental transformations. Through the development of an academic paper, students learn to formulate precise research questions, conduct systematic literature reviews, select appropriate methodological approaches, and document their findings in a transparent and structured manner. They engage in peer-review processes, providing and receiving constructive feedback, and thereby gain insights into the principles of academic quality assurance and scholarly discourse. Furthermore, students are capable of presenting their findings in a scientific talk, tailored to the target audience, and defending their arguments in critical discussions. In doing so, they acquire not only in-depth knowledge of passenger transport systems but also essential competencies in academic writing, reviewing, and presenting within the broader context of mobility research.		
Teaching form	☐ Lecture		
	☐ Exercise		
	☒ Seminar/seminar exercise		
	☐ Laboratory		
	☐ Project		
Recommended Prerequesites			
Literature	• Seminarunterlagen		
Study performance	☐ Exercise performance		
	☐ Laboratory performance		
	☐ Term paper		
	☐ Presentation		
	☐ Certificate		
Exam performance	☐ Written exam		
	☐ Oral exam		
	☐ Term paper		
	☐ Project paper		
	☐ Laboratory performance		
	☐ Final thesis and oral exam		
	☐ presentation		
	☒ Portfolio		
Usability	Master Mechanical Engineering - (PO 2015)	☒ CEM	
	Master Interdisciplinary Engineering - (PO 2021)	☒ CEM	
	Master Industrial Engineering - (PO 2015)	☒ CEM	
Offer	☒ Winter semester ☐ Summer semester ☐ Irregular		
Workload	Credit points	Contact time	Self-study
	5	60 hours [4 hours per week]	90 hours
Language	German and English		
Duration of the module	1 Semester		
Approved aids for the exam performance	None		
Lecturer(s)	Mr. Prof. Dr. Florian Dräger		
Responsible(s)	Mr. Prof. Dr. Florian Dräger		

Comment	
Change date	10.02.2026

Turbomachinery (M)			
Content	Fundamentals of thermodynamics and flow theory for turbomachinery, hydrofoil and cascade flow, description of flow and energy conversion in the impeller, stage theory of turbomachinery, losses and efficiencies, description of operating behavior by Characteristics, design of turbomachinery		
Competency goals	Upon successful completion of the module, students will be able to: • Turbomachinery in terms of fluid mechanics and thermodynamics. • turbomachinery in terms of their performance in the entire map range. • Develop concepts to meet customer requirements for turbo machines.		
Teaching form	☒ Lecture		
	☐ Exercise		
	☐ Seminar/seminar exercise		
	☐ Laboratory		
	☐ Project		
Recommended Prerequesites	• Fluid mechanics • Thermodynamics		
Literature	• Strömungsmaschinen (Sigloch, Hanser) • Compressor Aerodynamics (Cumpsty, Krieger) • Turbomachinery Flow Physics and Dynamic Performance (Schobeiri, Springer) • Thermische Strömungsmaschinen I (Traupel, Springer) • Vorlesungsunterlagen		
Study performance	☐ Exercise performance		
	☐ Laboratory performance		
	☐ Term paper		
	☒ Presentation (in case of low number of participants)		
	☐ Certificate		
Exam performance	☒ Written exam (in case of high number of participants)		
	☒ Oral exam (in case of low number of participants)		
	☐ Term paper		
	☐ Project paper		
	☐ Laboratory performance		
	☐ Final thesis and oral exam		
	☐ presentation		
	☐ Portfolio		
Usability	Master Mechanical Engineering - (PO 2015)	☒ CEM	
	Master Interdisciplinary Engineering - (PO 2021)	☒ CEM	
	Master Industrial Engineering - (PO 2015)	☒ CEM	
Offer	☒ Winter semester ☐ Summer semester ☐ Irregular		
Workload	Credit points	Contact time	Self-study
	5	60 hours [4 hours per week]	90 hours
Language	English		
Duration of the module	1 Semester		
Approved aids for the exam performance	None		
Lecturer(s)	Mr. Prof. Dr. Sven König		
Responsible(s)	Mr. Prof. Dr. Sven König		
Comment			
Change date	10.02.2026		

