HOCHSCHULE COBURG

Department of Mechanical Engineering and Automotive Technology

Bachelor Program in Automotive

Technology / Automotive Industrial

Engineering

Module Manual

Table of Contents

Preliminary remarks

Module plan

Specialization in Automotive Industrial Engineering
in the Automotive Technology Program

Semester \ CP	1-5	6-10	11-15	16-20	21-25	26-30
WS (1)	Engineering Mathematics I	Statics and Strength of Materials	Business Mathematics	Materials Engineering	Construction and Machine Elements	General Business Admin. for Industrial Engineering
SS (2)	Engineering Mathematics II	Dynamics and Vibration Theory I	Legal Aspects of the Car Industry	Marketing and Sales	Automotive Engineering I	Cost Accounting
WS (3)	Electrical Engineering for Industrial Engineers	Dynamics and Vibration Theory II	Project Management	Production and Logistics	Automotive Engineering II	Management Accounting (*Controlling*)
SS (4)	Computer Science for Industrial Management	Economics	Techn. and Business English	Production Technology	CEM	Standard Business Software

- Mathematical-engineering basics
- Mechatronics - Information technology
- Mechatronics - Electrics / Electronics
- Mechatronics - Mechanics
- Business administration fundamentals
- Fundamentals of the Value Chain and Customer Orientation
- Supra-disciplinary

CEM: e.g. Techn. Thermodyn. / Higher Mech

Semester \ CP	1-5	6-10	11-15	16-20	21-25	26-30
WS (5)	Industry Internship					Academic/Scientific Work and Presentation

- Professional practice
- Interdisciplinary qualification

Semester \ CP	1-5	6-10	11-15	16-20	21-25	26-30
SS (6)	Business Management	Personnel and Organization	Sensors and Actuators or Bus Systems or Autom. SW-Eng.	CEM ID	CEM 1	CEM 2
WS (7)	Scientific Foundation of the Bachelor Thesis		Bachelor Thesis and Colloquium			CEM 3

- Compulsory modules for technical specialization
- Compulsory elective modules for technical specialization
- Methodological competence
- Professional practice
- Interdisciplinary Qualification

General Business Administration for Industrial Engineers

Academic Program	Automotive Technology
Specialization	Automotive Industrial Engineering
Module name	General Business Administration for Industrial Engineers
Abbrev.	BWLW
Subtitle	-
Courses	-
Semester	1
Module coordinator	Dr. Philipp Precht
Instructor(s)	Dr. Philipp Precht
Language	German
Classification in curriculum	Compulsory module WIAM
Use in other academic programs	-
Format / SWH	Seminar-type lectures / 4 SWH
Work requirement	In-class program: 45 hrs. Self-directed study: 105 hrs.
ECTS	5
Technical prerequisites	-
Admission prerequisites for examination	-
Qualification objectives	Students will: - Know and understand basic business terms and economic facts. - Be familiar with the most important constitutive decisions a company needs to make (business model, choice of location, legal form) and be able to describe possible forms of cooperation with other companies. - Be able to analyze and explain the management process and link the elements of this process (planning, decision-making, management, organization, control) with the company's objectives.

	- Know which essential functions interact in processes of business performance. - Be able to point out the manifold relations between the business management sub-areas and interpret and evaluate these relations.
Contents	Introduction to Business Administration - Terms & general relationships in business administration - Development of business administration management process - Company objectives - Planning - Decision-making - Control - Organization Constitutive decisions - Business model - Location selection - Cooperation programs - Legal form The individual functional areas according to Porter's value chain - Research and development - Purchasing and materials management - Production - Marketing and sales - Logistics - Customer service - Finances - HR - IT
Requirements for successful completion	Written examination
Media	Projector, blackboard, overhead projector
Literature	Schmalen, Helmut; Pechtl, Hans: Grundlagen und Probleme der Betriebswirtschaft, 14th edition , Stuttgart, Verlag Schäffer-Poeschel

Vahs, D.; Schäfer-Kunz, J.: Einführung in die Betriebswirtschaftslehre, 5th ed., Stuttgart (Schäffer-Poeschel) 2007.

Wöhe, G.; Döring, U.: Einführung in die Allgemeine Betriebswirtschaftslehre, 24th ed., Munich (Vahlen) 2010.

Automotive Mechatronics Practical Course and Occupational Safety

Academic Program	Automotive Technology
Specialization	Automotive Mechatronics Automotive Industrial Engineering
Module name	Automotive Mechatronics Practical Course and Occupational Safety
Abbrev.	AMP
Subtitle	-
Courses	-
Semester	6
Module coordinator	Dipl.-Ing. Michael Florschütz
Instructor(s)	Dipl.-Ing. Michael Florschütz et al.
Language	German
Classification in curriculum	Compulsory elective modules AMEC and WIAM
Use in other academic programs	-
Format / SWH	Practical course / 4 SWH
Work requirement	In-class program: 24 hrs. Self-directed study: 128 hrs.
ECTS	5
Technical prerequisites	-
Admission prerequisites for examination	Successful participation in six experiments
Qualification objectives	Students will be able to ... - Study theoretical foundations themselves. - Carry out practical experiments. - Prepare reports on the individual experiments. - Deepen / link basic theory.
Contents	Model based application/ development Engine control unit application Sensors and actuators Programming Data processing

	Vehicle aerodynamics
Requirements for successful completion	Proof of performance to accompany program
Media	-
Literature	-

Automotive Software Engineering

Academic Program	Automotive Technology
Specialization	Automotive Mechatronics Automotive Industrial Engineering
Module name	Automotive Software Engineering
Abbrev.	ASE
Subtitle	-
Courses	-
Semester	6
Module coordinator	Dr. Ralf Reißing
Instructor(s)	Dr. Ralf Reißing
Language	German
Classification in curriculum	Compulsory module AMEC, Compulsory elective module WIAM
Use in other academic programs	-
Format / SWH	Seminar-type lecture and exercises / 4 SWH
Work requirement	In-class program: 45 hrs. Self-directed study: 105 hrs.
ECTS	5
Technical prerequisites	Basics of computer science and programming from previous modules
Admission prerequisites for examination	-
Qualification objectives	- Students will be able to name the framework conditions of software development for automobiles, e.g. applicable norms and standards, and to describe their effects on development. - They will be able to apply processes, methods, notations and tools for the development of high-quality embedded automotive software.
Contents	- Fundamentals of software engineering - Fundamentals of software development for automobiles

	- Core process of automotive software development, esp. requirements engineering and requirements management, modeling, design, quality assurance, and testing - Selected supporting processes of automotive software development, esp. defect management, version, and configuration management
Requirements for successful completion	Written examination
Media	Presentation, projector, blackboard, script
Literature	Schäuffele, Zurawka: Automotive Software Engineering. Vieweg und Teubner. Ludewig, Lichter: Software Engineering. dpunkt Verlag. Pohl, Rupp: Basiswissen Requirements Engineering. dpunkt Verlag. Rupp, Queins: UML 2 glasklar, Hanser Verlag. Spillner, Linz: Basiswissen Softwaretest. dpunkt Verlag.

Bachelor Thesis and Colloquium

Academic Program	Automotive Technology
Specialization	Automotive Mechatronics Automotive Industrial Engineering
Module name	Bachelor Thesis and Colloquium
Abbrev.	BAC
Subtitle	-
Courses	Bachelor thesis, final colloquium presentation
Semester	7
Module coordinator	Dr. Stefan Gast
Instructor(s)	Supervising professor
Language	German
Classification in curriculum	Compulsory module AMEC and WIAM
Use in other academic programs	-
Format / SWH	Bachelor Thesis
Work requirement	Bachelor thesis: - In-class program: 12 hrs. - Self-directed study: 348 hrs. Colloquium: - In-class program: 6 hrs. - Self-directed study: 54 hrs.
ECTS	Bachelor thesis: 12 Colloquium: 2
Technical prerequisites	According to SPO §5 (3) of Academic/Scientific Work and Presentation
Admission prerequisites for examination	According to SPO
Qualification objectives	Students will be able to: Develop complex, practical tasks using scientific methods to find solutions with successful personal integration in an industrial company; generate scientifically-sound written elaborations; and explain their own ideas and results in the face of professional criticism.

	Independently implement time management when working on a task.
Contents	Scientific, application-oriented paper with practical relevance on a self-contained engineering or industrial engineering topic in the field of automotive mechatronics.
Requirements for successful completion	Bachelor thesis with subsequent colloquium / presentation
Media	(Not relevant)
Literature	see Academic/Scientific Work and Presentation

Standard Business Software

Academic Program	Automotive Technology
Specialization	Automotive Industrial Engineering
Module name	Standard Business Software
Abbrev.	BSS
Subtitle	-
Courses	-
Semester	4
Module coordinator	Dr. Georg Roth
Instructor(s)	Dipl. BA. Thomas Haselbauer, MBA
Language	German
Classification in curriculum	Compulsory module WIAM
Use in other academic programs	-
Format / SWH	Seminar-type lectures, practical course / 4 SWH
Work requirement	In-class program: 45 hrs. Self-directed study: 105 hrs.
ECTS	5
Technical prerequisites	-
Admission prerequisites for examination	-
Qualification objectives	Students will be able to explain the contents and special features of operational software systems. They will understand and be able to describe the concepts and benefits of integrating applications and mapping end-to-end processes in an ERP system. They will have practical experience with using the ERP system of a market leader, independently executing ERP case studies, and practicing end-to-end, integrated processes within the case studies.
Contents	ERP: Classification, term, meaning, special features Mapping of company organization and business processes Structure and components of SAP ERP

	Manufacturing / production management Accounting Materials management and procurement Sales and distribution Shipping and transportation Extension of an ERP by integrating additional standard software Data warehouse Guided case study (based on SAP ERP 6.0) with continuous process example on materials management, production, sales, delivery, management accounting, posting, and related master data
Requirements for successful completion	Written examination
Media	Standard software with guided case study, script, projector, blackboard
Literature	Literature sources according to information provided in course

Bus and Communication Systems in Automobiles

Academic Program	Automotive Technology
Specialization	Automotive Mechatronics Automotive Industrial Engineering
Module name	Bus and Communication Systems in Automobiles
Abbrev.	BKA
Subtitle	-
Courses	-
Semester	6
Module coordinator	Dr. Peter Raab
Instructor(s)	Dr. Peter Raab
Language	German
Classification in curriculum	Compulsory module AMEC, Compulsory elective module WIAM
Use in other academic programs	-
Format / SWH	Seminar-type lectures / 4 SWH, integrated exercises (25%)
Work requirement	In-class program: 45 hrs. Self-directed study: 105 hrs.
ECTS	5
Technical prerequisites	Basics of computer science and programming (from computer science modules), electrical engineering
Admission prerequisites for examination	-
Qualification objectives	Students will be able to: - Name the most important bus systems in the vehicle. - Describe the basics of serial data communication (e.g. bus physics, bus access methods, error detection in data transmission, ...) and transfer them to bus systems in the vehicle. - Explain the bit transmission and the data link layer (layer 1 + 2 in the ISO layer model) of the important bus systems in the vehicle (e.g. CAN) and transfer them by example to data

	- Observe and explain the data traffic of an existing bus communication with the help of typical SW tools. - Realize simple ECU simulations in relation to bus communication in a tool-based manner.
Contents	- Basics of automotive bus systems (layer model, coding, wave propagation on conductors) - CAN bus (function, coding): Physical layer, data link layer, design - LIN bus (function, coding, configuration with ldf and lcf files) - FlexRay (function, coding, configuration with FIBEX files) - Ethernet (basics, applications: diagnostics and multimedia) - Measurements on CAN bus, LIN bus, and FlexRay - Configuration of CAN bus, LIN bus, and FlexRay - Introduction to programming with CAPL
Requirements for successful completion	Written examination
Media	Presentation, projector, blackboard, script
Literature	Werner Zimmermann, Ralf Schmidgall: Bussysteme in der Fahrzeugtechnik. Protokolle und Standards. Vieweg & Teubner Verlag. Konrad Etschberger: Controller-Area-Network. Hanser Verlag. Andreas Grzemba, Hans-Christan von der Wense: LIN-Bus Franzis Verlag. Robert Bosch GmbH: Autoelektrik/Autoelektronik. Horst Engels: CAN-Bus. Franzis Verlag. Mathias Rausch: FlexRay. Grundlagen, Funktionsweise, Anwendung. Hanser Verlag. Andreas Grzemba: MOST: Das Multimedia-Bussystem für den Einsatz im Automobil. Franzis Verlag. Robert Bosch GmbH. CAN 2.0 Specification.

Business English (B2)

Academic Program	Automotive Technology
Specialization	Automotive Mechatronics Automotive Industrial Engineering
Module name	Business English (B2)
Abbrev.	BE
Subtitle	-
Courses	-
Semester	4
Module coordinator	Barney Craven, M.A.
Instructor(s)	Barney Craven, M.A., Richard Fry, MCLFS
Language	English
Classification in curriculum	Compulsory module AMEC and WIAM
Use in other academic programs	-
Format / SWH	Seminar-type lectures, seminar and exercise / 2 SWH
Work requirement	In-class program: 22 hrs. Self-directed study: 68 hrs.
ECTS	3
Technical prerequisites	No formal prerequisites, but a plus are at least 6 years of school English enabling student to use language independently (B1 level of Common European Framework of Reference for Languages)
Admission prerequisites for examination	Course-related criteria
Qualification objectives	Expansion and improvement of individual English skills (reading, writing, listening comprehension, speaking) to the B2 level of the Common European Framework of Reference for Languages, with particular consideration of technical and professional topics From the Common European Framework of Reference for Languages (http://www.europaeischer-referenzrahmen.de/): "B2 – Independent use of language

	Is able to understand the main contents of complex texts on specific and abstract topics; also understands technical discussions in own specialty. Is able to communicate spontaneously and fluently enough to permit normal conversations with native speakers without great effort on either side. Is able to express himself/herself clearly and in detail on a wide spectrum of topics, explain an opinion on a current question, and state the advantages and disadvantages of different possibilities.
Contents	- Structure and expansion of basic vocabulary with business terminology and expressions using texts from different areas - Training of written expression in English by working through texts and writing professional correspondence - Training of verbal expression in English through discussion - If appl. grammar is reviewed with exercises
Requirements for successful completion	Accompanying performances and written examination
Media	Projector and blackboard / whiteboard, electronic scripts, and work documents language lab
Literature	Current literature will be recommended during the course.

CAx Techniques

Academic Program	Automotive Technology
Specialization	Automotive Mechatronics Automotive Industrial Engineering
Module name	CAx Techniques
Abbrev.	CAX
Subtitle	-
Courses	-
Semester	4
Module coordinator	Dipl.-Eng. Frank Höllein
Instructor(s)	Dipl.-Eng. Frank Höllein
Language	German
Classification in curriculum	Compulsory elective module AMEC and WIAM
Use in other academic programs	-
Format / SWH	Seminar-type lectures with integrated exercises / 4 SWH
Work requirement	In-class program: 45 hrs. Self-directed study: 105 hrs.
ECTS	5
Technical prerequisites	-
Admission prerequisites for examination	-
Qualification objectives	Students will be able to model components and assemblies using the CAx system "Siemens NX" and
Contents	- Parametric associative modeling - Sketch creation - Reference elements - Part modeling (3D bodies and 2D surfaces) - Sheet metal part modeling - Drafting components, detail elements - Bottom-up / top-down assemblies - Drafting of assemblies
Requirements for successful completion	One take-home paper

Media	CAx-workstation, beamer, script with videos in Moodle course
Literature	Sándor Vajna, Andreas Wünsch: Siemens NX für Einsteiger – kurz und bündig Maik Hanel, Michael Wiegand: Designing with NX Siemens E-Learning Portal "Learning Advantage".

Management Accounting (*Controlling*)

Academic Program	Automotive Technology
Specialization	Automotive Industrial Engineering
Module name	Management Accounting (*Controlling*)
Abbrev.	CON
Subtitle	-
Courses	-
Semester	3
Module coordinator	Dr. Georg Roth
Instructor(s)	Dr. Georg Roth
Language	German
Classification in curriculum	Compulsory module WIAM
Use in other academic programs	-
Format / SWH	Seminar-type lectures / 4 SWH
Work requirement	In-class program: 45 hrs. Self-directed study: 105 hrs.
ECTS	5
Technical prerequisites	-
Admission prerequisites for examination	-
Qualification objectives	Teaching basic terms and concepts in management accounting (*controlling*). Practical application of selected instruments of industrial management accounting.
Contents	Teaching basic terms and concepts in management accounting (*controlling*). Practical application of selected instruments of industrial management accounting. Basic understanding of the special features of management accounting in the automotive sector.
Requirements for successful completion	Written examination
Media	Blackboard transcript, Powerpoint presentations via projector, supplementary written documents

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Literature	Weber, J.; Schäffer, U.: Einführung in das Controlling, Schäffer-Pöschel 2008. Jung, H.: Controlling, Verlag Oldenbourg 2011.

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Dynamics and Vibration Theory I

Academic Program	Automotive Technology
Specialization	Automotive Mechatronics Automotive Industrial Engineering
Module name	Dynamics and Vibration Theory I
Abbrev.	DYS1
Subtitle	-
Courses	-
Semester	2
Module coordinator	Dr. Martin Prechtl
Instructor(s)	Dr. Martin Prechtl
Language	German
Classification in curriculum	Compulsory module AMEC and WIAM
Use in other academic programs	-
Format / SWH	Seminar-type lectures with exercises / 4 SWH
Work requirement	In-class program: 45 hrs. Self-directed study: 105 hrs.
ECTS	5
Technical prerequisites	-
Admission prerequisites for examination	-
Qualification objectives	Description of motion processes in different coordinate systems Basic understanding of relative kinematics Application of the Newton's second law to point masses Formulation of energy balances for point masses Calculation of central collision processes
Contents	Foundations of kinematics: Definition of velocity and acceleration, point kinematics, rectilinear motions (Cartesian coordinates), polar coordinates, natural coordinates, integration of equations of motion, relative kinematics,

	kinematics of rigid bodies (space-fixed axis of rotation, plane and spatial kinematics) and instantaneous center of rotation Kinetics of point masses: Newton's laws, basic dynamic equation ("F=m · a"), free and guided point mass motion, constraint forces, resistance forces (incl. Coulomb friction), (principle of) momentum and angular momentum, collision processes, principle of work and energy, conservative forces and potential, d'Alembert's principle, dynamic force balance, systems of point masses (kinematic and physical constraints, degrees of freedom), and principle of center of gravity/ angular momentum
Requirements for successful completion	Written examination
Media	Blackboard, projector, supplemental written documents
Literature	Prechtl, M.: Mathematische Dynamik – Modelle und analyt. Methoden der Kinematik und Kinetik. Berlin, Heidelberg: Springer Spektrum; 2015. Gross, D.; Hauger, W.; Schröder, J.; Wall, W.A.: Technische Mechanik 3 – Kinetik. Berlin, Heidelberg: Springer-Verlag; 2012. Gross, D.; Ehlers, W.; Wriggers, P.; Schröder, J.; Müller, R.: Formeln und Aufgaben zur Technischen Mechanik 3. Berlin, Heidelberg: Springer-Verlag; 2012

Dynamics and Vibration Theory II

Academic Program	Automotive Technology
Specialization	Automotive Mechatronics Automotive Industrial Engineering
Module name	Dynamics and Vibration Theory II
Abbrev.	DYS2
Subtitle	-
Courses	-
Semester	3
Module coordinator	Dr. Martin Prechtl
Instructor(s)	Dr. Martin Prechtl
Language	German
Classification in curriculum	Compulsory module AMEC and WIAM
Use in other academic programs	-
Format / SWH	Seminar-type lectures with exercises / 4 SWH
Work requirement	In-class program: 45 hrs. Self-directed study: 105 hrs.
ECTS	5
Technical prerequisites	DYS1
Admission prerequisites for examination	-
Qualification objectives	Formulation of kinematic relationships for multi-body systems Creation of free body diagrams for rigid bodies Calculation of multi-body systems using force and momentum equations and based on an energy balance Calculation of eccentric collision processes Modeling of simple oscillating systems and analysis of properties of motion
Contents	Kinetics of systems of point masses: degrees of freedom, kinematic relationships, principle of center of gravity/ angular momentum, principle of work and energy,

	Rigid body kinetics in the plane: rotation about a fixed axis, axial mass moment of inertia, Steiner's theorem, rotational energy, reduced mass moment of inertia, rotational collisions, rigid body kinetics in the plane, principle of center of gravity and angular momentum, principle of work and energy, rolling/ adhesion, rolling friction, d'Alembert's principle, principle of momentum and angular momentum, eccentric collisions, and center of collision Harmonic oscillations: state variable, period/ oscillation duration, (circular) frequency, amplitude, phase diagram, complex representation, free oscillations of conservative systems, circular eigenfrequency, damping proportional to speed (viscous), Lehr's damping factor, harmonic excitation (via spring / damper and/or due to a rotating imbalance), solution of corresponding oscillation differential equations, dimensionless time, magnification function / amplitude frequency response, and resonance effect
Requirements for successful completion	Written examination
Media	blackboard, projector, supplemental written documents
Literature	Prechtl, M.: Mathematische Dynamik – Modelle und analyt. Methoden der Kinematik und Kinetik. Berlin, Heidelberg: Springer Spektrum; 2015. Gross, D.; Hauger, W.; Schröder, J.; Wall, W.A.: Technische Mechanik 3 – Kinetik. Berlin, Heidelberg: Springer-Verlag; 2012. Gross, D.; Ehlers, W.; Wriggers, P.; Schröder, J.; Müller, R.: Formeln und Aufgaben zur Technischen Mechanik 3. Berlin, Heidelberg: Springer-Verlag; 2012.

Introduction to Transport Policy

Academic Program	Automotive Technology
Specialization	Automotive Mechatronics Automotive Industrial Engineering
Module name	Introduction to Transport Policy
Abbrev.	VP
Subtitle	-
Courses	-
Semester	4
Module coordinator	Dr. Mathias Wilde
Instructor(s)	Dr. Mathias Wilde
Language	German
Classification in curriculum	Compulsory elective modules AMEC and WIAM
Use in other academic programs	-
Format / SWH	Seminar-type lectures / 4 SWH
Work requirement	In-class program: 45 hrs. Self-directed study: 105 hrs.
ECTS	5
Technical prerequisites	-
Admission prerequisites for examination	-
Qualification objectives	Students will receive an introduction to the subject area of transport policy along the three dimensions of the concept of politics: form (polity), content (policy), and process (politics). They will have knowledge of the political decision-making process, policy instruments and legal regulations. Students will get an overview of the actors involved in transport policy in Germany, government institutions and stakeholders. Students will be taught the possibilities and limits of the power to shape transport policy and be shown the development paths for future transport policy. Students will learn about economic, social and ecological

	guiding principles and how to evaluate social power and dominance in relationships. This will enable students to recognize the interrelationships of transport policy decisions across the various political levels, to classify conflicts of interest, and to identify the possibilities of influencing transport policy as well as instruments of control.
Contents	- Goals and instruments of transport policy - Actors involved in transport policy - Decision-making levels - Transport policy in the federal states and municipalities - Transport policy in Germany: a balance between market regulation, public service and competition - European transport policy, goals, and basics - Regulation of transport markets - Liberalization of transport markets - Transport infrastructure planning and investment as a core public task - Transport services in public and private ownership
Requirements for successful completion	Portfolio (seminar paper 70% and presentation 30%)
Media	Projector, blackboard, overhead projector
Literature	Schwedes, Oliver (publ.) (2011): Verkehrspolitik. Eine interdisziplinäre Einführung. 1st ed. Wiesbaden: VS Verl. für Sozialwiss (Perspektiven der Gesellschaft). Schwedes, Oliver; Canzler, Weert; Knie, Andreas (publ.) (2016): Handbuch Verkehrspolitik. 2nd ed. Wiesbaden: VS Verlag für Sozialwissenschaften. Wilde, Matthias; Gather, Matthias; Neiberger, Cordula (2017): Verkehr und Mobilität zwischen Alltagspraxis und Planungstheorie. Ökologische und soziale Perspektiven. Wiesbaden: Springer VS (Studien zur Mobilitäts- und Verkehrsforschung). Wilde, Mathias (2015): Die Re-Organisation der Verkehrssysteme. Warum sich die städtische Verkehrsplanung zu einer Mobilitätsplanung weiterentwickeln sollte. In: Standort 39 (1)

Wilde, Mathias; Klinger, Thomas (2017): Städte für Menschen. Transformationen urbaner Mobilität. In: Aus Politik und Zeitgeschichte (48), pp. 32–38.

Electrical Engineering

Academic Program	Automotive Technology
Specialization	Automotive Mechatronics Automotive Industrial Engineering
Module name	Electrical Engineering
Abbrev.	EMAB
Subtitle	-
Courses	-
Semester	6
Module coordinator	Dr. Matthäus Brela
Instructor(s)	Dr. Matthäus Brela
Language	German
Classification in curriculum	Compulsory elective modules AMEC and WIAM
Use in other academic programs	Bachelor in "Automation Technology and Robotics", Bachelor in "Electrical Engineering and Information Technology", Bachelor in "Power Engineering and
Format / SWH	Seminar-type lectures / 2 SWH, excursion / 1 SWH, seminar paper / 1 SWH
Work requirement	In-class program: 45 hrs. Self-directed study: 105 hrs.
ECTS	5
Technical prerequisites	Basic knowledge of electrical drive technology
Admission prerequisites for examination	
Qualification objectives	Subject-related skills • Understanding the operation and structure of electrical machines • Naming and evaluating the steps involved in the manufacture of electrical machines • Reproducing the manufacturing processes necessary for the production • Analyzing, evaluating and developing the manufacturing chain of electrical machines holistically

Contents	• Typical applications / fields of application of electrical machinery manufacturing • Electromagnetic and mechanical fundamentals of electrical machines • Basic motor topologies • Components of the drive train • Manufacturing processes for electrical steel strip, electrical single sheet and sheet stack as well as production-related influencing factors • Fundamentals of loss effects and numerical analysis methods • Production of hard magnetic materials as well as quality assurance and failure analysis • Magnetization and magnet assembly • Winding technology, impregnation, and insulation • Manufacturing of power electronics • Assembly processes and testing technology for quality assurance at the end of the value chain • Electromagnetic actuators, their manufacturing processes, and quality assurance • Recycling of electrical machines and their components • Traceability and I4.0 in electrical engineering • Basics of contactless power transmission and inductive charging systems • Additive manufacturing in electrical engineering • Superconductor electric motors and transfer systems
Requirements for successful completion	Written exam 60 min. and seminar paper (weighting 3:1)
Media	Projector and blackboard/whiteboard, simulation programs, electronic scripts and working documents, practical exercises.
Literature	Elektrische Servoantriebe, Manfred Schulze, 2008, ISBN 978-3-446-41459-4 Elektrische Antriebssysteme, Ulrich Riefenstahl, 2nd ed., 2006, ISBN 3-8351-0029-7

	Elektrische Maschinen, Hans-Ulrich Giersch, 2003, ISBN 3-519-46821-2

Electrical Engineering for Industrial Engineers

Academic Program	Automotive Technology
Specialization	Automotive Industrial Engineering
Module name	Electrical Engineering for Industrial Engineers
Abbrev.	ETW
Subtitle	-
Courses	-
Semester	3
Module coordinator	Dr. Stefan Gast
Instructor(s)	Dr. Stefan Gast
Language	German
Classification in curriculum	Compulsory module WIAM
Use in other academic programs	-
Format / SWH	Seminar-type lectures / 3 SWH, exercise and practical course / 1 SWH
Work requirement	In-class program: 45 hrs. Self-directed study: 105 hrs.
ECTS	5
Technical prerequisites	-
Admission prerequisites for examination	-
Qualification objectives	Students will be able to: Interpret DC networks, evaluate the effect of passive components (resistor, capacitor, coil) in DC networks, relate the effect of DC electrical networks in motor vehicles, explain the effect of magnetic circuits, and assign applications of magnetic circuits in motor vehicles.
Contents	Current, voltage and power in DC electrical circuits, parallel and series connections of resistors, effect of passive components (resistors, capacitors, inductors)

	in DC circuits, switching on and off processes in DC circuits, electromagnetism, and induction processes
Requirements for successful completion	Written examination
Media	Projector, blackboard
Literature	Wolfgang Böge (publ.), Wilfried Plaßmann (publ.): Handbuch Elektrotechnik - Grundlagen und Anwendungen für Elektrotechniker. Vieweg & Sohn Verlag Wiesbaden 2007. Wilfried Weißgerber: Elektrotechnik für Ingenieure 1. Vieweg+Teubner, Wiesbaden 2009. Martin Vömel, Dieter Zastrow: Aufgabensammlung Elektrotechnik 1: Gleichstrom, Netzwerke und elektrisches Feld. Vieweg Verlag Wiesbaden, 2009. Martin Vömel, Dieter Zastrow: Aufgabensammlung Elektrotechnik 2: Magnetisches Feld und Wechselstrom. Vieweg Verlag Wiesbaden, 2009.