Vehicle Drivelines and Chassis Technology (M)			
Content	Powertrain: This section of the lecture deals primarily with new and future powertrain concepts. The switch to electromobility also leads to new challenges and opportunities for other vehicle systems such as the brakes and steering. These aspects will be discussed in more detail in the lecture. Chassis: Safety and comfort of active chassis based on optimized passive chassis as well as objectives of vehicle control systems are presented; sensors, signal analysis, signal output, actuators, active chassis, semi-active suspension and damping, ABS, ESP and market examples.		
Competency goals	Powertrain: The students are able to independently analyze problems in drive trains of passenger cars and develop solutions. Based on specific tasks, they learn about targetoriented product innovations and are able to evaluate them. Chassis: After successful completion of the module, students will be familiar with the mechanical relationships of statics and vibration technology in vehicle chassis and will be able to translate this knowledge into design measures. They are able to make independent conceptual decisions for the design of a motor vehicle chassis involving semiactive and active components and systems.		
Teaching form	☒ Lecture		
	☒ Exercise		
	☐ Seminar/seminar exercise		
	☐ Laboratory		
	☐ Project		
Recommended Prerequesites			
Literature	• Mitschke, Wallentowitz: ”Dynamik der Kraftfahrzeuge”, 2014, Springer Vieweg Verlag • Naunheimer, Lechner: ”Fahrzeuggetriebe” • Kücükay: ”Grundlagen der Fahrzeugtechnik”, 2021, Springer Vieweg Verlag • Isermann (Hrsg.): ”Fahrdynamik-Regelung”, 2006, Vieweg-Verlag • Kücükay: ”Grundlagen der Fahrzeugtechnik”, 2021, Springer Vieweg Verlag • Isermann (Hrsg.): ”Fahrdynamik-Regelung”, 2006, Vieweg-Verlag		
Study performance	☐ Exercise performance		
	☐ Laboratory performance		
	☐ Term paper		
	☐ Presentation		
	☐ Certificate		
Exam performance	☐ Written exam		
	☒ Oral exam		
	☐ Term paper		
	☐ Project paper		
	☐ Laboratory performance		
	☐ Final thesis and oral exam		
	☐ presentation		
	☐ Portfolio		
Usability	Master Mechanical Engineering - General Mechanical Engineering (PO 2015)	☒ CEM	
	Master Mechanical Engineering - Automotive Engineering (PO 2015)	☒ RM	
	Master Interdisciplinary Engineering - (PO 2021)	☒ CEM	
	Master Industrial Engineering - (PO 2015)	☒ CEM	
Offer	☐ Winter semester ☒ Summer semester ☐ Irregular		
Workload	Credit points	Contact time	Self-study
	5	60 hours [4 hours per week]	90 hours
Language	German		
Duration of the module	1 Semester		
Approved aids for the exam performance	Will be announced in the lecture		

Lecturer(s)	Mr. Prof. Dr. Florian Dräger
Responsible(s)	Mr. Prof. Dr. Florian Dräger
Comment	
Change date	08.12.2025

Vehicle Dynamics			
Content	CHAPTER I: INTRODUCTION Classification of vibration, definitions, mechanical vibrating systems, mechanical vibration and human comfort. Modelling and simulation studies. Model of an automobile, one degree of freedom, two degree of freedom systems, free, forced and damped vibrations - Random vibration - Magnification and Transmissibility. Vibration absorber. Multidegree of Freedom Systems-Closed and far coupled system, orthogonally of modal shapes, Modal analysis. CHAPTER II: SUSPENSION Requirements. Spring mass frequency. Wheel hop, wheel wobble, wheel shimmy, Choice of suspension spring rate. Calculation of effective spring rate. Vehicle suspension in fore and aft directions. Hydraulic dampers and choice of damper characteristics. Independent, compensated, rubber and air suspension systems. Roll axis and vehicle under the action of side forces. CHAPTER III: STABILITY OF VEHICLES Load distribution. Stability on a curved track and on a slope. Gyroscopic effects, weight transfer during acceleration and braking, overturning and sliding. Rigid vehicle - stability and equations of motion. Cross wind handling. CHAPTER IV: TYRES Types. Relative merits and demerits. Ride characteristics. Behavior while cornering, slip angle, cornering force, power consumed by a tyre. Effect of camber, camber thrust. CHAPTER V: VEHICLE HANDLING Over steer, under steer, steady state cornering. Effect of braking, driving torques on steering. Effect of camber, transient effects in cornering. Directional stability of vehicles.		
Competency goals	To Understand vibrating systems and its analysis, modeling and simulation and modal analysis To Understand various Suspension systems, selection of springs and dampers To Understand the stability of vehicles on curved track and slope, gyroscopic effects and cross wind handling To Know about tyres, ride characteristics and effect of camber, camber thrust To Learn about vehicle handling under different steering conditions and directional stability of vehicles		
Teaching form	☒ Lecture		
	☐ Exercise		
	☐ Seminar/seminar exercise		
	☐ Laboratory		
	☐ Project		
Recommended Prerequesites			
Literature	• wird in der Lehrveranstaltung bekannt gegeben		
Study performance	☐ Exercise performance		
	☐ Laboratory performance		
	☐ Term paper		
	☐ Presentation		
	☐ Certificate		
Exam performance	☒ Written exam		
	☐ Oral exam		
	☐ Term paper		
	☐ Project paper		
	☐ Laboratory performance		
	☐ Final thesis and oral exam		
	☐ presentation		
	☐ Portfolio		
Usability	Master Interdisciplinary Engineering - (PO 2021)	☒ CEM	
Offer	☐ Winter semester ☒ Summer semester ☐ Irregular		
Workload	Credit points	Contact time	Self-study
	5	60 hours [4 hours per week]	90 hours
Language	English		
Duration of the module	1 Semester		