Production Technology

Academic Program	Automotive Technology
Specialization	Automotive Mechatronics Automotive Industrial Engineering
Module name	Production Technology
Abbrev.	FT
Subtitle	-
Courses	-
Semester	4
Module coordinator	Dr. Oliver Koch
Instructor(s)	Dr. Oliver Koch
Language	German
Classification in curriculum	Compulsory module WIAM, Compulsory elective module AMEC
Use in other academic programs	-
Format / SWH	Seminar-type lectures / 4 SWH
Work requirement	In-class program: 45 hrs. Self-directed study: 105 hrs.
ECTS	5
Technical prerequisites	Basic knowledge: metallic materials
Admission prerequisites for examination	-
Qualification objectives	- Familiarization with manufacturing processes for machining metallic materials. - Ability to select suitable manufacturing processes depending on defined boundary conditions.
Contents	- Principles of chipping, wear - Cutting materials and cooling lubricants - Tool monitoring - Lathing - Milling - Drilling

	- Sanding - Honing, lapping - Sintering - Foundations forming technology - Rolling - Continuous and discontinuous extrusion - Smithing - Deep-drawing - Bending - Splitting, punching - Ablation - Welding - Soldering, gluing
Requirements for successful completion	Written examination
Media	Projector and blackboard Scripts and work documents
Literature	Scheipers: Handbuch der Metallbearbeitung, Europa Lehrmittel 2002. Fritz, Schulze: Fertigungstechnik, Springer Verlag 2001. König, Klocke: Fertigungsverfahren Vol. 1 to 5, VDI-Verlag 2008.

Advanced Dynamics / Machine Dynamics

Academic Program	Automotive Technology
Specialization	Automotive Mechatronics Automotive Industrial Engineering
Module name	Advanced Dynamics / Machine Dynamics
Abbrev.	HDY
Subtitle	-
Courses	-
Semester	6
Module coordinator	Dr. Martin Prechtl
Instructor(s)	Dr. Martin Prechtl
Language	German
Classification in curriculum	Compulsory elective module AMEC and WIAM
Use in other academic programs	Bachelor in "Mechanical Engineering"
Format / SWH	Seminar-type lectures / 4 SWH
Work requirement	In-class program: 45 hrs. Self-directed study: 105 hrs.
ECTS	5
Technical prerequisites	Engineering Mathematics I and II, Statics and Strength of Materials, Dynamics and Vibration I and II
Admission prerequisites for examination	-
Qualification objectives	Preliminary design of a drive on the basis of the basic methods of dynamics Application of the principle of virtual work as well as the Lagrangian equations of the 1st and 2nd kind for determining equations of motion Basic understanding of the properties of the motion of spinning tops Calculation of dynamic bearing reactions and the required masses for balancing components Mathematical description and analysis of coupled oscillators

	Calculation of bending natural frequencies and critical speeds Basic understanding of mathematical modeling of continuum oscillations
Contents	Mathematical methods: d'Alembert's principle according to Lagrange, virtual work, Lagrangian equations of 1st and 2nd kind, generalized coordinates and forces, constraints Spatial rigid body kinetics: principle of center of gravity or principle of moments, principle of work and energy, angular momentum, inertia tensor / matrix, Steiner-Huygens theorem, principal axis system, Euler derivation, Euler's equations, motion of force-free and non-force-free, symmetrical tops, gyroscopic movement, self-centering effect, dynamic bearing reactions, structural analysis and dynamic balancing Advanced vibration theory: systems with several degrees of freedom (DE system), angular eigenfrequency, harmonic excitation, frequency response and vibration damping, bending vibrations (massless beams with attached point masses), influence coefficient and Castigliano's theorem, critical revolution speeds, and bending vibrations of continua
Requirements for successful completion	Written examination
Media	Blackboard, projector, supplemental written documents
Literature	Prechtl, M.: Mathematische Dynamik – Modelle und analyt. Methoden der Kinematik und Kinetik. Berlin, Heidelberg: Springer Spektrum; 2015. Gross, D.; Hauger, W.; Schröder, J.; Wall, W.A.: Engineering Mechanics 3 - Kinetics. Berlin, Heidelberg: Springer-Verlag; 2012. Gross, D.; Ehlers, W.; Wriggers, P.; Schröder, J.; Müller, R.: Formeln und Aufgaben zur Technischen Mechanik 3. Berlin, Heidelberg: Springer-Verlag; 2012.

Industry Internship

Academic Program	Automotive Technology
Specialization	Automotive Mechatronics Automotive Industrial Engineering
Module name	Industry Internship
Abbrev.	IP
Subtitle	-
Courses	-
Semester	5
Module coordinator	Dr. Michael Steber
Instructor(s)	Dr. Michael Steber
Language	German
Classification in curriculum	Compulsory module AMEC and WIAM
Use in other academic programs	-
Format / SWH	Required internship semester in industrial operations
Work requirement	22 weeks (4 days) or 20 weeks (5 days if more than 100 km distance from Coburg)
ECTS	25
Technical prerequisites	Advancement authorization to 3rd semester pursuant to SPO (§5 Para. 2) and successful completion and recognition of basic practical course pursuant to SPO (§7 Para. 1 and 2)
Admission prerequisites for examination	Original grade report
Qualification objectives	Engineering collaboration in operational processes/projects
Contents	- Development, design, project planning - Manufacturing, production preparation and control - Assembly, operation, maintenance - Testing, production control - Application engineering (technical consulting), sales
Requirements for successful completion	Internship report (approx. 30 pages)

	Examination performance is the prerequisite for recognition of the required internship semester.
Media	Projector, blackboard
Literature	Coburg University of Applied Sciences, Department of Mechanical Engineering and Automotive Technology (2012): Information sheet on the required internship semester in the bachelor's degree program in Automotive Engineering and Management at the University of Applied Sciences. Coburg. Coburg University of Applied Sciences, Department of Mechanical

Computer Science for Industrial Engineers

Academic Program	Automotive Technology
Specialization	Automotive Industrial Engineering
Module name	Computer Science for Industrial Engineers
Abbrev.	INW
Subtitle	-
Courses	-
Semester	4
Module coordinator	Dr. Peter Raab
Instructor(s)	Dr. Peter Raab Dipl.-Ing. Andreas-Michael Geißler Yannick Pfister (B.Eng.)
Language	German
Classification in curriculum	Compulsory module WIAM
Use in other academic programs	-
Format / SWH	Seminar-type lectures / 2 SWH, exercises / practical courses to accompany lecture / 2 SWH
Work requirement	In-class program: 45 hrs. Self-directed study: 105 hrs.
ECTS	5
Technical prerequisites	-
Admission prerequisites for examination	-
Qualification objectives	Students will be able to: - Describe and convert the number representations commonly used in a computer system. - Describe and compare algorithms using flowchart/pseudocode. - Apply simple data structures using sorting algorithms as an example. - Apply the basic concepts of programming languages to simple problems.

	- Create and debug simple C programs.
Contents	- Representation of programs and numbers in the computer - Basics of information technology - Algorithmics, representation of algorithms, examples of algorithms - Basic constructs of the C programming language
Requirements for successful completion	Written examination
Media	Presentation, projector, blackboard, computer exercises
Literature	Ernst: Grundkurs Informatik. Vieweg und Teubner. Herold, Lurz, Wohlrabe: Grundlagen der Informatik. Pearson. Gumm, M. Sommer: Einführung in die Informatik, Oldenbourg Verlag, 9th edition, 2011. M. Dausmann, U. Bröckl, D. Schoop, J. Goll: C als erste Programmiersprache – vom Einsteiger zum Fortgeschrittenen, Vieweg+Teubner, 7th edition, 2011. R. Klima, S. Selberherr: Programmieren in C, Springer, 3rd edition, 2010. P. Prinz: C – das Übungsbuch Testfragen und Aufgaben mit Lösungen, 1st edition, mitp, 2011. RRZN - UNI Hannover : Die Programmiersprache C - Ein Nachschlagwerk.

Automotive Engineering I

Academic Program	Automotive Technology
Specialization	Automotive Mechatronics Automotive Industrial Engineering
Module name	Automotive Engineering I
Abbrev.	KT1
Subtitle	-
Courses	-
Semester	2
Module coordinator	Dr. Markus Jakob
Instructor(s)	Dr. Markus Jakob
Language	German
Classification in curriculum	Compulsory module AMEC and WIAM
Use in other academic programs	-
Format / SWH	Seminar-type lectures / 4 SWH
Work requirement	In-class program: 45 hrs. Self-directed study: 105 hrs.
ECTS	5
Technical prerequisites	-
Admission prerequisites for examination	-
Qualification objectives	Students will be able to correctly describe components and subsystems of road vehicles in terms of concept and function and to assess them correctly in terms of the overall vehicle system.
Contents	Vehicle types; four-stroke Otto engine, four-stroke diesel engine; fuels; power transfer: drive types, clutch, manual transmission, automatic transmission, wheel drive; chassis: axle geometry, steering, suspension, vibration damping; current trends in development
Requirements for successful completion	Written examination
Media	Projector

Literature	Gerigk, Bruhn e.a.: Kraftfahrzeugtechnik (westermann). Lecture manuscripts (of external) speakers

HOCHSCHULE COBURG

Automotive Engineering II

Academic Program	Automotive Technology
Specialization	Automotive Mechatronics Automotive Industrial Engineering
Module name	Automotive Engineering II
Abbrev.	KT2
Subtitle	-
Courses	-
Semester	3
Module coordinator	Dr. Markus Jakob
Instructor(s)	Dr. Markus Jakob
Language	German
Classification in curriculum	Compulsory module AMEC and WIAM
Use in other academic programs	-
Format / SWH	Seminar-type lectures / 4 SWH
Work requirement	In-class program: 45 hrs. Self-directed study: 105 hrs.
ECTS	5
Technical prerequisites	-
Admission prerequisites for examination	-
Qualification objectives	Students will be able to correctly describe components and subsystems of road vehicles in terms of concept and function and to assess them correctly in terms of the overall vehicle system.
Contents	Chassis: wheel suspension, tires and wheels; brakes: basics, hydraulic brake system, vehicle dynamics control systems; vehicle body; electronic systems; new drive concepts; current development trends
Requirements for successful completion	Written examination
Media	Projector

HOCHSCHULE COBURG

Literature	Gerigk, Bruhn e.a.: Kraftfahrzeugtechnik (westermann). Lecture manuscripts (of external) speakers

HOCHSCHULE COBURG

Construction and Machine Elements

Academic Program	Automotive Technology
Specialization	Automotive Mechatronics Automotive Industrial Engineering
Module name	Construction and Machine Elements
Abbrev.	KM
Subtitle	-
Courses	-
Semester	1
Module coordinator	Dr. Kai Hiltmann
Instructor(s)	Dr. Kai Hiltmann
Language	German
Classification in curriculum	Compulsory module AMEC and WIAM
Use in other academic programs	-
Format / SWH	Seminar-type lectures / 2 SWH, exercise / 2 SWH
Work requirement	In-class program: 45 hrs. Self-directed study: 105 hrs.
ECTS	5
Technical prerequisites	-
Admission prerequisites for examination	Successful completion of three written take-home assignments
Qualification objectives	Representing simple geometry in a hand sketch Reading and interpreting a technical drawing Recognizing individual parts from overall drawings or models Assigning the most important machine elements such as screws, welded, soldered, and glued connections, springs, dampers, axles and shafts, bearings and important types of gears to an application situation. Design of simple construction elements to given loads
Contents	Technical communication: sketch, drawing, model, diagram, table. Freehand sketching.

	Standardized representation, drawing, and dimensioning. Drawing sets; surfaces and tolerances. Qualitative overview of important machine elements and gear types.
Requirements for successful completion	Exam 90 min with multiple-choice part
Media	Presentation, projector, blackboard, script
Literature	Labisch, S. and Weber, C.: Technisches Zeichnen, Wiesbaden : Vieweg , 3rd ed. 2009: Viewegs Fachbücher der Technik . -- ISBN 978-3-8348-0312-2. Schmid, D.: Konstruktionslehre Maschinenbau, Haan-Gruiten : Verl. Europa-Lehrmittel Nourney, Vollmer , 1st ed. 2009 . -- ISBN 978-3-8085-1400-9. Decker, K.-H. und Kabus, K.: Maschinenelemente, Munich: Hanser, 18th ed. 2011 . -- ISBN 978-3-446-42608-5. Wittel, H.; Roloff, H. und Matek, W.: Maschinenelemente, Wiesbaden : Vieweg + Teubner , 20th ed. 2011 . -- ISBN 978-3-8348-1454-8.

Cost Accounting

Academic Program	Automotive Technology
Specialization	Automotive Industrial Engineering
Module name	Cost Accounting
Abbrev.	KR
Subtitle	-
Courses	-
Semester	2
Module coordinator	Dr. Georg Roth
Instructor(s)	Dr. Georg Roth
Language	German
Classification in curriculum	Compulsory module WIAM
Use in other academic programs	-
Format / SWH	Seminar-type lectures / 4 SWH
Work requirement	In-class program: 45 hrs. Self-directed study: 105 hrs.
ECTS	5
Technical prerequisites	-
Admission prerequisites for examination	-
Qualification objectives	Students will know essential basic terms and the fundamental interrelationships of industrial cost accounting. They will learn the basic concepts of cost accounting with its three sub-areas (cost types, cost centers and cost unit accounting). They will understand the interrelationships between the three sub-areas and be able to apply them in a practice-oriented manner within the framework of cost accounting tasks and exercises.
Contents	Basic concepts of cost accounting; cost element accounting (e.g. fixed, variable costs, direct/overhead costs, etc.); cost center accounting (e.g. equation method, step ladder method, attachment method, etc.);

	Cost unit accounting (e.g. division costing, various methods of overhead costing, joint costing, etc).
Requirements for successful completion	Written examination
Media	Projector, blackboard, overhead projector
Literature	Friedl, G.; Hofmann, Ch.; Pedell, B.: Kostenrechnung, Vahlen Verlag 2010. Haberstock, L.: Kostenrechnung I - Einführung, E.-Schmidt-Verlag 2005. Scheld, G.: Das interne Rechnungswesen im Industriebetrieb. Volume 1: Istkostenrechnung, Büren 2004. Wöhe, G.: Einführung in die Allgemeine Betriebswirtschaftslehre, Verlag Vahlen, 2010.

Fuel Analysis and Exhaust Gas Measurement Technology

Academic Program	Automotive Technology
Specialization	Automotive Mechatronics Automotive Industrial Engineering
Module name	Fuel Analysis and Exhaust Gas Measurement Technology
Abbrev.	KAA
Subtitle	-
Courses	-
Semester	6
Module coordinator	Dr. Markus Jakob
Instructor(s)	Dr. Thomas Garbe Dr. Markus Jakob Dr. Olaf Schröder
Language	German, English
Classification in curriculum	Compulsory elective module AMEC and WIAM
Use in other academic programs	Bachelor in "Engineering Physics"
Format / SWH	Seminar-type lectures / 2 SWH, block practical course / 2 SWH
Work requirement	In-class program: 60 hrs. Self-directed study: 90 hrs.
ECTS	5
Technical prerequisites	-
Admission prerequisites for examination	100% participation in the block seminar
Qualification objectives	Part 1 (Fuels): Students will be able to identify and analyze the physical, chemical, and analytical problems of fuel and engine oil interactions and to evaluate them in terms of engine and exhaust effects. Part 2 (Emissions): Students will be able to understand engine combustion (technical aspect), the formation of pollutants

	(chemical aspect), and their analytical measurement techniques (analytical aspect). In addition, the chemical modes of operation for exhaust gas aftertreatment will be explained and the analytical equipment used to determine the limited and non-limited exhaust gas components will be described.
Contents	Part 1 (Fuels): Fluid analysis; introduction to fuel and oil chemistry, fossil and biogenic components, chemical reactions and their effects on physical and engineering applications. Aging studies. Practical course: Chemical analyses using UV-Vis, FTIR, GC-FID, GC- MS, HPLC, ASS, ICP-MS, GPC-MS, ZLIF, NIR, dielectric spectroscopy, and standard fuel analysis Part 2 (Emission Focus): Gas analysis; introduction to combustion chemistry and presentation of policy framework. Engine fundamentals; fuel as an engine design element. Exhaust gas sampling and chemical measurement techniques, particle counting, impact studies. Practical course: Engine testing, determination of HC, NOx, CO, PM, particle count, NH3, PAH, summer smog formers, and aldehydes. Investigation of load dependency in pollutant formation.
Requirements for successful completion	Colloquium à 60min (2 participants each)
Media	Common presentation techniques; exercise and test material on the intranet
Literature	Handbuch Dieselmotoren (Springer- Verlag) The Biodiesel Handbook (AOCS Press) Literatur der Fuels Joint Research Group (Cuviller Verlag Göttingen) Publications of the Working Group Fuel Standards DIN EN590, DIN EN 15940, DIN EN 228 (DIN FAM); Handbuch Verbrennungsmotor (Springer- Verlag)

Marketing and Sales

Academic Program	Automotive Technology
Specialization	Automotive Industrial Engineering
Module name	Marketing and Sales
Abbrev.	MV
Subtitle	-
Courses	-
Semester	2
Module coordinator	Dr. Georg Roth
Instructor(s)	Dipl. BA. Nicole Strehl
Language	German
Classification in curriculum	Compulsory module WIAM
Use in other academic programs	-
Format / SWH	Seminar-type lectures / 4 SWH
Work requirement	In-class program: 45 hrs. Self-directed study: 105 hrs.
ECTS	5
Technical prerequisites	-
Admission prerequisites for examination	-
Qualification objectives	One of the main factors of successfully managing a business is the ability to align entrepreneurial activities with the opportunities and risks of the market. Companies increase their range of services and competitiveness through targeted marketing and in this way adapt to the constantly changing conditions of the market. The Marketing and Sales module provides students with the knowledge to carry out strategic situation analyses, to develop realistic marketing goals and strategies, and to use suitable marketing instruments.
Contents	Marketing basics Defining the marketing plan

	- Marketing as market-oriented decision-making behavior (situation analysis, marketing goals) - Marketing as a management function (content, phases and levels of marketing planning) Marketing strategies - Relevant decisions in strategy building - Choice of market and market segments - Strategic behaviors - Positioning Marketing mix instruments - Product policy - Price policy - Communication policy - Sales policy Relationship marketing Basics of market research Marketing case studies
Requirements for successful completion	Written examination
Media	Projector, blackboard, overhead projector
Literature	Bruhn, M.: Marketing – Grundlagen für Studium und Praxis. Springer Gabler, 2014. Becker, J.: Marketingkonzeption: Grundlagend des zielstrategischen und operativen Marketing-Managements. Vahlen, 2011. Ramme, I.: Marketing Einführung mit Fallbeispielen, Aufgaben und Lösungen. Schäffer-Pöschel 2009. Bauer, H.; Dichtl, E.; Herrmann A.: Automobilmarktforschung. Vahlen 1996.

Marketing Management

Academic Program	Automotive Technology
Specialization	Automotive Industrial Engineering
Module name	Marketing Management
Abbrev.	MM
Subtitle	-
Courses	-
Semester	7
Module coordinator	Dr. Georg Roth
Instructor(s)	Dr. Georg Roth
Language	German
Classification in curriculum	Compulsory elective module WIAM
Use in other academic programs	-
Format / SWH	Seminar-type lectures with exercises / 4 SWH
Work requirement	In-class program: 45 hrs. Self-directed study: 105 hrs.
ECTS	5
Technical prerequisites	-
Admission prerequisites for examination	-
Qualification objectives	Students will gain an understanding of the importance of marketing in the value creation process, the interpretation of marketing in the modern management process, and the relationship between marketing and market orientation. They will know the essential strategic and operational tasks in marketing, understand the importance of market research, and be familiar with the supporting areas of control, human resources management, IT and organization in marketing.
Contents	- Marketing planning (objectives, strategies), marketing implementation (4 P's), and marketing/management accounting - Marketing intelligence: Basics of market research and its application in the automotive sector (basics of

	marketing management accounting, profitability analysis of projects, pricing and price calculation) - EDP systems in marketing + sales: (CRM and distribution systems in practice) - SAP ERP modules "Sales+Distribution" and "CRM"
Requirements for successful completion	Written examination
Media	Projector, blackboard, overhead projector
Literature	Various literature sources according to the information given in the course (see corresponding documents).

Methods of Experimental Methodology

Academic Program	Automotive Technology
Specialization	Automotive Mechatronics Automotive Industrial Engineering
Module name	Methods of Experimental Methodology
Abbrev.	MVD
Subtitle	-
Courses	-
Semester	7
Module coordinator	Dr. Thomas Garbe
Instructor(s)	Dr. Thomas Garbe
Language	German
Classification in curriculum	Compulsory elective module AMEC and WIAM
Use in other academic programs	Academic programs in the AN department
Format / SWH	Seminar-type lectures / 4 SWH
Work requirement	In-class program: 45 hrs. Self-directed study: 105 hrs.
ECTS	5
Technical prerequisites	-
Admission prerequisites for examination	
Qualification objectives	After successful completion, students will be familiar with: - The theoretical background on conducting experiments in science and industry. - Flowcharts for performing experiments. - Selected tools for planning and conducting experiments. - Examples of real experimental projects with different objectives.
Contents	The lecture covers: - The classification of experiments in the methodology of gaining knowledge.

	- Theoretical and application-related background information for performing experiments. - Details of a test procedure in the planning, execution, and evaluation phases. - Selected tools for carrying out experiments, such as statistical test planning, using test rigs and test cycles - The application of standardized methods. - The transfer of test results into real applications.
Requirements for successful completion	Written examination
Media	Projector, blackboard, PC, crafts materials
Literature	

Mobility and Digital Transformation

Academic Program	Automotive Technology
Specialization	Automotive Industrial Engineering
Module name	Mobility and Digital Transformation
Abbrev.	MDT
Subtitle	-
Courses	-
Semester	7
Module coordinator	Dr. Mathias Wilde
Instructor(s)	Dr. Mathias Wilde
Language	German
Classification in curriculum	Compulsory elective module WIAM
Use in other academic programs	-
Format / SWH	Seminar-type lectures / 4 SWH
Work requirement	In-class program: 45 hrs. Self-directed study: 105 hrs.
ECTS	5
Technical prerequisites	-
Admission prerequisites for examination	-
Qualification objectives	The seminar covers the trends and framework conditions of digitalization in traffic and transportation. The contents are divided into the four topics: 1) automotive management, 2) automotive engineering, 3) digitalization of public transport systems, and 4) digital value chain. The "automotive management" and "engineering" areas cover content such as the challenges of digitalization in the automotive industry and network-connected vehicles. The topic of "digitization of public transport systems" includes the treatment of solutions to meet urban and regional transport requirements. In the topic area "digital

	value chain", the seminar ultimately addresses the changing value chains of established and new mobility concepts. Along these four thematic areas, the seminar sheds light on the architecture of digital transportation systems and takes a critical look at new urban mobility concepts under the regime of digital transformation. In doing so, the seminar addresses questions of political frameworks and degrees of freedom as well as requirements of ethics and data sovereignty. In this respect, students will learn about the facets of the transformation process in transportation, be able to assess the consequences for the automotive industry, and be aware of the opportunities and risks associated with digitalization.
Cont	Introduction: - Digital transformation processes, developments - Technical, business, and social challenges - Application areas of networked mobility - Political framework and degrees of freedom - Issues of ethics and data sovereignty Topic 1: Automotive management - Customer solutions, services, and cooperation - Basics of Big Data Analytics Topic 2: Automotive engineering - Connected vehicles and infrastructure - Automated driving Topic 3: Digitization of public transport systems - Infrastructure for the digitization of transport, smart cities and their resilience - Demand-responsive transport Topic 4: Digital value chain - Mobility-as-a-Service (MaaS) - Platform economy and system integration

Requirements for successful completion	Preparation of assignments during the semester that will be graded 70% and presentation 30%.
Media	Projector, blackboard, overhead projector
Literature	Canzler, Weert/Knie, Andreas (2016): Die digitale Mobilitätsrevolution: Vom Ende des Verkehrs, wie wir ihn kannten. Munich: Oekom Verlag. Gassmann, Oliver/Böhm, Jonas/Palmié, Maximilian (2018): Smart City: Innovationen für die vernetzte Stadt - Geschäftsmodelle und Management. Munich: Hanser. Krüger, Philip (2015): Architektur Intelligenter Verkehrssysteme (IVS): Grundlagen, Begriffsbestimmungen, Überblick, Entwicklungsstand. Wiesbaden: Springer Vieweg. (= Essentials). Proff, Heike et al. (Publ.) (2012): Zukünftige Entwicklungen in der Mobilität. Springer Gabler. Proff, Heike (Publ.) (2014): Radikale Innovationen in der Mobilität: Technische und betriebswirtschaftliche Aspekte. Wiesbaden: Springer Gabler. (= Research). Proff, Heike (Publ.) (2019): Mobilität in Zeiten der Veränderung: Technische und betriebswirtschaftliche Aspekte. Proff, Heike/Fojcik, Thomas M. (Publ.) (2018): Mobilität und digitale Transformation: Technische und betriebswirtschaftliche Aspekte. Wiesbaden: Springer Gabler. (= Research). Roßnagel, Alexander/Hornung, Gerrit (Publ.) (2019): Grundrechtsschutz im Smart Car: Kommunikation, Sicherheit und Datenschutz im vernetzten Fahrzeug. Wiesbaden: Springer Fachmedien Wiesbaden. Winkelhake, Uwe (2017): Die digitale Transformation der Automobilindustrie: Treiber - Roadmap - Praxis. Berlin: Springer.