Approved aids for the exam performance	None
Lecturer(s)	
Responsible(s)	Mr. Prof. Dr. Alexander Wohlers
Comment	pure online lecture
Change date	26.01.2026

Vehicle Safety (M)		
Content	Medical and biomechanical principles of injuries in accidents, accident research, statistical accident data collection, explanation of legal requirements and current consumer protection tests. Crash configurations (front, side, rear), foot restraint, RCAR. Design and development of car bodies and restain sytems, belts, airbags, sensors, introduction to crash simulations, and optimization of restain yems, execution of crash tests of a crash test, introduction to the test technique	
Competency goals	The students can describe the basics of biomechanics, the load limits of humans and the current crash test dummies. They can summarize and compare the current legal requirements for the passive safety of vehicles and the contents of consumer protection tests (NCAPs) and can design measures to improve vehicle safety for each of these. The students are able to independently optimize an existing car restain sytem conept in the simulation and to develop target-oriented determine system parameters.	
Teaching form	☒ Lecture	
	☐ Exercise	
	☐ Seminar/seminar exercise	
	☐ Laboratory	
	☐ Project	
Recommended Prerequesites		
Literature		
Study performance	☒ Exercise performance	
	☐ Laboratory performance	
	☐ Term paper	
	☐ Presentation	
	☐ Certificate	
Note on study performance	The study performance is a prerequisite for taking the exam	
Exam performance	☒ Written exam	
	☐ Oral exam	
	☐ Term paper	
	☒ Project paper	
	☐ Laboratory performance	
	☐ Final thesis and oral exam	
	☐ presentation	
	☐ Portfolio	
Usability	Master Mechanical Engineering - Automotive Engineering (PO 2015)	☒ RM
	Master Mechanical Engineering - General Mechanical Engineering (PO 2015)	☒ CEM
	Master Interdisciplinary Engineering - (PO 2021)	☒ CEM
	Master Industrial Engineering - (PO 2015)	☒ CEM
	Master Electrical Engineering (-Cooperative Study Programme) - (FPO 2024 FPO 2025)	☒ CEM
	Master Electrical Engineering - (PO 2019)	☒ CEM
Offer	☒ Winter semester ☐ Summer semester ☐ Irregular	
Workload	Credit points: 5	Contact time: 60 hours [4 hours per week]	Self-study: 90 hours
Language	German and English	
Duration of the module	1 Semester	
Approved aids for the exam performance	None	
Lecturer(s)	Mr. Prof. Dr.-Ing. Peter König	
Responsible(s)	Mr. Prof. Dr.-Ing. Peter König	
Comment		
Change date	26.02.2026	

Vibration Technology (M)				
Content	- Consolidation of selected chapters of dynamics - Development of differential equations to describe the motion in vibrational mechanical systems - Development and solution of the differential equations in time and frequency domain - Practical implementation of the theory with the simulation tool SDT-DynaSim			
Competency goals	The module Vibration Engineering imparts students with fundamental knowledge and skills in the field of vibration analysis, calculation, and damping. Its aim is to enable students to recognize, analyze, and develop suitable solutions for vibration-related issues in technical systems.			
Teaching form	☒ Lecture			
	☐ Exercise			
	☐ Seminar/seminar exercise			
	☒ Laboratory			
	☐ Project			
Recommended Prerequesites				
Literature	• Michael Wahle ”Grundlagen der Maschinen- und Strukturdynamik” Wissenschaftsverlag Mainz - Aachen • Horst Irretier ”Grundlagen der Schwingungstechnik 2” Vieweg Verlag • Vorlesungsumdruck • Horst Irretier ”Grundlagen der Schwingungstechnik 1” Vieweg Verlag			
Study performance	☐ Exercise performance			
	☐ Laboratory performance			
	☐ Term paper			
	☐ Presentation			
	☐ Certificate			
Exam performance	☒ Written exam			
	☐ Oral exam			
	☐ Term paper			
	☐ Project paper			
	☐ Laboratory performance			
	☐ Final thesis and oral exam			
	☐ presentation			
	☐ Portfolio			
Usability	Master Industrial Engineering - (PO 2015)	☒ RM		
	Master Mechanical Engineering - (PO 2015)	☒ RM		
	Master Electrical Engineering (-Cooperative Study Programme) - (FPO 2024 FPO 2025)	☒ CEM		
	Master Interdisciplinary Engineering - (PO 2021)	☒ CEM		
Offer	☒ Winter semester ☐ Summer semester ☐ Irregular			
Workload	Credit points	Contact time	Self-study	
	5	60 hours [4 hours per week]	90 hours	
Language	German			
Duration of the module	1 Semester			
Approved aids for the exam performance	None			
Lecturer(s)	Mr. Prof. Dr. Alexander Wohlers			
Responsible(s)	Mr. Prof. Dr. Alexander Wohlers			
Comment	None None			
Change date	08.12.2025			