Modern Production Technology

Academic Program	Automotive Technology
Specialization	Automotive Industrial Engineering
Module name	Modern Production Technology
Abbrev.	MPR
Subtitle	-
Courses	-
Semester	6
Module coordinator	Dr. Michael Steber
Instructor(s)	Dr. Michael Steber
Language	German
Classification in curriculum	Compulsory elective module WIAM
Use in other academic programs	Bachelor in "Mechanical Engineering"
Format / SWH	Seminar-type lectures / 3 SWH, research/project paper / 1 SWH
Work requirement	In-class program: 45 hrs. Self-directed study: 105 hrs.
ECTS	5
Technical prerequisites	-
Admission prerequisites for examination	Successful completion of research papers
Qualification objectives	Students will be able to assess, select, and apply modern production technologies.
Contents	Computer-integrated production Networking of WZM controls Tooling machines for flexible production systems (FPS) Tool administration and process monitoring Material flow components Device periphery and handling installation Control of flexible production systems MDE/BDE systems Joining process in electronics production

	Joining process for detachable and non-detachable joints Simulation Profitability consideration of FFS Planning of FFS
Requirements for successful completion	Written examination and research papers
Media	Projector, blackboard, scripts, and work documents
Literature	

Personnel and Organization

Academic Program	Automotive Technology
Specialization	Automotive Industrial Engineering
Module name	Personnel and Organization
Abbrev.	PO
Subtitle	-
Courses	-
Semester	6
Module coordinator	Dr. Alexander Rost
Instructor(s)	Dr. Alexander Rost
Language	German
Classification in curriculum	Compulsory module WIAM
Use in other academic programs	-
Format / SWH	Seminar-type lectures / 2 SWH
Work requirement	In-class program: 45 hrs. Self-directed study: 105 hrs.
ECTS	5
Technical prerequisites	-
Admission prerequisites for examination	-
Qualification objectives	The aim is for students to gain knowledge both in the area of organizational forms and the processes of an organization in technical areas. Economic facts will also be transferred to business organization theory and business organization. Examples will be analyzed and evaluated. The behavior of people in companies should be interpreted and one's own behavior adapted to it.
Contents	Topics include the general basics and principles of the organization theory of business enterprises; the organization and workplace design, including in the production area; fundamental issues concerning the

	production processes (e.g. lead times and methods for their improvement), and topics that address the keywords of "lean production" and "Toyota production system"... the second block of topics covers issues related to personnel management and personnel guidance. It offers insights on personnel planning and development, as well as compensation systems.
Requirements for successful completion	Written examination
Media	Projector, blackboard, overhead projector
Literature	Jones, Bouncken: Organisation, Pearson 5th edition, 2008. Bühner R.: Betriebswirtschaftliche Organisationslehre, 10th edition 2004. Blohm, Beer et al: Produktionswirtschaft, 4th edition 2008. Härdler: Betriebswirtschaftslehre für Ingenieure, Hanser Verlag, Munich, 2012. Rother, Shook: Sehen lernen, Lean Management Inst., 2006. Wiendahl H.-P.: Betriebsorganisation für Ingenieure, Hanser Verlag, 7th edition 2010. Vahs: Organisation, Schäffer-Poeschel Verlag, Stuttgart, 2009.

Production and Logistics

Academic Program	Automotive Technology
Specialization	Automotive Industrial Engineering
Module name	Production and Logistics
Abbrev.	PUL
Subtitle	-
Courses	-
Semester	3
Module coordinator	Dr. Philipp Precht
Instructor(s)	Dr. Philipp Precht
Language	German
Classification in curriculum	Compulsory module WIAM
Use in other academic programs	-
Format / SWH	Seminar-type lectures / 4 SWH
Work requirement	In-class program: 45 hrs. Self-directed study: 105 hrs.
ECTS	5
Technical prerequisites	Mathematics and statistics
Admission prerequisites for examination	-
Qualification objectives	Students will get an overview of tasks, phases, logistics institutions, and production systems. They will understand the significance of logistics in enterprises from different industries and be able to make an economic comparative assessment of total cost analytical correlations in production and logistics. They will understand and be able to evaluate lean production and logistics systems in terms of the five principles of lean management.
Contents	Introduction to logistics & production terms, numbers, data & trends Logistics & production systems

	Total cost, efficiency & quality thinking in logistics & production Lean management: lean logistics & production
Requirements for successful completion	Written examination
Media	Script, whiteboard, beamer, supplementary written material
Literature	Gabler Lexikon Logistik, 4th ed., Wiesbaden 2008, S. 389 – 394 Günter, H.-O. / Tempelmeier, H.: Produktion und Logistik - Supply Chain und Operations Management, Norderstedt, BoD - Books on Demand, 2016 Günter, H.-O. / Tempelmeier, H.: Übungsbuch Produktion und Logistik, Berlin [et al.], Springer, 2010 Pfohl, H.-C.: Logistiksysteme – Betriebswirtschaftliche Grundlagen, 8th ed., Berlin, Heidelberg 2010 Klaus, P.: Logistikmanagement, in: Klaus, P. / Krieger, W. (publ.) Schwemmer, M.: TOP 100 in der Logistik 2016/2017 Ōno, Taiichi: Das Toyota-Produktionssystem, Frankfurt am Main [et al.], Campus-Verl., 2009 Schulte, Ch.: Logistik - Wege zur Optimierung der Supply Chain, Munich, Verlag Franz Vahlen, 2016

Automotive Mechatronics Project

Academic Program	Automotive Technology
Specialization	Automotive Mechatronics Automotive Industrial Engineering
Module name	Automotive Mechatronics Project
Abbrev.	PAM
Subtitle	-
Courses	-
Semester	6 or 7
Module coordinator	Dr. Stefan Gast
Instructor(s)	Dr. Stefan Gast
Language	German
Classification in curriculum	Compulsory elective module AMEC and WIAM
Use in other academic programs	-
Format / SWH	Take-home assignment
Work requirement	In-class program: 30 hrs. Self-directed study: 120 hrs.
ECTS	5
Technical prerequisites	-
Admission prerequisites for examination	-
Qualification objectives	Students will be able to: Plan an independent solution for a technical and / or industrial engineering specific task from the field of automotive mechatronics - also in a team - while taking into account time management. Implement time management independently in the project. Undertake independent familiarization with the task. Independently develop a solution for the task. Generate documentation according to engineering standards.
Contents	Familiarization with a task from the field of automotive mechatronics, independent solution finding, independent

	time management, and documentation as a final report as defined in the module "Academic/Scientific Work and Presentation".
Requirements for successful completion	Final report
Media	(Not relevant)
Literature	Assignment-specific

Automotive Industry Project

Academic Program	Automotive Technology
Specialization	Automotive Industrial Engineering
Module name	Automotive Industry Project
Abbrev.	PAW
Subtitle	-
Courses	-
Semester	6 or 7
Module coordinator	Dr. Stefan Gast
Instructor(s)	N.N.
Language	German
Classification in curriculum	Compulsory elective module WIAM
Use in other academic programs	-
Format / SWH	Take-home assignment
Work requirement	In-class program: 30 hrs. Self-directed study: 120 hrs.
ECTS	5
Technical prerequisites	-
Admission prerequisites for examination	-
Qualification objectives	Students will be able to: Plan a way to independently find a solution for a task specifically related to economics or /industrial engineering from the field of automotive engineering or automotive economy - also in a team - while taking into account time management. Implement time management independently in the project. Undertake independent familiarization with the task. Independently develop a solution for the task. Generate documentation according to engineering standards.
Contents	Familiarization with a task from the field of automotive technology or the automotive industry, independent solution finding, independent time management, and

	documentation as final report as defined in the module "Academic/Scientific Work and Presentation".
Requirements for successful completion	Final report
Media	(Not relevant)
Literature	Assignment-specific

Formula Student Project

Academic Program	Automotive Technology
Specialization	Automotive Mechatronics Automotive Industrial Engineering
Module name	Formula Student Project
Abbrev.	PFS
Subtitle	-
Courses	-
Semester	6 or 7
Module coordinator	Dr. Stefan Gast
Instructor(s)	Dr. Stefan Gast
Language	German
Classification in curriculum	Compulsory elective module AMEC and WIAM
Use in other academic programs	Bachelor in "Mechanical Engineering"
Format / SWH	Take-home assignment
Work requirement	In-class program: 30 hrs. Self-directed study: 120 hrs.
ECTS	5
Technical prerequisites	-
Admission prerequisites for examination	-
Qualification objectives	Students will be able to: Develop independent solutions in coordination with the Formula Student Team of Coburg University (CAT Racing) for a technical / business engineering-specific assignment from the area of Formula Student. Independently organize the training required. Independently plan time management while taking overriding constraints for the assignment into consideration.
Contents	Familiarization with a task from the field of Formula Student, independent solution finding, independent

	time management, in each case while taking into account overriding constraints arising from the requirements of the team. Documentation as final report as defined in the module "Academic/Scientific Work and Presentation".
Requirements for successful completion	Final report
Media	(Not relevant)
Literature	Assignment-specific

Project Management of Mechatronic Vehicle Systems I

Academic Program	Automotive Technology
Specialization	Automotive Mechatronics Automotive Industrial Engineering
Module name	Project Management of Mechatronic Vehicle Systems I
Abbrev.	PMA1
Subtitle	-
Courses	-
Semester	3
Module coordinator	Dr. Alexander Rost
Instructor(s)	Dr. Alexander Rost
Language	German
Classification in curriculum	Compulsory module AMEC and WIAM
Use in other academic programs	-
Format / SWH	Seminar-type lectures / 1 SWH, exercise / 1 SWH
Work requirement	In-class program: 22.5 hrs. Self-directed study: 52.5 hrs.
ECTS	5 (PMA1 and PMA2)
Technical prerequisites	-
Admission prerequisites for examination	-
Qualification objectives	Students will: Know what fundamental project management methods there are and how to apply them. Learn how to consistently plan and work on their project as a process in a team. Be able to develop project visions and goals. Improve their collaboration abilities and work techniques. Improve their "social skills".
Contents	Role understanding From idea to clarified assignment

	Project influences Highlighting the benefits of the project Collaboration in projects Vision and goals Procedure and milestones Overview of all Pj tasks Project phases Process and time planning Presentation techniques Voice training
Requirements for successful completion	Written examination according to PMA 2
Media	Script, projector, blackboard, overhead projector, audio and video presentations
Literature	The lecturer provides a script in the form of checklists and questions.

Project Management of Mechatronic Vehicle Systems II

Academic Program	Automotive Technology
Specialization	Automotive Mechatronics Automotive Industrial Engineering
Module name	Project Management of Mechatronic Vehicle Systems II
Abbrev.	PMA2
Subtitle	-
Courses	-
Semester	4
Module coordinator	Dr. Alexander Rost
Instructor(s)	Dr. Alexander Rost
Language	German
Classification in curriculum	Compulsory module AMEC and WIAM
Use in other academic programs	-
Format / SWH	Seminar-type lectures with integrated exercise / 2 SWH
Work requirement	In-class program: 22.5 hrs. Self-directed study: 52.5 hrs.
ECTS	5 (PMA1 and PMA2)
Technical prerequisites	-
Admission prerequisites for examination	-
Qualification objectives	Students will: Know what fundamental project management methods there are and how to apply them. Learn how to consistently plan and work on their project as a process in a team. Improve their collaboration abilities and work techniques. Improve their "social skills". Be able to present issues in a milestone meeting independently. Be able to independently evaluate and reflect on the results of their work.

Contents	Stakeholder analysis Cost and resource planning Managing risks Agile project management
Requirements for successful completion	Written examination
Media	Projector, blackboard, overhead projector
Literature	Burghardt (2008): Project management Cleland / King (1997): Project Management Handbook GPM, Gessler (2009): Kompetenzbasiertes Projektmanagement (PM3) PM Guide 2.0, IAPM, https://www.iapm.net/de/zertifizierung/zertifizierungsgrundlagen/pm-guide-2-0 Kerzner (2003): Project management Litke (2005): Projektmanagement - Handbuch für die Praxis Patzak / Rattay (2004): Project management RKW / GPM (2003) (publ.): Projektmanagement Fachmann Schelle / Ottmann / Pfeiffer (2008): ProjektManager Schelle et.al. (Publ.): Projekte erfolgreich managen (collection of sheets)

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Quality Management

Academic Program	Automotive Technology
Specialization	Automotive Mechatronics Automotive Industrial Engineering
Module name	Quality Management
Abbrev.	QM
Subtitle	-
Courses	-
Semester	4
Module coordinator	Dr. Oliver Koch
Instructor(s)	Dr. Oliver Koch
Language	German
Classification in curriculum	Compulsory elective module AMEC and WIAM
Use in other academic programs	-
Format / SWH	Seminar-type lectures / 4 SWH
Work requirement	In-class program: 45 hrs. Self-directed study: 105 hrs.
ECTS	5
Technical prerequisites	-
Admission prerequisites for examination	-
Qualification objectives	- Students will: Understand the need for and objectives of quality management. - Get acquainted with the standards and definitions. - Understand the structure of quality management systems and organization. - Know the tools of quality management in the product development process, in production, and in product use - Be able to select suitable quality management tools and to apply them in principle.
Contents	- Historical development

	- Standardization and definition - Organization of QM systems - Methods of quality management in the product development process (QFD, FTA, FMEA, DRBFM) - Methods of quality management in production (process and measurement capability, SPC, supplier management) - Quality management in product use (8D systematics, documentation) - Operational improvement programs (Kaizen lean production and Six Sigma methodology)
Requirements for successful completion	Written examination
Media	Lecture, projector, blackboard, script/textbook
Literature	Schmitt, Pfeifer: "Qualitätsmanagement".

Legal Aspects of the Automotive Industry

Academic Program	Automotive Technology
Specialization	Automotive Industrial Engineering
Module name	Legal Aspects of the Automotive Industry
Abbrev.	RAA
Subtitle	-
Courses	-
Semester	2
Module coordinator	RA Sven-Wulf Schöller
Instructor(s)	RA Sven-Wulf Schöller, Specialist for Insurance Law; ADAC Syndicus attorney; specialist for transportation law RA Matthias Schmid, LL.M (Exeter)
Language	German
Classification in curriculum	Compulsory module WIAM
Use in other academic programs	-
Format / SWH	Seminar-type lectures / 4 SWH
Work requirement	In-class program: 45 hrs. Self-directed study: 105 hrs.
ECTS	5
Technical prerequisites	-
Admission prerequisites for examination	-
Qualification objectives	At the end of the course, students will able to recognize legal problem areas, especially in closing and drafting contracts, as well as the resulting consequences, and to act accordingly.
Contents	We will discuss: - Fundamentals of private commercial law - Basic principles of private law - The general part of the German Civil Code (*BGB*) for concluding contracts; General Terms & Conditions - *BGB* laws on obligations; (warranty; commercial law specifics)

	- (Relevant) contract types for industry (supply contracts; framework agreements; project contracts; contracts for work and services; protection of intellectual property) - Product liability law - Issues in insurance law; business liability insurance with the modules relevant for the automotive sector (e.g. return costs insurance and its prerequisites) - Quality assurance measures/risk management to minimize insurance costs (reduction of expenses). Special emphasis is placed on questions and problems relevant to practice in the automotive sector (typical types of contracts; typical problems; approaches to solutions in practice).
Requirements for successful completion	Written examination
Media	Projector, blackboard, overhead projector
Literature	Crashkurs Privatrecht, Hans Römer, 6th or 7th edition 2011; as well as current text edition of the BGB, e.g. dtv.

Automotive Industry Seminar

Academic Program	Automotive Technology
Specialization	Automotive Industrial Engineering
Module name	Automotive Industry Seminar
Abbrev.	SAW
Subtitle	-
Courses	-
Semester	4 and 6
Module coordinator	Dr. Philipp Precht
Instructor(s)	Dr. Philipp Precht Dr. Mathias Wilde
Language	German
Classification in curriculum	Compulsory elective module WIAM
Use in other academic programs	-
Format / SWH	Seminar-type lectures, take-home assignment and presentation / 4 SWH
Work requirement	In-class program: 45 hrs. Self-directed study: 80 hrs for research and development of the report 25 hrs for the preparation of the presentation
ECTS	5
Technical prerequisites	-
Admission prerequisites for examination	-
Qualification objectives	Independent development of topics and problems in the automotive sector. Practice of presentations and presentation techniques
Contents	Study seminar (if necessary together with logistics) Seminar papers and presentations on various topics in the automotive industry from the fields of sales, marketing, and
Requirements for successful completion	Presentation and scientific report
Media	Projector, blackboard

Literature Literature sources according to the information given in the course (see corresponding documents).

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Sensor Systems and Actuators in Vehicles

Academic Program	Automotive Technology
Specialization	Automotive Mechatronics Automotive Industrial Engineering
Module name	Sensor Systems and Actuators in Vehicles
Abbrev.	SAK
Subtitle	-
Courses	-
Semester	6
Module coordinator	Dr. Stefan Gast
Instructor(s)	Dr. Stefan Gast
Language	German
Classification in curriculum	Compulsory module AMEC, Compulsory elective module WIAM
Use in other academic programs	-
Format / SWH	Seminar-type lectures / 3 SWH, exercise / 1 SWH
Work requirement	In-class program: 45 hrs. Self-directed study: 105 hrs.
ECTS	5
Technical prerequisites	Electrical Engineering I, Electrical Engineering for business information systems specialists
Admission prerequisites for examination	-
Qualification objectives	Students will be able to: Recognize resistive, capacitive, and inductive operating principles. Assign these operating principles to common automotive sensors. Apply methods of sensor signal processing (amplification, filtering, FFT). Recognize the role of sensor technology in motor vehicle-specific higher-level applications (e.g. driver assistance systems, engine control, ...).
Contents	Function of sensors and actuators in mechatronic automotive systems; signal processing and signal conditioning; signal shapes, characteristics, physical principles of action and conversion of sensors and actuators;

	inductive, galvanic and capacitive sensor technologies and their application in motor vehicles; electromechanical actuators.
Requirements for successful completion	Written examination
Media	Projector, blackboard, lab applications
Literature	Reif, Konrad: Automobilelektronik. Vieweg + Teubner, Wiesbaden 2009. Bosch (publ.): Autoelektrik, Autoelektronik. Vieweg + Teubner, Wiesbaden 2008. Kai Borgeest: Elektronik in der Fahrzeugtechnik. Vieweg + Teubner, Wiesbaden 2010.

Statics and Strength of Materials

Academic Program	Automotive Technology
Specialization	Automotive Mechatronics Automotive Industrial Engineering
Module name	Statics and Strength of Materials
Abbrev.	SFL
Subtitle	-
Courses	-
Semester	1
Module coordinator	Dr. Markus Stark
Instructor(s)	Dr. Markus Stark
Language	German
Classification in curriculum	Compulsory module AMEC and WIAM
Use in other academic programs	-
Format / SWH	Seminar-type lectures / 3 SWH, exercise / 1 SWH
Work requirement	In-class program: 45 hrs. Self-directed study: 105 hrs.
ECTS	5
Technical prerequisites	-
Admission prerequisites for examination	-
Qualification objectives	Students will be able to: - Calculate central systems of forces and structures in equilibrium, including adhesion, in the plane. - Calculate section reactions for bodies loaded by forces and moments. - Calculate stresses and deformations of beams with different cross-sections under tension/compression, shear, bending and torsion loads, and to check them for safety or dimension them appropriately for simple load cases.

Contents	Stereostatics: equilibrium conditions, center of gravity, bearings and joints, distributed loads Elastostatics/strength theory: load types, plane stress state, deformations, bending, torsion loading, strength hypotheses
Requirements for successful completion	Written examination
Media	Blackboard, projector, supplemental written documents
Literature	Gross, D.; Hauger, W.; Schröder, J.; Wall, W.: Technische Mechanik 1 – Statik. Springer Vieweg; 2013. [Erg.: Formeln und Aufgaben zur Techn. Mechanik 1]. Gross, D.; Hauger, W.; Schröder, J.; Wall, W.: Technische Mechanik 2 – Elastostatik. Springer Verlag; 2014. Hibbeler, R.C.: Technische Mechanik (Band 1) – Statik. Pearson Studium; 2005. Hibbeler, R.C.: Technische Mechanik (Band 2) – Festigkeitslehre. Pearson Studium; 2005.

Supply Chain Management (vhb)

Academic Program	Automotive Technology
Specialization	Automotive Industrial Engineering
Module name	Supply Chain Management (vhb)
Abbrev.	SCM
Subtitle	
Courses	
Semester	7
Module coordinator	Dr. Michael Steber
Instructor(s)	NN
Language	English
Classification in curriculum	Compulsory elective module WIAM
Use in other academic programs	
Format / SWH	Virtual lectures and exercises
Work requirement	
ECTS	5
Technical prerequisites	
Admission prerequisites for examination	
Qualification objectives	
Contents	
Requirements for successful completion	Written examination
Media	
Literature	

Technical English (B2)

Academic Program	Automotive Technology
Specialization	Automotive Mechatronics Automotive Industrial Engineering
Module name	Technical English (B2)
Abbrev.	TE
Subtitle	-
Courses	-
Semester	3
Module coordinator	Richard Fry, MCLFS
Instructor(s)	Barney Craven, M.A., Richard Fry, MCLFS
Language	English
Classification in curriculum	Compulsory module AMEC and WIAM
Use in other academic programs	-
Format / SWH	Seminar-type lectures, seminar and exercise / 2 SWH
Work requirement	In-class program: 22 hrs. Self-directed study: 38 hrs.
ECTS	2
Technical prerequisites	No formal prerequisites, but a plus are at least 6 years of school English enabling student to use the language independently (B1 level of Common European Framework of Reference for Languages)
Admission prerequisites for examination	Course-related criteria
Qualification objectives	Expansion and improvement of individual English skills (reading, writing, listening comprehension, speaking) to the B2 level of the Common European Framework of Reference for Languages, with particular consideration of technical and professional topics From the Common European Framework of Reference for Languages (http://www.europaeischer-referenzrahmen.de/): "B2 – Independent use of language

	Is able to understand the main contents of complex texts on specific and abstract topics; also understands technical discussions in own specialty. Is able to communicate spontaneously and fluently enough to permit normal conversations with native speakers without great effort on either side. Is able to express himself/herself clearly and in detail on a wide spectrum of topics, explain an opinion on a current question, and state the advantages and disadvantages of different possibilities.
Contents	- Structure and expansion of basic vocabulary with technical terminology and expressions using texts from different areas - Training of written expression in English by working through texts and writing professional correspondence - Training of verbal expression in English through discussion - If appl. grammar is reviewed with exercises
Requirements for successful completion	Accompanying performances as admission to the examination and written exam
Media	Projector and blackboard / whiteboard, electronic scripts, and work documents language lab
Literature	Current literature will be recommended during the course.

Engineering Mathematics I

Academic Program	Automotive Technology
Specialization	Automotive Mechatronics Automotive Industrial Engineering
Module name	Engineering Mathematics I
Abbrev.	MAT1
Subtitle	-
Courses	-
Semester	1
Module coordinator	Dr. Marcus Baur
Instructor(s)	Dr. Marcus Baur
Language	German
Classification in curriculum	Compulsory module AMEC and WIAM
Use in other academic programs	-
Format / SWH	Seminar-type lectures with exercises / 4 SWH
Work requirement	In-class program: 45 hrs. Self-directed study: 105 hrs.
ECTS	5
Technical prerequisites	-
Admission prerequisites for examination	-
Qualification objectives	Specialized skills: Students will have a sound basic knowledge of linear algebra (vector calculus, matrix calculus, solving linear equations). They will be able to do calculations with complex numbers. They will know the elementary properties of real-valued functions. They will be able to transform function terms by polynomial division as well as partial fraction decomposition. Methodological skills: Students will be able to mathematically apply the acquired technical knowledge to physical and engineering problems and solve them.

	Personal skills (social skills and self-competence): They will be able to optimize their personal time management for preparing materials and follow-up, for doing exercises and preparing for
Contents	Foundations: propositional logic and elementary methods of proof. Basics of linear algebra: matrices, vectors, determinants, Laplacian development theorem, systems of linear equations, Gauss algorithm, matrix rank, Cramer's rule, eigenvalue problems, eigenvalues and eigenvectors. Complex numbers: definition, component, polar and exponential form, Gaussian number plane, Moivre's theorem, Euler's relation, circle division equation "z^n = a", quadratic equations (sol. in complex). Sequences and series, limits: arithmetic and geometric number sequences, limit definition, numerical series, convergence and divergence, summation formulas Real-valued functions: concept of a function, inverse function, shifting and reflection of graphs, continuity, trigonometric equations, hyperbolic and area functions, polynomials, fundamental theorem of algebra, rational functions, polynomial division and Horner's scheme, function series (uniform convergence) Introduction to differential calculus: slope of a curve, definition of first derivative, differential quotient, higher derivatives, product rule, quotient rule, chain rule, derivation of inverse function, implicit differentiation, curve discussion, zeros and poles/singularities, and relative and absolute maxima
Requirements for successful completion	Written examination
Media	Visualizer, projector, laptop, blackboard

Literature	Papula, L.: Mathematik für Ingenieure und Naturwissenschaftler (3 volumes, 1 exercise book, and collection of formulas), Vieweg+Teubner Bronstein-Semendjajew: Mathematische Formelsammlung "Taschenbuch der Mathematik, Harri Deutsch.

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Engineering Mathematics II

Academic Program	Automotive Technology
Specialization	Automotive Mechatronics Automotive Industrial Engineering
Module name	Engineering Mathematics II
Abbrev.	MAT2
Subtitle	-
Courses	-
Semester	2
Module coordinator	Dr. Ingo Faber
Instructor(s)	Dr. Ingo Faber
Language	German
Classification in curriculum	Compulsory module AMEC and WIAM
Use in other academic programs	-
Format / SWH	Seminar-type lectures with exercises / 4 SWH
Work requirement	In-class program: 45 hrs. Self-directed study: 105 hrs.
ECTS	5
Technical prerequisites	Engineering Mathematics I
Admission prerequisites for examination	-
Qualification objectives	Application of differential calculus with one variable to specific problems Mastery of integral calculus with one real variable Application of integral calculus with one variable to specific problems Basic understanding of functions with several variables Mastery of the technique of partial derivative Calculation of absolute and relative error Solution of multiple integrals in different coordinates as well as their application to specific problems

Contents	Applications of differential calculus: extreme value problems, Newton-Raphson method, linearization, differential, error estimation, Taylor series, Lagrange residual representation, power series expansion, MacLaurin series, linear differential equations (DGLs) with constant coefficients Fundamentals of integral calculus: root function, indefinite integrals, calculation rules, substitution in indefinite integrals, integration of fractional rational functions, fundamental domain, main theorem of differential and integral calculus, integral function, substitution in definite integrals, partial integration, improper integrals, and selected applications of integral calculus: integral averages, volume calculation, center of gravity of solids of revolution. Functions with several variables: concept of a function, partial derivatives, continuity, complete differential, moment of area and mass inertia, relative extrema, optimization with constraints.
Requirements for successful completion	Written examination
Media	Visualizer, projector, laptop, blackboard
Literature	Papula, L.: Mathematik für Ingenieure und Naturwissenschaftler (3 volumes, 1 exercise book, and collection of formulas),

Technical Thermodynamics

Academic Program	Automotive Technology
Specialization	Automotive Mechatronics Automotive Industrial Engineering
Module name	Technical Thermodynamics
Abbrev.	TTD
Subtitle	-
Courses	-
Semester	4
Module coordinator	Dr. Philipp Epple
Instructor(s)	Dr. Philipp Epple
Language	German
Classification in curriculum	Compulsory elective module AMEC and WIAM
Use in other academic programs	Bachelor in "Mechanical Engineering"
Format / SWH	Seminar-type lectures / 2 SWH, exercise / 2 SWH
Work requirement	In-class program: 45 hrs. Self-directed study: 105 hrs.
ECTS	5
Technical prerequisites	-
Admission prerequisites for examination	-
Qualification objectives	Students will be able to: - Differentiate state and process variables and calculate special gas constants. - Understand phase diagrams and calculate state variables in a two-phase domain. - Apply the first law of thermodynamics for closed and open systems. - Apply the second law of thermodynamics for various systems. - Calculate the properties of ideal gases and gas mixtures. - Calculate simple cycles.

Contents	System and state Processes and process parameters Phase diagrams 1st law of thermodynamics 2nd law of thermodynamics State variables of ideal gases Gas mixtures, moist air and steam Cycles of engines and machines Selected adiabatic flow processes
Requirements for successful completion	Written examination
Media	Blackboard, projector, supplemental written documents
Literature	Windisch, H.: Thermodynamik - Ein Lehrbuch für Ingenieure, 5th edition, Oldenbourg Verlag, Munich, 2014. Hahne, E.: Technische Thermodynamik, Einführung und Anwendung, 5th edition, Oldenbourg Verlag, Munich, 2011. Cerbe, G. and Wilhelms, G.: Technische Thermodynamik, Einführung und Anwendung, 16th edition, Oldenbourg Verlag, Munich, 2011. Döring, E., Schedwill, H., Dehli, M.: Grundlagen der Technischen Thermodynamik, Lehrbuch für Studierende der Ingenieurwissenschaften, 7th edition, Springer Vieweg, Heidelberg, 2012. Geller, W.: Thermodynamik für Maschinenbau, Grundlagen für die Praxis, 4th edition, Springer Verlag, 2006. Langeheinecke, K., Jany, P., Thieleke, G.: Thermodynamik für Ingenieure, 7th edition, Vieweg Teubner Verlag, Wiesbaden 2008. Meyer, G., Schiffner, E.: Thechnische Thermodynamik, 3rd edition, VCH Verlagsgesellschaft Weinheim, 1968. Kretzschmar, H.-J. and Kraft, I.: Kleine Formelsammlung Technische Thermodynamik, 4th updated edition, Carl Hanser Verlag, Munich, 2011. Cengel, Turner, Cimbala: Fundamentals of Thermal-Fluid Sciences with Student Resource DVD and Property Tables Booklet, 4th Edition, Mcgraw-Hill Higher Education, 2012.

Potter, M. and Somerton, C.: Thermodynamics for Engineers, Second Edition, Schaums Outlines, 2006.

Technical Combustion

Academic Program	Automotive Technology
Specialization	Automotive Mechatronics Automotive Industrial Engineering
Module name	Technical Combustion
Abbrev.	TV
Subtitle	-
Courses	-
Semester	7
Module coordinator	Dr. Markus Jakob
Instructor(s)	Dr. Markus Jakob
Language	German
Classification in curriculum	Compulsory elective module AMEC and WIAM
Use in other academic programs	-
Format / SWH	Seminar-type lectures / 4 SWH
Work requirement	In-class program: 45 hrs. Self-directed study: 105 hrs.
ECTS	5
Technical prerequisites	-
Admission prerequisites for examination	-
Qualification objectives	After successful completion, students will be familiar with: - Theoretical principles of technical combustion - The two main forms of technical combustion - The details of the combustion processes up to elementary reaction equations and their summary to gross reaction equations for technical consideration - Application examples of the combustion processes on gas burners, turbines, and internal combustion engines
Contents	The lecture covers: - Premixed and diffusive combustion - Material and energy balances

	- Gross and elementary reaction equations - Chain reaction mechanisms - Ignition and extinction processes in homogeneous systems - Laminar and turbulent combustion rates
Requirements for successful completion	Written examination
Media	Projector, blackboard, PC
Literature	

Business Management

Academic Program	Automotive Technology
Specialization	Automotive Industrial Engineering
Module name	Business Management
Abbrev.	UF
Subtitle	-
Courses	-
Semester	6
Module coordinator	Dr. Philipp Precht
Instructor(s)	Dr. Philipp Precht
Language	German
Classification in curriculum	Compulsory module WIAM
Use in other academic programs	-
Format / SWH	Seminar-type lectures / 4 SWH
Work requirement	In-class program: 45 hrs. Self-directed study: 105 hrs.
ECTS	5
Technical prerequisites	-
Admission prerequisites for examination	-
Qualification objectives	The aim of the module is to familiarize students with aspects and concepts of corporate management. In particular, the aspects of strategic corporate management are addressed. Furthermore, basic elements and instruments of project management are an important part of the module, so that students can process projects in an appropriate manner, combine them into a project plan, carry out important control activities, and take elements of quality management into account. A concrete case study on business process management in the automotive trade complements the theoretical explanations.

Contents	Basic concepts: Company and corporate management System and history of corporate management Normative and strategic corporate management Organization: Project management
Requirements for successful completion	Written examination
Media	Projector, blackboard, overhead projector
Literature	Coenenberg, A. G. / Salfeld, R.: Wertorientierte Unternehmensführung. Vom Strategieentwurf zur Implementierung, Stuttgart, 2nd ed., 2007. Dillerup, R.; Stoi, R.: Unternehmensführung, Verlag Vahlen 2011. Dillerup, R.; Stoi, R.: Praxis der Unternehmensführung, Verlag Vahlen 2010. Steinmann, H. / Schreyögg, G. / Koch, J.: Management. Grundlagen der Unternehmensführung, 6th ed., Gabler Wiesbaden, 2005. Vahs, D.: Organisation, 7th edition, Stuttgart 2009.

Internal Combustion Engines I

Academic Program	Automotive Technology
Specialization	Automotive Mechatronics Automotive Industrial Engineering
Module name	Internal Combustion Engines I
Abbrev.	VKM1
Subtitle	-
Courses	-
Semester	6
Module coordinator	Dr. Hartmut Gnuschke
Instructor(s)	Dr. Hartmut Gnuschke
Language	German
Classification in curriculum	Compulsory elective module AMEC and WIAM
Use in other academic programs	Bachelor in "Mechanical Engineering"
Format / SWH	Seminar-type lectures with 15% integrated practical course / 4 SWH
Work requirement	In-class program: 45 hrs. Self-directed study: 105 hrs.
ECTS	5
Technical prerequisites	-
Admission prerequisites for examination	Successful completion of the practical course
Qualification objectives	Students will be able to: Correctly describe concept and function of components of combustion engines. Describe and assess the engine process in terms of mechanics and thermodynamics. Understand and interpret typical measurement activities at engine test stations (e.g. creation of engine maps, indexing).
Contents	Mechanical structure: crank shaft, piston rod, pistons, crank case, cylinder head Kinematics / Kinetics: laws of motion and forces in engines; assessing engine components; mass compensation

	Thermodynamics of combustion engines; engine tests
Requirements for successful completion	Written examination
Media	Projector, blackboard
Literature	Grohe, Otto- und Dieselmotoren, Vogel-Verlag 2003. Basshuysen, Schäfer (Publ.), Vieweg Handbuch Verbrennungsmotor, Vieweg 2010. Bosch Kraftfahrttechnisches Taschenbuch, Vieweg 2012. Mollenhauer, Tschöke (publ.) Handbuch Dieselmotor, Springer-Verlag 2007.

Internal Combustion Engines II

Academic Program	Automotive Technology
Specialization	Automotive Mechatronics Automotive Industrial Engineering
Module name	Internal Combustion Engines II
Abbrev.	VKM2
Subtitle	-
Courses	-
Semester	6
Module coordinator	Dr. Hartmut Gnuschke
Instructor(s)	Dr. Hartmut Gnuschke
Language	German
Classification in curriculum	Compulsory elective module AMEC and WIAM
Use in other academic programs	Bachelor in "Mechanical Engineering"
Format / SWH	Seminar-type lectures with 15% integrated practical course / 4 SWH
Work requirement	In-class program: 45 hrs. Self-directed study: 105 hrs.
ECTS	5
Technical prerequisites	-
Admission prerequisites for examination	Successful completion of the practical course
Qualification objectives	Students will: Be able to correctly describe concept and function of components of combustion engines. Be able to describe and assess the engine process including exhaust treatment. Understand and be able to interpret typical measurement activities at engine test stations (e.g. determination of catalytic converter efficiency and emission measurements).
Contents	Fluid dynamics: charge cycle, charging Carburetion: injection systems Combustion: (self) ignition, formation of pollutants and exhaust treatment; engine tests

Requirements for successful completion	Written examination
Media	Projector, blackboard
Literature	Grohe, Otto- und Dieselmotoren, Vogel-Verlag 2003. Basshuysen, Schäfer (Publ.), Vieweg Handbuch Verbrennungsmotor, Vieweg 2010. Bosch Kraftfahrttechnisches Taschenbuch, Vieweg 2012. Mollenhauer, Tschöke (publ.) Handbuch Dieselmotor, Springer-Verlag 2007.

Traffic Generation

Academic Program	Automotive Technology
Specialization	Automotive Industrial Engineering
Module name	Traffic Generation
Abbrev.	VE
Subtitle	-
Courses	-
Semester	6
Module coordinator	Dr. Mathias Wilde
Instructor(s)	Dr. Mathias Wilde
Language	German
Classification in curriculum	Compulsory elective module WIAM
Use in other academic programs	-
Format / SWH	Seminar-type lectures / 4 SWH
Work requirement	In-class program: 45 hrs. Self-directed study: 105 hrs.
ECTS	5
Technical prerequisites	-
Admission prerequisites for examination	-
Qualification objectives	Students will become familiar with the social science, psychological, economic, and spatial science theories that explain the emergence of traffic and mobility behavior. With this theoretical background, they will be able to identify determinants of traffic genesis in passenger and freight transport, to operationalize them for model building, and to evaluate development paths of traffic. Furthermore, students will learn the fundamentals for undertaking a critical evaluation of political and technical decisions and for formulating objectives.
Contents	- Definition and clarification of terms: Traffic and mobility

	- Traffic originates in space - spatial determinants of transport demand - Individual determinants of transport demand - Economic systems and freight transport development - Mobility/transport in a global context - Determinants of transport mode choice - Spatial explanations - Psychological explanations - Lifestyles and mobility attitudes - Induced traffic - Possibilities of controlling mobility behavior - Possibilities of influencing traffic behavior
Requirements for successful completion	Portfolio (seminar paper 70% and presentation 30%)
Media	Projector, blackboard, overhead projector
Literature	Beckmann, Klaus J. (2016): Verkehrspolitik und Mobilitätsforschung: Die angebotsorientierte Perspektive. In: Oliver Schwedes, Weert Canzler und Andreas Knie (Publ.): Handbuch Verkehrspolitik. 2nd ed. Wiesbaden: VS Verlag für Sozialwissenschaften. Busch-Geertsema, Annika; Lanzendorf, Martin; Müggenburg, Hannah; Wilde, Mathias (2016): Mobilitätsforschung aus nachfrageorientierter Perspektive: Theorien, Erkenntnisse und Dynamiken des Verkehrshandelns. In: Oliver Schwedes, Weert Canzler und Andreas Knie (Publ.): Handbuch Verkehrspolitik. 2nd ed. Wiesbaden: VS Verlag für Sozialwissenschaften, pp. 755–779. Dalkmann, H., M. Lanzendorf & J.Scheiner (Publ.) (2004): Verkehrsgenese. Entstehung von Verkehr sowie Potenziale und Grenzen der Gestaltung einer nachhaltigen Mobilität. Mannheim: Verl. MetaGIS-Infosysteme. Scheiner, Joachim (2016): Verkehrsgeneseforschung: Wie entsteht Verkehr? In: Oliver Schwedes, Weert Canzler und Andreas Knie (Publ.): Handbuch Verkehrspolitik. 2nd ed. Wiesbaden: VS Verlag für Sozialwissenschaften, pp. 1-18.

Scheiner, Joachim; Holz-Rau, Christian (2007): Travel mode choice: affected by objective or subjective determinants? In: Transportation (34), Sp. 487-511

Schwedes, Oliver (publ.) (2013): Räumliche Mobilität in der zweiten Moderne. Freiheit und Zwang bei Standortwahl und Verkehrsverhalten. Münster: Lit (Mobilität und Gesellschaft, 3).

Wilde, Mathias (2015): Mobilität im ländlichen Raum. In: Tilman Bracher, Katrin Dziekan, J. Gies, Helmut Holzapfel, F. Huber, F. Kiepe et al. (Publ.): Handbuch der kommunalen Verkehrsplanung. für die Praxis in Stadt und Region, 71. Ergänzungs-Lieferung 4/2015. Berlin, Bonn: Wichmann, pp. 1–17.

Specialization in Production and Logistics

Academic Program	Automotive Technology
Specialization	Automotive Industrial Engineering
Module name	Specialization in Production and Logistics
Abbrev.	VPUL
Subtitle	-
Courses	-
Semester	6
Module coordinator	Dr. Philipp Precht
Instructor(s)	Dr. Philipp Precht
Language	German
Classification in curriculum	Compulsory elective module WIAM
Use in other academic programs	
Format / SWH	Seminar-type lectures / 4 SWH, integrated exercises (50%)
Work requirement	In-class program: 35 hrs. self-study: 115
ECTS	5
Technical prerequisites	Foundations of production and logistics
Admission prerequisites for examination	-
Qualification objectives	Students will Be familiar with important planning and analysis problems related to configuring supply chains. Be able to apply basic methods for solving the planning and analysis problems. Be able to apply methods and procedures to problems in
Contents	Logistics & production - review & future configuration of supply chains Planning & control of supply chains Auto-ID application in PuL environment Applications & analysis tools in the PuL environment
Requirements for successful completion	Research paper / group project and presentation

Media	Projector, blackboard
Literature	Finkenzeller, K.: RFID-Handbuch - Grundlagen und praktische Anwendungen von Transpondern, kontaktlosen Chipkarten und NFC, Munich, Hanser, 2012 Franke, W.: RFID - Leitfaden für die Logistik, Anwendungsgebiete, Einsatzmöglichkeiten, Integration, Praxisbeispiele, Wiesbaden, Gabler, 2006 Gabler Lexikon Logistik, 4th ed., Wiesbaden 2008, S. 389 – 394 Günter, H.-O. / Tempelmeier, H.: Produktion und Logistik - Supply Chain und Operations Management, Norderstedt, BoD - Books on Demand, 2016 Günter, H.-O. / Tempelmeier, H.: Übungsbuch Produktion und Logistik, Berlin [et al.], Springer, 2010 Pfohl, H.-C.: Logistiksysteme – Betriebswirtschaftliche Grundlagen, 8th ed., Berlin, Heidelberg 2010 Klaus, P.: Logistikmanagement, in: Klaus, P. / Krieger, W. (publ.) Schwemmer, M.: TOP 100 in der Logistik 2016/2017 Ōno, Taiichi: Das Toyota-Produktionssystem, Frankfurt am Main [et al.], Campus-Verl., 2009 Schulte, Ch.: Logistik - Wege zur Optimierung der Supply Chain, Munich, Verlag Franz Vahlen, 2016

Sales Basics of the Automotive Industry

Academic Program	Automotive Technology
Specialization	Automotive Industrial Engineering
Module name	Sales Basics of the Automotive Industry
Abbrev.	VDA
Subtitle	-
Courses	-
Semester	6
Module coordinator	Dr. Georg Roth
Instructor(s)	Dr. Georg Roth
Language	German
Classification in curriculum	Compulsory elective module WIAM
Use in other academic programs	-
Format / SWH	Seminar-type lectures / 4 SWH
Work requirement	In-class program: 45 hrs. Self-directed study: 105 hrs.
ECTS	5
Technical prerequisites	-
Admission prerequisites for examination	-
Qualification objectives	The automotive sector is characterized by a number of special features. The aim of the course is both the theoretical-systematic teaching of structures and concepts in the automotive industry - especially from a sales perspective - and the presentation of the models, characteristics and special features occurring in practice in the automotive industry (e.g. sales forms, BER). Students will learn to transfer general concepts, e.g. from sales, to the special needs of the automotive industry and to develop functioning concepts.
Contents	Basics of marketing and sales in the automotive sector (problem areas, structures, organs, market relations,

	legal framework, sales systems in the automotive sector, bonus systems and pricing strategies, customer requirements, suppliers and demand structures). The conceptual basis is formed by systematizations and insights from industry and supplier marketing as well as services marketing.
Requirements for successful completion	Written examination
Media	Projector, blackboard, overhead projector
Literature	Diez, Willi: Automobil-Marketing, 6th edition, Munich 2015. Various literature sources according to the information given in the course (see corresponding documents).

Sales Management (CRM)

Academic Program	Automotive Technology
Specialization	Automotive Industrial Engineering
Module name	Sales Management (CRM)
Abbrev.	VMS
Subtitle	-
Courses	-
Semester	7
Module coordinator	Dr. Georg Roth
Instructor(s)	Dr. Georg Roth
Language	German
Classification in curriculum	Compulsory elective module WIAM
Use in other academic programs	-
Format / SWH	Seminar-type lectures / 4 SWH
Work requirement	In-class program: 45 hrs. Self-directed study: 105 hrs.
ECTS	5
Technical prerequisites	-
Admission prerequisites for examination	-
Qualification objectives	Stable customer/supplier relationships are an important factor for success in the automotive sector. The aim is to convey the theoretical concepts and approaches to comprehensive customer relationship management. This includes the technical and conceptual basics of CRM as well as customer satisfaction, opportunities to retain customers and to acquire new customers in the sense of comprehensive lead management for car manufacturers and partners in automotive sales. Students will learn the conceptual basics of CRM. They will understand the problems of building stable customer relationships and learn to

	apply them in the context of specific issues in the automotive sector.
Contents	Management of customer relationships (Customer Relationship Management CRM and Lead Management)
Requirements for successful completion	Written examination
Media	Projector, blackboard, overhead projector
Literature	Diller, H.; Haas, A.; Ivens, B.: Verkauf und Kundenmanagement, Verlag Kohlhammer 2005. Hofbauer, G.; Schöpfel, B.: Professionelles Kundenmanagement, verlag Publicis, 2010. Kulmann, E.: Industrielles Vertriebsmanagement, Verlag Vahlen 2001. Various literature sources according to the information given in the course (see corresponding documents).

Economics

Academic Program	Automotive Technology
Specialization	Automotive Industrial Engineering
Module name	Economics
Abbrev.	Economics
Subtitle	-
Courses	-
Semester	4
Module coordinator	Dr. Georg Roth
Instructor(s)	Dr. Georg Roth
Language	German
Classification in curriculum	Compulsory module WIAM
Use in other academic programs	-
Format / SWH	Seminar-type lectures / 4 SWH
Work requirement	In-class program: 45 hrs. Self-directed study: 105 hrs.
ECTS	5
Technical prerequisites	-
Admission prerequisites for examination	-
Qualification objectives	Students will develop an understanding of macroeconomic relationships as well as macroeconomic decision-making processes. Students will be able to apply these to current topics and discussions relevant to macroeconomics.
Contents	Economic activity, market supply and demand, market forms, economic concepts such as gross domestic product, monetary and fiscal policy, foreign trade.
Requirements for successful completion	Written examination
Media	Projector, blackboard, overhead projector
Literature	Mankiw, N. G.; Taylor, M. P.: Grundzüge der Volkswirtschaftslehre, Pearson Verlag 2016.

Materials Engineering

Academic Program	Automotive Technology
Specialization	Automotive Mechatronics Automotive Industrial Engineering
Module name	Materials Engineering
Abbrev.	WST
Subtitle	-
Courses	-
Semester	1
Module coordinator	Dr. Alexander Rost
Instructor(s)	Dr. Alexander Rost
Language	German
Classification in curriculum	Compulsory module AMEC and WIAM
Use in other academic programs	-
Format / SWH	Seminar-type lectures, practical course / 4 SWH
Work requirement	In-class program: 45 hrs. Self-directed study: 105 hrs.
ECTS	5
Technical prerequisites	-
Admission prerequisites for examination	Proof of practical work
Qualification objectives	Students will be able to: Connect structure properties and processing of the most important plastics with their specific processing procedures. Connect structure, properties, and processing of the most important plastics with their specific processing procedures. Select suitable material testing procedures and assess the significance of different material tests.
Contents	Atoms, periodic table of elements, bonding; crystal systems; state diagrams; microstructure; iron-carbon diagram; heat treatments; heat treatment of steel;

	material short names; alloying elements; steels; precipitation hardening of aluminum alloys; practical course: tensile test, hardness test, metallography; structure of polymers; macromolecular structure of plastics; fundamentals of the relationship between structure and properties; overview of the most important plastics; plastics processing; plastics testing methods; practical course: plastics determination, tensile test, hardness test.
Requirements for successful completion	Practical performance and written examination
Media	Projector, blackboard, visualizer, worksheets
Literature	Seidel: Werkstofftechnik, Hanser 2012. Bergmann: Werkstofftechnik 1, Hanser 2013. Domke: Werkstoffkunde und Werkstoffprüfung, Cornelsen 2001. Schwarz, Ebeling: Kunststoffkunde, Vogel 2007. Kaiser: Kunststoffchemie für Ingenieure, Hanser 2011. Menges et al.: Werkstoffkunde Kunststoffe, Springer 2011.

Business Mathematics

Academic Program	Automotive Technology
Specialization	Automotive Industrial Engineering
Module name	Business Mathematics
Abbrev.	WMA
Subtitle	-
Courses	-
Semester	1
Module coordinator	Dr. Ulrich Sax
Instructor(s)	Dr. Ulrich Sax
Language	German
Classification in curriculum	Compulsory module WIAM
Use in other academic programs	-
Format / SWH	Seminar-type lectures / 4 SWH
Work requirement	In-class program: 45 hrs. Self-directed study: 105 hrs.
ECTS	5
Technical prerequisites	-
Admission prerequisites for examination	-
Qualification objectives	Students will be able to: Understand, correctly apply, and evaluate basic mathematical thinking, concepts, and techniques. Examine application requirements for quantitative economic problems. Decide on mathematical methods, develop solutions, review results, and draw conclusions.
Contents	Financial mathematics: compound interest, annuity and annuity calculation, rate and effective interest calculation Linear algebra in economic applications: matrices, determinants, systems of linear equations, linear optimization analysis in economic applications: functions with one and several variables, differential and integral calculus

Requirements for successful completion	Written examination
Media	Projector, blackboard, overhead projector
Literature	Tietze: Einführung in die angewandte Wirtschaftsmathematik. Tietze: Einführung in die Finanzmathematik. Sax: Skriptum zur Vorlesung

Scientific Foundation of the Bachelor Thesis

Academic Program	Automotive Technology
Specialization	Automotive Mechatronics Automotive Industrial Engineering
Module name	Scientific Foundation of the Bachelor Thesis
Abbrev.	WFUN
Subtitle	-
Courses	-
Semester	7
Module coordinator	Dr. Stefan Gast
Instructor(s)	Supervising professor
Language	German
Classification in curriculum	Compulsory module AMEC and WIAM
Use in other academic programs	-
Format / SWH	Mainly self-study
Work requirement	In-class program: 15 hrs. Self-directed study: 315 hrs.
ECTS	11
Technical prerequisites	Recommended: Successful completion of all modules of the first six semesters of study.
Admission prerequisites for examination	-
Qualification objectives	Students will be able to: Develop complex, practical tasks using scientific methods to find solutions with successful personal integration in an industrial company. Generate scientifically-sound written elaborations. Explain their own ideas and results in the face of professional criticism. Independently implement time management while working on a task.
Contents	Well-founded specialization in a technical and / or economic topic - preferably

	Bachelor thesis - from the field of automotive mechatronics; application of scientific methodological competence; scientific documentation and defense of the in-depth content; preparation for content requirements of the Bachelor thesis
Requirements for successful completion	Final report and final presentation
Media	Projector
Literature	see Academic/Scientific Work and Presentation

Academic/Scientific Work and Presentation

Academic Program	Automotive Technology
Specialization	Automotive Mechatronics Automotive Industrial Engineering
Module name	Academic/Scientific Work and Presentation
Abbrev.	WA
Subtitle	-
Courses	-
Semester	5
Module coordinator	Dr. Philipp Precht
Instructor(s)	Dr. Philipp Precht Dr. Michael Steber
Language	German
Classification in curriculum	Practice-based specialization module AMEC and WIAM
Use in other academic programs	-
Format / SWH	Seminar-type lectures / 2 SWH
Work requirement	In-class program: 23 hrs. Self-directed study: 127 hrs.
ECTS	5
Technical prerequisites	-
Admission prerequisites for examination	-
Qualification objectives	Students will learn about the methodical approach to undertaking academic/scientific work and how to document and present their scientific results.
Contents	The module covers: the techniques of scientific work, basics of academic/scientific work, structure of a scientific work, dealing with library and literature, literature research, argumentation structure, presentation of results, presentation techniques, and preparation of technical reports and theses. Part Dr. Precht:

	Basics of scientific work Topic identification (creativity techniques, topic delimitation, work planning) Information acquisition (literature research, source selection, empiricism) Information processing (reading & comprehension, follow-up) Elements of academic/scientific work (introduction & motivation, main part, conclusion, summary & outlook) Content aspects of an academic/scientific paper (sequence and form, outline, figures and tables, references, bibliography, other formalities)
Requirements for successful completion	Dr. Steber: Practical lecture Dr. Precht: scientific report Both examination performances are prerequisites for recognition of the required internship.
Media	Projector, blackboard, eLearning
Literature	Jacob, R. (1997): Wissenschaftliches Arbeiten. Opladen. Sesink, W. (2005): Einführung in das wissenschaftliche Arbeiten ohne und mit PC. Munich, Vienna. Scholz, D. (2006): Diplomarbeiten normgerecht verfassen. Vogel, Würzburg. Coburg University of Applied Sciences, Department of Mechanical Engineering and Automotive Technology (2015): Guidelines on Academic/Scientific Work. Coburg. Theisen, Manuel-René (2011): Wissenschaftliches Arbeiten: