

Program and Course Description

Automotive Production Engineering

Master of Engineering (M. Eng.)

Study regulation: WS 2020/21

as per: 31.07.2023

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1 Overview

Name of the programme	Automotive Production Engineering
Study type & degree	Consecutive Master of Engineering (full time)
First start date	SS 14/15; Start only in summer semester
Standard period of study	3 semesters (90 ECTS, 48 SWS)
Study location	THI-Campus in Ingolstadt
Language of instruction	English
Cooperation	None
Admission requirement	Bachelor degree
Capacity	30 students p.a.
Programme director	Prof. Dr.-Ing. Bernhard Axmann Email: bernhard.axmann@thi.de Phone: +49 841 9348-3505

2 Introduction

The text describes the current state of the program modules in the Master's degree "Automotive Production Engineering" according to the study and examination regulations ("Studien- und Prüfungsordnung").

The module handbook ("Modulhandbuch") presents the objectives and contents of the individual compulsory and elective modules and the breakdown of SWS (semester hours per week) per module and semester.

2.1 Objectives

Based on their completed Bachelor's program, graduates acquire and expand their knowledge, skills and competencies in order to understand automotive production systems in their complexity theoretically, technically and practically. Furthermore, they shall understand development processes in product development to be able to plan, develop, implement, operate, and develop such systems further in an entire technical, strategic, and managerial manner.

There is an emphasis on the graduate's qualification enabling them to in highly linked processes, recognize, plan, and execute tasks, assess the need and scope for action as well as take part in developing and managing. They can recognize the interdependency of technical, strategic, managerial, social and further non-technical topics and integrate their actions responsibly.

Thus, students are enabled to solve complex problems that require production, engineering, and business skills by being able to develop solution concepts for practice based on scientific knowledge.

2.2 Admission requirements

- Proof of successful completion of a degree program in industrial engineering, mechanical engineering, automotive engineering, or mechatronics from a German university with at least 210 ECTS credits or equivalent or an equivalent successful domestic or foreign degree.
- All foreign applicants must submit their Bachelor's degree to *uni-assist*, which verifies their eligibility and converts their grades to the German grade system. *uni-assist* will issue a so-called preliminary inspection documentation (VPD), which they must upload to the application portal (like their other documents).
- Proof of English proficiency level B2 or higher.

The binding regulations for this curriculum can be found in:

- "Studien- und Prüfungsordnung" (SPO) of Master's degree "Automotive Production Engineering" of 18.07.2016;
- "Rahmenprüfungsordnung" (RaPO);
- „Allgemeine Prüfungsordnung" (APO) of Technische Hochschule Ingolstadt;
- „Immatrikulationssatzung" of Technische Hochschule Ingolstadt;

The sequence of studies is influenced by the regulations of the study and examination regulations ("Studien- und Prüfungsordnung").

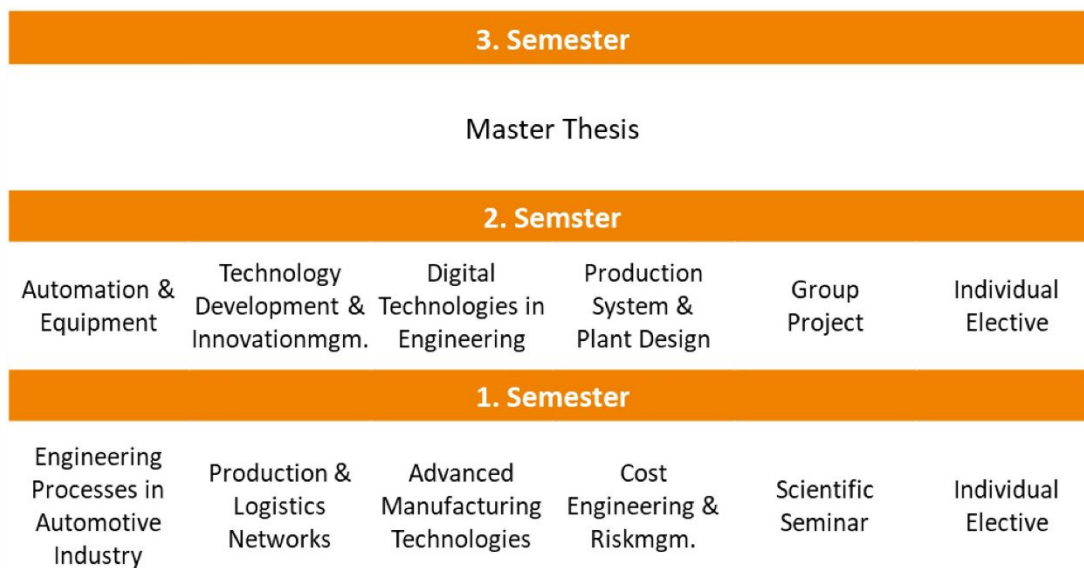
2.3 Target group

The program addresses to prospective students that

- are creative, curious, and enthusiastic about automotive and production as well as engineering and management,
- prefer a master's programme fully taught in English, like to gain intercultural experience, and go for an international career at home and abroad,
- enjoy questioning things and see themselves as a driver for change,
- are graduates of bachelor's programs or young professionals with a Bachelor's degree in industrial engineering, mechanical engineering, automotive engineering, mechatronics engineering, engineering, and management, IT, or a degree in another related discipline.

2.4 Structure of the program

The standard period of study for Master's programs amounts to three theoretical semesters, whereby the third semester shall be primarily used for the completion of the Master's thesis. The program is offered as a full-time course. Within the range of subjects, students are conveyed an in-depth and detailed theoretical, technical, and practical understanding of production systems in the automotive sector. This understanding goes beyond the strategic, planning, and operative development processes of these systems regarding product development.



Picture 1: Program structure

In the first semester (see Picture 1), knowledge, skills, and competencies in the field of Engineering Processes in Automotive Industry, Production and Logistics Networks, Advanced Manufacturing Technologies, Cost Engineering & Risk Management in Automotive, Scientific Research Seminar and one Individual Elective are conveyed.

The second semester includes following modules: Automation and Equipment Technologies, Technology Development & Innovation Management, Digital Technologies in Engineering, Production System and Plant Design, Group Project and one Individual Elective. In Group Project, students practicing working on a bigger task as part of a project team are given the opportunity to try out all project stages.

The Master's program concludes with the master's thesis in the third and last semester. The thesis is complemented by seminars.

There are practical elements in all modules, stressing the application-oriented profile of this master's program, e.g., by providing project and thesis topics set by partner companies.

Language and culture courses are offered during the semester times. German students can learn another foreign language.

2.5 Prerequisites for advancement

To get the title of master's thesis requires at least 30 ECTS to be achieved in the sequence of study (compare "Studien- und Prüfungsordnung" as of 18.07.2016).

3 Qualification profile

The study contents have been defined according to the requirements of industry and small and medium-sized companies as well as the qualification framework for German university degrees.

Graduates have acquired in-depth knowledge in the three main knowledge areas of the program:

- Production,
- Engineering &
- Management

and their interfaces in theory and practice.

Production engineering modules are

- Automation & Equipment
- Production System & Plant Design
- Production & Logistics Networks
- Advanced Manufacturing Technologies

Engineering modules are

- Digital Technologies in Engineering
- Engineering Processes in Automotive Industry

Management modules are

- Cost Engineering & Risk Management
- Group Project

Interfaces between management and engineering modules are

- Technology Development & Innovation Management

The two elective subjects can be freely chosen from the three knowledge areas of Production, Engineering & Management or a subject which represents an interface of these knowledge areas.

Considering the specific objectives of the individual modules (see module descriptions in the next chapter), graduates are familiar with the engineering and management methods used in the field of "Automotive Production Engineering" to work adequately.

They can quickly familiarize themselves with operational and strategic tasks in the field of "Automotive Production Engineering" by mastering not only specialist knowledge required for this, but also knowledge of managing employees (e. g. project) and designing or optimizing the necessary operational processes.

Students are especially advised of language training opportunities at Technische Hochschule Ingolstadt.

3.1 Mission statement

We prepare our students for the challenges of the future:

- The master's programme creates future competence.
- It creates a spirit of innovation and teaches entrepreneurial thinking.
- It is an interdisciplinary programme, which enables students to develop future-oriented solutions for interdisciplinary challenges.
- It qualifies students to help shape social changes such as the digital transformation and technological change. It sensitizes students to the sustainable use of the environment and resources, to socially responsible behaviour and to social commitment.

We enable our students to develop solutions to problems based on scientific knowledge:

- The master's programme includes a lot of project work. This enables students to acquire applicable problem-solving skills.
- The lecturers transfer their practical experience and teach academic knowledge. They are professionally competent, are constantly developing in their areas of expertise and contribute their research experience to teaching.
- Students acquire professional, methodical, social, and self-competences.

We open outstanding regional and international perspectives for our students:

- The master's programme is fully taught in English, addresses international students, and creates intercultural competences.
- In this way, the programme contributes to a cosmopolitan, international campus.
- Our numerous cooperation with companies in the region enables our students to start their careers in the best possible way, both regionally and internationally.

We teach and learn through personal exchange:

- Because this is a master's programme, small groups and seminar-based forms of teaching are set to enable individual exchange with the students.
- The teaching concept offers digitalized courses (e.g., inverted classroom) in combination with many practical project studies to enhance the learning progress.
- The lecturers try out new ways of innovative and experimental teaching. For example, the first half of the semester concentrates on theoretical basics, the second half on practical application.

We help all students discover and realize their individual potential:

- The master's programme includes a lot of project work. In joint project work, our students gain social skills such as the ability to cooperate and deal with conflict, and leadership skills.
- The master's programme is international and intercultural. Hence, the programme promotes performance in an appreciative cooperation. We meet each other with tolerance and openness and understand diversity as an opportunity to learn from each other and develop further.

3.2 Study objectives

3.2.1 Subject-specific competences of the study program

The graduates:

- are able to analyze complex tasks/problems in the area of complex production systems and their development, to identify their key factors and to carry out evaluations as well as hedgings,
- are able to solve problems relating to the development and operation of production systems, which are incompletely defined and demonstrate competing requirements by using scientific, theoretical as well as application-oriented methods,
- master the rules of project and process management, production systems planning, development and operation as well as their use on technical, strategic, planning, and economic problems and questions in practice, especially in the automotive production including suppliers,
- can use tried-and-tested and new production, planning, engineering, procurement, logistics, project management and staff management methods, and apply them successfully in production systems development and operation,
- are aware of digital technologies with a focus of office automation and their impact on the future work life in industrial companies.

3.2.2 Interdisciplinary competences of the study program

Methodical competences:

The graduates are able:

- to work scientifically,
- to assess holistically and systematically digital technologies,
- to plan, compile and lead projects,
- to apply methods of foresight and methods of innovation and technology management,
- to develop business models methodically, to evaluate business scenarios, to apply methods of change management, risk management and technology assessment,
- to analyze interdisciplinary problems, to recognize comprehensive correlations, to transfer learned competences to new tasks and to evaluate the technical, economic, and social impact of compiled solutions.

Social competences:

The graduates are able:

- to compile complex tasks in cross-functional and international teams, to solve conflicts in teams and to lead teams,
- to speak English fluently (including technical terms),
- to react sensitively in intercultural situations,
- to communicate their competencies and to communicate generally,
- to convince and become accepted.

Personal competences:

The graduates:

- are able to organize themselves and to manage their time,
- have analytical and outcome-oriented intellectual power,
- work target-oriented and autonomously,
- are able to present results and themselves.

3.2.3 Examination concept of the study program

The focus of the selection of examination forms is on the best possible assessment of the achievement of the set learning objectives - accordingly, there is a variety of different examination forms ranging from oral and written examinations, project work and study papers as well as presentations.

Also, a project is included in the program where students learn to put theoretical knowledge into practice and to deepen it in a team. The examination form "Project" is a group work to which each student must contribute individually and whose results are presented orally or in writing.

For the form of examinations, please refer to "Studien- und Prüfungsordnung", Appendix 1, which can be found under:

https://www.thi.de/fileadmin/daten/recht/SPOs_Fakultaet_WI/Master_Fakultaet_WI/Master_Automotive_Production_Engineering/2020_01_20_SPO_MA_APE_Anlage_1_V6.pdf.

3.2.4 Application of the study program

The study program “Automotive Production Engineering” has a strong application relevance as it is developed in close coordination with industry practice. It offers interdisciplinary competence teaching with an application reference, where students can participate in networking and learn how to deal with conflicts in a practical setting. The program includes practice and transfer projects during the study, and master’s thesis topics are often drawn from professional practice.

The program equips graduates with the skills and knowledge to take on qualified specialist and management roles in the field of production, factory planning, or technology development. The Scientific Research Seminar and Group Project provide students with exposure to industrial problems and scientific working methods. Overall, the study program has high relevance to the practical needs of the industry, and graduates are well-prepared for a range of career options.

3.2.5 Contribution of individual modules to the objectives of the program

Module	Professional competence	Methodology	Social competence	Personal competence
Technology Development & Innovation Management	+	++	o	o
Advanced Manufacturing Technologies	++	+	+	+
Cost Engineering & Risk Management	++	++	o	o
Engineering Processes in Automotive Industry	++	+	o	o
Production System and Plant Design	++	+	o	o
Production and Logistics Networks	++	+	o	o
Automation and Equipment Technologies	++	+	o	o
Digital Technologies in Engineering	++	++	+	+
Group Project	++	++	++	++
Electives	depends on the elective			
Scientific Research Seminar	++	++	+	+
Master’s Thesis	++	++	++	++

3.3 Possible professional fields

Graduates of the Master program Automotive Production Engineering have all skills enabling them to work as an engineer in the development of a production system at the company at their disposal. These skills enable them to work as production planner (with strategic, technological, managerial and process-related focus), plant engineer/engineer for equipment technologies as well as plant developer, planning/production manager and manufacturing developer.

Graduates of Automotive Production Engineering are in great demand. There is a wide field of application in specialist or management roles in national or international companies and organizations.

They are especially well prepared to take on specialist and management roles in the following areas:

- Engineer in the development of a production system
 - Plant & Production Engineer
 - Production & Quality Controlling
 - Planning/production manager
 - Manufacturing developer
 - Engineer for Equipment Technologies
- Quality Engineer & Manager
- Project Management
- Product and Technology Management
- Creativity and Innovation Management
- Business Development & Entrepreneurship

Graduates are also particularly well qualified for these tasks in an international context. Typical industries for the graduates of this program are:

- Automotive & Mobility Industry
- Mechanical and Electrical Engineering
- IT
- Services
- Consultancy
- Research & Education.

4 Dual Studies

In cooperation with selected industry partners, the study program can be completed also in a dual study model. The dual study model is offered as a study program with in-depth practice, in which the regular study program is supplemented by intensive practical phases in a company.

In dual study model, university, and practical phases (especially during semester breaks and for the final thesis) regularly alternate during study. The lecture times in the dual study model correspond to the standard study and lecture times at the THI.

By systematically linking the learning locations of university and company, students gain professional practical experience with selected practice partners as an integral part of their studies.

The curriculum of the two dual degree program models differs from the regular degree program concept in the following points:

- **Final thesis in the cooperation company**

In both dual study models, the final thesis is written at a cooperating company, usually on a practice-relevant topic related to the focus of study. Organizationally, the two dual degree program models are characterized by the following components:

- **Mentoring**

The central contact persons for dual students in the faculty are the respective program head of studies. They organize an annual mentoring meeting with the dual students of the respective study program.

- **Quality Management**

In the evaluation and surveys at the THI on the quality assurance of the dual study separate question blocks are included.

- **“Forum Dual”**

Organized by the Career Service and Student Counseling (CSS), the “Forum Dual” takes place once a year. The “Forum Dual” promotes the professional-organizational exchange between the dual cooperation partners and the faculty and serves to ensure the quality of the dual study programs. All cooperation partners in the dual study program as well as representatives and dual students of the faculty are invited to the meeting.

Formal-legal regulation for dual studies for all degree programs of the THI are regulated in the APO (see §§ 17, 18 and 21) and the enrollment statutes (see §§ 8b and 18).

- **Master’s Thesis**

Description that is more detailed can be found in the corresponding module description.

5 Description of Modules

5.1 Compulsory Modules

Technology Development & Innovation Management			
Module abbreviation:	TDevInnM_M-APE	SPO-No.:	1
Curriculum:	Programme	Module type	Semester
	Automotive Production Engineering (SPO WS 20/21)	Pflichtfach	2
Modulattribute:	Language of instruction	Duration of module	Frequency of offer
	Englisch	1 semester	only winter term
Responsible for module:	Schwarz, Jan Oliver		
Lecturers:	Ruppert, Max; Schropp, Theresa; Schwarz, Jan Oliver		
Credit points / SWS:	5 ECTS / 4 SWS		
Workload:	Kontaktstunden:	47 h	
	Selbststudium:	78 h	
	Gesamtaufwand:	125 h	
Subjects of the module:	Technology Development & Innovation Management (TDevInnM_M-APE)		
Lecture types:	SU/Ü-Lecture with integrated exercises		
Examinations:	schrP90 - schriftliche Prüfung, 90 Minuten (TDevInnM_M-APE)		
Usability for other study programs:	Please see the subject recognition list of SCS (Study Service Center).		
Prerequisites according examination regulation:			
None			
Recommended prerequisites:			
None			
Objectives:			
<p>Students</p> <ul style="list-style-type: none">• know the significance, methods, elements and processes of innovation and technology management;• understand the involvement in corporate and product development processes;• can independently use methods of innovation and technology management;• can install processes suited for systematic technology development and use methods;• know about the significance, effect and limits of IP protection (Intellectual Property) and its targeted application as well as patenting processes.			
Content:			
<ul style="list-style-type: none">• Technology and innovation management• Technology development: processes, methods, examples• Benchmarking			
Literature:			
<ul style="list-style-type: none">• BESSANT, John R. und Joseph TIDD, 2015. <i>Innovation and Entrepreneurship</i>. Chichester: Wiley. ISBN 978-1-119-08943-8• BIAZZO, Stefano, FILIPPINI, Roberto, 2021. <i>Product Innovation Management: Intelligence, Discovery, Development</i> [online]. Cham: Springer PDF e-Book. ISBN 978-3-030-75011-4. Verfügbar unter: Online verfügbar unter: https://ebookcentral.proquest.com/lib/kxp/detail.action?docID=6661653.			

- CORSTEN, Hans und andere, 2016. *Grundlagen des Technologie- und Innovationsmanagements*. 2. Auflage. München: Verlag Franz Vahlen. ISBN 978-3-8006-5132-0, 3-8006-5132-7. Online verfügbar unter <https://ebookcentral.proquest.com/lib/kxp/detail.action?docID=6991130>
- GRASHILLER, M., LUEDEKE, T., VIELHABER, M., 2017. Integrated Approach to the Agile Development with Design Thinking in an Industrial Environment. In: 21. ICED, THE UNIVERSITY OF BRITISH COLUMBIA, Vancouver.
- KELLEY, Braden, 2016. *Charting Change: A Visual Toolkit for Making Change Stick* [online]. New York, NY: Palgrave Macmillan PDF e-Book. ISBN 978-1-137-53697-6, 978-1-137-53695-2. Verfügbar unter: <https://doi.org/10.1057/9781137536976>.
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- SAVOIA, Alberto, 2019. *The right it: why so many ideas fail and how to make sure yours succeed*. F. Auflage. New York, NY: HarperOne. ISBN 978-0-06-288465-7, 978-0-06-288466-4
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- SCHWARZ, Jan-Oliver, 2023. *Strategic Foresight: An Introductory Guide to Practice*. London: Routledge.
- TIDD, Joseph und John R. BESSANT, 2021. *Managing innovation: integrating technological, market and organizational change*. Hoboken, NJ: Wiley. ISBN 978-1-119-71330-2
- TROTT, Paul, 2021. *Innovation management and new product development*. Harlow, England; London; New York; Munich: Pearson. ISBN 9781292251547
- WEINBERG, Ulrich, 2015. *Network Thinking: was kommt nach dem Brockhaus-Denken?* Hamburg. Murmann. ISBN 978-3-86774-469-0, 3-86774-469-6

Additional remarks:

No remarks.

Advanced Manufacturing Technologies			
Module abbreviation:	AdManT_M-APE	SPO-No.:	2
Curriculum:	Programme	Module type	Semester
	Automotive Production Engineering (SPO WS 20/21)	Pflichtfach	1
Modulattribute:	Language of instruction	Duration of module	Frequency of offer
	Englisch	1 semester	only winter term
Responsible for module:	Bednarz, Martin		
Lecturers:	Bednarz, Martin		
Credit points / SWS:	5 ECTS / 4 SWS		
Workload:	Kontaktstunden:	47 h	
	Selbststudium:	78 h	
	Gesamtaufwand:	125 h	
Subjects of the module:	Advanced Manufacturing Technologies (AdManT_M-APE)		
Lecture types:	SU/Ü - Lecture with integrated exercises		
Examinations:	LN - Seminararbeit: Power Point ca. 15 bis 20 Seiten und mündliche Präsentation 15 Min. (AdManT_M-APE)		
Usability for other study programs:	Please see the subject recognition list of SCS (Study Service Center).		
Prerequisites according examination regulation:			
None			
Recommended prerequisites:			
None			
Objectives:			
<ul style="list-style-type: none">• The students understand typical industry application;• They can analyse advantages and disadvantages of different manufacturing technologies;• They gain process know-how and understand the physical working principles of the technologies;• They research new trends in the industry and apply this knowledge in a paper.			
Content:			
Advanced Manufacturing Technologies e.g.: <ul style="list-style-type: none">• Additive Manufacturing• Laser Technologies• Technologies for Battery production• Manufacturing Technologies for fibre reinforced plastics			
Literature:			
<ul style="list-style-type: none">• GROOVER, Mikell P., 2013. <i>Fundamentals of modern manufacturing: materials, processes, and systems</i>. 5. Auflage. Hoboken, NJ: Wiley. ISBN 978-1-118-231463• BRECHER, Christian, 2015. <i>Advances in production technology</i> [online]. Cham [u.a.]: Springer PDF e-Book. ISBN 978-3-319-12304-2, 978-3-319-12303-5. Verfügbar unter: http://dx.doi.org/10.1007/978-3-319-12304-2.			

- KALPAKJIAN, Serope und Steven R. SCHMID, 2014. *Manufacturing engineering and technology*. 7. Auflage. Singapore [u.a.]: Pearson. ISBN 978-0-13-312874-1, 978-981-06-9406-7

Additional remarks:

No remarks.

Cost Engineering & Riskmanagement			
Module abbreviation:	CostERiskM_M-APE	SPO-No.:	3
Curriculum:	Programme	Module type	Semester
	Automotive Production Engineering (SPO WS 20/21)	Pflichtfach	1
Modulattribute:	Language of instruction	Duration of module	Frequency of offer
	Englisch	1 semester	only winter term
Responsible for module:	Hecht, Dirk		
Lecturers:	Hecht, Dirk; Horák, Jiří; Ruppert, Max		
Credit points / SWS:	5 ECTS / 4 SWS		
Workload:	Kontaktstunden:	47 h	
	Selbststudium:	78 h	
	Gesamtaufwand:	125 h	
Subjects of the module:	Cost Engineering & Risk Management (CostERiskM_M-APE)		
Lecture types:	SU/Ü- Lecture with integrated exercises		
Examinations:	schrP90 - schriftliche Prüfung, 90 Minuten (CostERiskM_M-APE)		
Usability for other study programs:	Please see the subject recognition list of SCS (Study Service Center).		
Prerequisites according examination regulation:			
None			
Recommended prerequisites:			
None			
Objectives:			
<p>The students</p> <ul style="list-style-type: none">• get to know the importance of cost engineering methods in cross functional teams;• can recognise, assess and include in their work interactions between cost engineering, innovations and product development;• can handle and apply tools of cost engineering projects and processes;• understand cost levers within different technologies (Assembly, Moulding, Die Casting, Software);• understand the importance of Risk Management;• present the classic models of Risk Management and are able to apply those;• portray the stages of Risk Management and design specific, interdisciplinary practical cases and are able to comprehend the overall context;• analyse certain situations regarding the applicability of the methods of Risk Management.• combine Risk Management with technical design and mathematical calculations			
Content:			
<ul style="list-style-type: none">• Cost engineering, methods and tools• Calculation within various technologies• Cost Engineering as part of innovations and Project Management• Classic Risk Management methods and case studies in specific technologies			

<ul style="list-style-type: none">• Alternative methods of Risk Management and mathematical application
Literature:
<ul style="list-style-type: none">• VDI, 2011. <i>Wertanalyse - das Tool im Value Management</i>. 6. Auflage. Berlin [u.a.]: Springer. ISBN 978-3-540-79516-2, 978-3-540-79517-9• VENKATARAMAN, Ray R. und Jeffrey K. PINTO, 2008. <i>Cost and value management in projects</i>. Hoboken, N.J.: John Wiley & Sons. ISBN 978-0-470-06913-4, 0-470-06913-9• HECHT, Dirk, 2017. <i>Modernes Beschaffungsmanagement in Lehre und Praxis</i>. Berlin: Uni-Edition. ISBN 978-3-944072-88-3, 3-944072-88-X• WOLKE, Thomas, 2008. <i>Risikomanagement</i>. 2. Auflage. München [u.a.]: Oldenbourg. ISBN 978-3-486-58714-2, 3-486-58714-5• KEITSCH, Detlef, 2007. <i>Risikomanagement</i>. Stuttgart: Schaeffer-Poeschel. ISBN 978-3-7910-2713-5, 3-7910-2713-1• HOPKIN, Paul, 2013. <i>Risk Management</i>. London; Philadelphia, PA: Kogan Page Ltd. ISBN 978-0-7494-6839-2, 0-7494-6839-4• BABBAGE, Charles, 2010. <i>On the economy of machinery and manufactures</i>. Memphis, Tenn.: General Books. ISBN 978-0-217-26690-1
Additional remarks:
No remarks.

Engineering Processes in Automotive Industry			
Module abbreviation:	EngineeProcAuto_M-APE	SPO-No.:	4
Curriculum:	Programme	Module type	Semester
	Automotive Production Engineering (SPO WS 20/21)	Pflichtfach	1
Modulattribute:	Language of instruction	Duration of module	Frequency of offer
	Englisch	1 semester	only summer term
Responsible for module:	Meyer, Roland		
Lecturers:	Meyer, Roland; Neumann, Alexander		
Credit points / SWS:	5 ECTS / 4 SWS		
Workload:	Kontaktstunden:	47 h	
	Selbststudium:	78 h	
	Gesamtaufwand:	125 h	
Subjects of the module:	Engineering Processes in Automotive Industry (EngineeProcAuto_M-APE)		
Lecture types:	SU/Ü - Lecture with integrated exercises		
Examinations:	schrP90 - schriftliche Prüfung, 90 Minuten (EngineeProcAuto_M-APE)		
Usability for other study programs:	Please see the subject recognition list of SCS (Study Service Center).		
Prerequisites according examination regulation:			
None			
Recommended prerequisites:			
None			
Objectives:			
<p>The students</p> <ul style="list-style-type: none">• know the strong networked and parallel processes in the product and process development of automobiles;• can recognise, assess and include in the work interactions between production and product;• know the significance and working methods of Simultaneous Engineering (SE) including the involvement of suppliers in product design and product and process quality to meet the requirements of production;• can handle tools of project and process management and know the working methods and processes (e.g. for networking, decision-making, escalation, etc.) in large automotive and supplier companies;• know the significance of prototype, pilot production and release processes and here applied tools;• know about the significance of lean development methods and cost management.			
Content:			
<ul style="list-style-type: none">• Product and process development in the automotive industry• Automotive project- and process-management and according methods• Requirements and quality management tools• Pre-series process• Cost management			

- Lean development

Literature:

- STAMATIS, Diomidis H., 2001. *Advanced quality planning: a common sense guide to AQP and APQP*. 1. Auflage. New York, NY: Productivity Press. ISBN 1-56327-258-X
- COOPER, Robert G., 2017. *Winning at new products: creating value through innovation*. New York, NY: Basic Books. ISBN 0-465-09332-9, 978-0-465-09332-8
- WOMACK, James P., Daniel T. JONES und Daniel ROOS, 2007. *The machine that changed the world: [how lean production revolutionized the global car wars]*. London [u.a.]: Simon & Schuster. ISBN 978-1-84737-055-6, 1-8473-7055-1
- WOMACK, James P. und Daniel T. JONES, 2003. *Lean thinking: banish waste and create wealth in your corporation*. London [u.a.]: Simon & Schuster. ISBN 978-0-7432-3164-0
- ROTHER, Mike und John SHOOK, 2009. *Learning to see: value-stream mapping to create value and eliminate muda*. Version 1. Auflage. Cambridge, Mass.: Lean Enterprise Inst. ISBN 978-0-9667843-0-5, 0-9667843-0-8
- MORGAN, James M. und Jeffrey K. LIKER, 2006. *The Toyota product development system: integrating people, process, and technology*. New York, NY: Productivity Press. ISBN 1-56327-282-2, 978-1-563-27282-0
- REINERTSEN, Donald G., 2009. *The principles of product development flow: second generation lean product development*. Redondo Beach, Calif: Celeritas. ISBN 978-1-935401-00-1, 1-935401-00-9
- CHANG, Kuang-Hua, 2013. *Product manufacturing and cost estimating using CAD/CAE*. Burlington: Elsevier Science. ISBN 978-0-12-404600-9, 0-12-404600-2
- MITAL, Anil, ©2008. *Product development: a structured approach to consumer product development, design, and manufacture*. Amsterdam: Elsevier/Butterworth-Heinemann. ISBN 978-0-08-055641-3, 0-08-055641-8

Additional remarks:

Bonus system:

In the course, tasks can be set that lead to bonus points for the examination performance for each qualitatively completed task. The maximum crediting of bonus points takes place according to the APO.

Production System and Plant Design			
Module abbreviation:	PSPD_M-APE	SPO-No.:	5
Curriculum:	Programme	Module type	Semester
	Automotive Production Engineering (SPO WS 20/21)	Pflichtfach	2
Modulattribute:	Language of instruction	Duration of module	Frequency of offer
	Englisch	1 semester	only winter term
Responsible for module:	Meyer, Roland		
Lecturers:	Meyer, Roland		
Credit points / SWS:	5 ECTS / 4 SWS		
Workload:	Kontaktstunden:	47 h	
	Selbststudium:	78 h	
	Gesamtaufwand:	125 h	
Subjects of the module:	Production System and Plant Design (PSPD_M-APE)		
Lecture types:	SU/Ü - Seminar with integrated exercises		
Examinations:	schrP90 - schriftliche Prüfung, 90 Minuten (PSPD_M-APE)		
Usability for other study programs:	Please see the subject recognition list of SCS (Study Service Center).		
Prerequisites according examination regulation:			
None			
Recommended prerequisites:			
None			
Objectives:			
<p>After this lecture subject, students can:</p> <ul style="list-style-type: none">• understand and apply basics of production systems in the automotive industry;• asses and design processes, structures and elements of production systems;• understand, rate and apply variables and aims of design and control (added value, motivation, workload, ergonomics, etc.);• handle necessary basics and implement methodical approaches (MTM, REFA);• understand and use procedures and methods of manufacturing planning;• determine and optimize flow production• investigate workplaces and apply basics methods of ergonomics (e.g. workplace design);• get around and understand modern leadership;• classify the importance of digital industry 4.0 methods.			
Content:			
<ul style="list-style-type: none">• Basics of production systems• Production organisation strategies and shopfloor management• Machine tools in production systems• Technical capacity, MTM, REFA target time determination• Design for manufacturing and assembly (DFMA)			

<ul style="list-style-type: none">• Manufacturing and assembly planning• Industry 4.0 applications in production systems• Lean Leadership• Production training
Literature:
<ul style="list-style-type: none">• BOKRANZ, Rainer und Kurt LANDAU, 2006. <i>Produktivitätsmanagement von Arbeitssystemen: MTM-Handbuch</i>. Stuttgart: Schäffer-Poeschel. ISBN 3-7910-2133-8, 978-3-7910-2133-1
Additional remarks:
<p>Bonus system:</p> <p>In the course, tasks can be set that lead to bonus points for the examination performance for each qualitatively completed task. The maximum crediting of bonus points takes place according to the APO.</p>

Production and Logistics Networks			
Module abbreviation:	ProdLogis_M-APE	SPO-No.:	6
Curriculum:	Programme	Module type	Semester
	Automotive Production Engineering (SPO WS 20/21)	Allgemeines Wahlpflichtfach	1
Modulattribute:	Language of instruction	Duration of module	Frequency of offer
	Englisch	1 semester	only winter term
Responsible for module:	Jattke, Andreas		
Lecturers:	Jattke, Andreas		
Credit points / SWS:	5 ECTS / 4 SWS		
Workload:	Kontaktstunden:	47 h	
	Selbststudium:	78 h	
	Gesamtaufwand:	125 h	
Subjects of the module:	Production and Logistics Networks (ProdLogis_M-APE)		
Lecture types:	SU/Ü - Lecture with integrated exercises		
Examinations:	mdIP - mündliche Prüfung 15 Minuten (ProdLogis_M-APE)		
Usability for other study programs:	Please see the subject recognition list of SCS (Study Service Center).		
Prerequisites according examination regulation:			
None			
Recommended prerequisites:			
None			
Objectives:			
<p>The students</p> <ul style="list-style-type: none">• get to know the significance, elements, basic structure, design and execution of production and logistic networks in the automotive industry;• can capture and assess interactions between production network, location factors, suppliers, logistics network, own/external skills, own manufacturing penetration, product design/technologies, production design/technologies etc.;• get to know possible production strategies, their effects on the production and logistics network including suppliers' environment and can systematically assess and develop different production strategies;• can design skills strategies in conjunction with the production strategy and hence derive and establish skills development including supplier development;• get to know procurement, intra/production and distribution logistics systems used in the automotive industry (e. g. JIT, milkrun, supermarket, kanban concept, single/multi-level, combined logistics systems etc.);• can assess and fundamentally calculate the effects of different logistics concepts;• can optimize supply chains (specific design, KPI, transport- and warehousing strategies, make or buy decisions, etc.).			
Content:			
<ul style="list-style-type: none">• Production networks and skills strategies			

- Logistics systems and networks
- Logistics concepts in manufacture (intralogistics)
- Supply Chain management design methodologies
- Supply Chain KPIs
- SCM Simulation - case study
- Supply chain management in line with industry 4.0 (digitalisation)

Literature:

- ERRASTI, Ander, 2013. *Global production networks: operations design and management*. 2. Auflage. Boca Raton, FL: CRC Press. ISBN 978-1-4665-6294-3, 1-4665-6294-3
- ZHENG, Li und Frank POSSEL-DÖLKEN, 2002. *Strategic production networks: with 17 tables*. Berlin [u.a.]: Springer. ISBN 3-540-43162-4, 978-3-642-07734-0
- ABELE, Eberhard, Ulrich NÄHER und Gernot STRUBE, 2007. *Global production: a handbook for strategy and implementation*. 1. Auflage. Berlin: Springer Berlin. ISBN 978-3-540-71652-5, 3-540-71652-1
- STADTLER, Hartmut, 2015. *Supply chain management and advanced planning: concepts, models, software, and case studies*. 5. Auflage. Berlin [u.a.]: Springer. ISBN 978-3-642-55308-0, 3-642-55308-7

Additional remarks:

No remarks.

Automation and Equipment Technologies			
Module abbreviation:	A&ET_M-APE	SPO-No.:	7
Curriculum:	Programme	Module type	Semester
	Automotive Production Engineering (SPO WS 20/21)	Pflichtfach	2
Modulattribute:	Language of instruction	Duration of module	Frequency of offer
	Englisch	1 semester	only winter term
Responsible for module:	Großmann, Daniel		
Lecturers:	Feistle, Martin; Großmann, Daniel		
Credit points / SWS:	5 ECTS / 4 SWS		
Workload:	Kontaktstunden:	47 h	
	Selbststudium:	78 h	
	Gesamtaufwand:	125 h	
Subjects of the module:	Automation and Equipment Technologies (A&ET_M-APE)		
Lecture types:	SU/Ü-Lecture with integrated exercises		
Examinations:	schrP90 - schriftliche Prüfung, 90 Minuten (A&ET_M-APE)		
Usability for other study programs:	Please see the subject recognition list of SCS (Study Service Center).		
Prerequisites according examination regulation:			
None			
Recommended prerequisites:			
None			
Objectives:			
The students			
<ul style="list-style-type: none">• get to know the fields of application of automation technologies in automotive production including suppliers. They can determine suitable application-oriented levels of automation (economic and technological);• know the structure and individual components of automation systems and their interaction in automotive production (amongst others, steerings, software, clamping systems, robots, transport technology, systems, factory);• can derive and assess interactions between automation technology and manufacturing technology/processes, product design, production design, productivity/availability etc.;• can interpret robot systems in particular (single robot, robotic cells and gardens) mathematically and with planning (possibly do it themselves and programme using exercises/practical exercises in the lab?);• know the planning and development processes of automation systems and equipment in automotive production (e. g. robot offline programming, accessibility simulations, virtual commissioning, tooling methods planning, forming simulation etc.) and their involvement in product/production development processes;• know the involvement, processes and technology of equipment manufacture for the development, construction and production of tools and systems;• learn the methods for the construction, commissioning and quality optimisation of systems and tools in conjunction with the production start-up processes;			

<ul style="list-style-type: none"> • get to know the tool machines used in automotive production and can assess these both technologically and economically (e. g. for procurement processes).
Content:
<ul style="list-style-type: none"> • Robotics, automation and control technology in automotive manufacturing • Equipment manufacturing: system manufacturing, tool and mould making, tool machines
Literature:
<ul style="list-style-type: none"> • JOHN, Karl-Heinz und Michael TIEGELKAMP, 2010. <i>IEC 61131-3: programming industrial automation systems: concepts and programming languages, requirements for programming systems, decision-making aids</i>. 2. Auflage. Berlin: Springer. ISBN 978-3-642-43694-9, 3-642-43694-3 • LAMB, Frank, 2013. <i>Industrial automation: hands on</i>. New York, N.Y.: McGraw-Hill Education LLC. • BARTELT, Terry, 2011. <i>Industrial automated systems: instrumentation and motion control</i>. Clifton, NY: Delmar Cengage Learning. ISBN 978-1-4354-8888-5, 1-4354-8888-1 • STEPHENS, Matthew P. und Fred E. MEYERS, 2013. <i>Manufacturing facilities design and material handling</i>. West Lafayette, Indiana: Purdue University Press. ISBN 978-1-61249-272-8 • THIEDE, Sebastian, 2012. <i>Energy efficiency in manufacturing systems</i>. Heidelberg: Springer. ISBN 978-3-642-25914-2, 978-3-642-25913-5 • HOFFMAN, Edward G., 2004. <i>Jig and fixture design</i>. 5. Auflage. New York: Thomson. ISBN 1-4018-1107-8 • GIBSON, Ian, David ROSEN und Brent STUCKER, 2015. <i>Additive manufacturing technologies: 3D printing, rapid prototyping, and direct digital manufacturing</i>. 2. Auflage. New York, NY [u.a.]: Springer. ISBN 978-1-4939-2112-6, 1-4939-2112-6 • , 2011. <i>Cyber-Physical Systems: Driving force for innovation in mobility, health, energy and production</i>. Berlin, Heidelberg: Springer Berlin Heidelberg. ISBN 978-3-642-29090-9 • UHL, Axel, 2016. <i>Digital enterprise transformation: a business-driven approach to leveraging innovative IT</i>. London: Routledge, Taylor & Francis Group. ISBN 978-1-4724-4854-5 • BAUERNHANSL, Thomas, Michael TEN HOMPEL und Birgit VOGEL-HEUSER, 2014. <i>Industrie 4.0 in Produktion, Automatisierung und Logistik: Anwendung, Technologien, Migration</i>. Wiesbaden: Springer Vieweg. ISBN 978-3-658-04681-1, 3-658-04681-3
Additional remarks:
No remarks.

Digital Technologies in Engineering			
Module abbreviation:	DigiTEng_M-APE	SPO-No.:	8
Curriculum:	Programme	Module type	Semester
	Automotive Production Engineering (SPO WS 20/21)	Pflichtfach	2
Modulattribute:	Language of instruction	Duration of module	Frequency of offer
	Englisch	1 semester	only winter term
Responsible for module:	Bednarz, Martin		
Lecturers:	Basta, Georg; Landesberger, Martin; Lerher, Tone; Schönbach, Eva		
Credit points / SWS:	5 ECTS / 4 SWS		
Workload:	Kontaktstunden:	47 h	
	Selbststudium:	78 h	
	Gesamtaufwand:	125 h	
Subjects of the module:	Digital Technologies in Engineering (DigiTEng_M-APE)		
Lecture types:	SU/Ü-Lecture with integrated exercises		
Examinations:	LN - StA+Koll. (Studienarbeit mit Kolloquium), schriftlich 8-15 Seiten oder Präsentation 15-20 Seiten; mdl.Prfg 10-15 Min. (DigiTEng_M-APE)		
Usability for other study programs:	Please see the subject recognition list of SCS (Study Service Center).		
Prerequisites according examination regulation:			
None			
Recommended prerequisites:			
None			
Objectives:			
<p>The students</p> <ul style="list-style-type: none">• can assess the considerable significance of PLM/PDM as a means of communication in the product development process;• are familiar with the management of product and production data in the engineering process;• know and understand models, concepts and methods of PLM/PDM;• can handle exemplary, specific PLM/PDM systems;• get to know and understand CAx strategies (amongst others, for CAD, CAQ, CAE, CAM, DMU etc.) and their interactions on corporate processes;• know possibilities and systems of the “digital factory“ for production and factory design, planning and development, in particular for Simultaneous Engineering, and their involvement in the product development process;• understand the theory behind different simulation methods such as discrete event simulation, continuous simulation, FEM simulation as well as the according modelling steps;• can handle exemplary, specific systems of the digital factory (e. g. system layout, process/availability simulation, robot offline programming, system simulation, assembly and ergonomics simulation);• know foundations (FEM methodology) and different systems of (physical) manufacturing process simulation (e. g. forming simulation, casting simulation, joining simulation, painting simulation etc.) and their fields of application as well as limits.			

Content:

- Product Life Cycle Management (PLM)
- Product Data Management (PDM)
- CAx strategies
- Digital factory (planning) and manufacturing (process) simulation

Literature:

- HIRZ, Mario, 2013. *Integrated computer-aided design in automotive development: development processes, geometric fundamentals, methods of CAD, knowledge-based engineering data management*. Berlin [und 4 weitere]: Springer. ISBN 978-3-642-11939-2, 978-3-642-11940-8
- VAJNA, Sándor, 2009. *CAx für Ingenieure: eine praxisbezogene Einführung* [online]. Berlin: Springer Berlin PDF e-Book. ISBN 978-3-540-36038-4, 978-3-540-36039-1. Verfügbar unter: http://deposit.d-nb.de/cgi-bin/dokserv?id=2842151&prov=M&dok_var=1&dok_ext=htm.
- BRAESS, Hans-Hermann, SEIFFERT, Ulrich, 2003. *Vieweg Handbuch Kraftfahrzeugtechnik* [online]. Wiesbaden: Vieweg+Teubner Verlag PDF e-Book. ISBN 978-3-663-11757-5, 978-3-663-11758-2. Verfügbar unter: <http://dx.doi.org/10.1007/978-3-663-11757-5>.
- AHMED, Sayed und Wolf-Heinrich HUCHO, 2008. *Aerodynamik des Automobils : Strömungsmechanik, Wärmetechnik, Fahrdynamik, Komfort*. 5. Auflage. ISBN 978-3-528-03959-2
- SEIFFERT, Ulrich, 2008. *Virtuelle Produktentstehung für Fahrzeug und Antrieb im Kfz: Prozesse, Komponenten, Beispiele aus der Praxis* [online]. Wiesbaden: Vieweg + Teubner PDF e-Book. ISBN 978-3-8348-0345-0, 978-3-8348-9479-3. Verfügbar unter: <http://dx.doi.org/10.1007/978-3-8348-9479-3>.
- CANETTA, Luca, 2011. *Digital factory for human-oriented production systems: the integration of international research projects* [online]. London [u.a.]: Springer PDF e-Book. ISBN 978-1-84996-172-1, 978-1-84996-171-4. Verfügbar unter: <http://dx.doi.org/10.1007/978-1-84996-172-1>.
- WESTKÄMPER, Engelbert, 2013. *Digitale Produktion* [online]. Berlin: Springer PDF e-Book. ISBN 978-3-642-20259-9, 978-3-642-20258-2. Verfügbar unter: <http://dx.doi.org/10.1007/978-3-642-20259-9>.
- BRACHT, Uwe, GECKLER, Dieter, WENZEL, Sigrid, 2011. *Digitale Fabrik: Methoden und Praxisbeispiele* [online]. Berlin: Springer PDF e-Book. ISBN 978-3-540-89038-6, 978-3-540-88973-1. Verfügbar unter: <http://dx.doi.org/10.1007/978-3-540-88973-1>.

Additional remarks:

No remarks.

Group Project			
Module abbreviation:	Project_M-APE	SPO-No.:	9
Curriculum:	Programme	Module type	Semester
	Automotive Production Engineering (SPO WS 20/21)	Pflichtfach	2
Modulattribute:	Language of instruction	Duration of module	Frequency of offer
	Englisch	1 semester	only winter term
Responsible for module:	Axmann, Bernhard		
Lecturers:	Axmann, Bernhard; Hecht, Dirk; Ruppert, Max		
Credit points / SWS:	5 ECTS / 4 SWS		
Workload:	Kontaktstunden:	47 h	
	Selbststudium:	78 h	
	Gesamtaufwand:	125 h	
Subjects of the module:	Group Project (Project_M-APE)		
Lecture types:	S-Seminar		
Examinations:	PA - Projektarbeit. Seminararbeit. Schriftliche Ausarbeitung ca. 10-15 Seiten mit Präsentation 15-30 Minuten. (Project_M-APE)		
Usability for other study programs:	Please see the subject recognition list of SCS (Study Service Center).		
Prerequisites according examination regulation:			
None			
Recommended prerequisites:			
None			
Objectives:			
<p>The students</p> <ul style="list-style-type: none">• can successfully work on and solve a complex, professional task in a team during the course of a semester;• can independently learn the ropes of a new, demanding professional theme, unfamiliar to them, and work on this using academic methods and engineering and economic expert knowledge gained so far;• can competently discuss and convincingly present the obtained project results and document these according to the technical and academic standards;• can develop interdisciplinary connections and understand the interaction of different specialist disciplines in engineering;• has distinctive methodological and social skills in areas such as teamwork, communication, leadership, creative techniques, project management and time management.			
Content:			
<ul style="list-style-type: none">• Working on a project task in a team during a semester; the project tasks differ from semester to semester.• The project is generally a complex task from the area of production systems and their development processes and is carried out in small teams with divided responsibilities, put together by the students themselves.			

- In this type of work, knowledge acquired so far can be practically implemented by means of a practical task.
- In addition, the ability of the students to organise, carry out, document and present a project is promoted.
- Key qualifications around teamwork, project management as well as social skills are consolidated.

Literature:

Will be specified at the beginning.

Additional remarks:

No remarks.

Scientific Research Seminar			
Module abbreviation:	SciResSem_M-APE	SPO-No.:	12
Curriculum:	Programme	Module type	Semester
	Automotive Production Engineering (SPO WS 20/21)	Pflichtfach	1
Modulattribute:	Language of instruction	Duration of module	Frequency of offer
	Englisch	1 semester	only winter term
Responsible for module:	Axmann, Bernhard		
Lecturers:	Axmann, Bernhard		
Credit points / SWS:	5 ECTS / 2.5 SWS		
Workload:	Kontaktstunden:	30 h	
	Selbststudium:	95 h	
	Gesamtaufwand:	125 h	
Subjects of the module:	Scientific Research Seminar (SciResSem_M-APE)		
Lecture types:	S-Seminar		
Examinations:	LN - 11 Arbeiten/Studienarbeiten (SciResSem_M-APE)		
Usability for other study programs:	Please see the subject recognition list of SCS (Study Service Center).		
Prerequisites according examination regulation:			
None			
Recommended prerequisites:			
None			
Objectives:			
<p>The students</p> <ul style="list-style-type: none">• can successfully process a complex technical task within one semester;• are able to work independently into a new, challenging theme;• are able to document and present their project results;• have strong methodological and social competency in areas such as communication, project management and time management.			
Content:			
<p>Processing of a semester-accompanying scientific question differ from semester to semester. Several topics are offered, from which one can be selected. The task is a scientific question and is handled by the student on his own responsibility. At the end of the semester, the results are summarized in the form of a report (approx. 10-15 pages)</p>			
Literature:			
<p>Will be specified at the beginning.</p>			
Additional remarks:			
<p>Seminar paper (10-15 pages)</p>			

Master's Thesis			
Module abbreviation:	Ma_Thes_APE	SPO-No.:	13
Curriculum:	Programme	Module type	Semester
	Automotive Production Engineering (SPO WS 20/21)	Pflichtfach	3
Modulattribute:	Language of instruction	Duration of module	Frequency of offer
	Englisch	1 semester	only winter term
Responsible for module:	Axmann, Bernhard		
Lecturers:			
Credit points / SWS:	30 ECTS / 0 SWS		
Workload:	Kontaktstunden:	0 h	
	Selbststudium:	750 h	
	Gesamtaufwand:	750 h	
Subjects of the module:	Master's Thesis (Ma_Thes_APE)		
Lecture types:	MA		
Examinations:	Master-Abschlussarbeit (Ma_Thes_APE)		
Usability for other study programs:	Please see the subject recognition list of SCS (Study Service Center).		
Prerequisites according examination regulation:			
None			
Recommended prerequisites:			
None			
Objectives:			
<p>Acquisition and proof of the ability to work independently on complex problems from the field of Automotive Production Engineering to a high academic level using the expert knowledge gained as well as academic methods and knowledge within a specified period of time.</p> <p>The Master's students are furthermore able to classify results in a professional and interdisciplinary context and present them in the form of an academic piece of work.</p>			
Content:			
<ul style="list-style-type: none">• Analysis of the problem and definition of the theme• Literature/patent research• Formulation of the approach/methods• Determination of a solution/approach• Planning and development of the solution, analysis of results• Classification of references to professional sources and other non- subject related references <p>Use of academic work methods and methodology, i.e., proceeding systematically, analytically and using correct methodology, forming arguments logically and concisely, as well working in a targeted manner and time critically and presenting results in a formally correct manner</p>			

Literature:
Will be specified at the beginning.
Additional remarks:
<p>For dual students:</p> <p>The master thesis is to be written in cooperation with the respective dual company. The details of the content and the scientific standard are ensured in cooperation between the company's supervisor and the first examiner at Ingolstadt University of Applied Sciences.</p>

5.2 Individual Electives

Entrepreneurship Coaching			
Module abbreviation:	MVM_EC	SPO-No.:	10
Curriculum:	Programme	Module type	Semester
	Automotive Production Engineering (SPO WS 20/21)	Individual Elective	
Modulattribute:	Language of instruction	Duration of module	Frequency of offer
	Deutsch	1 Semester	Winter- und Sommersemester
Responsible for module:	Bader, Martin		
Lecturers:	Bader, Martin		
Credit points / SWS:	5 ECTS / 4 SWS		
Workload:	Kontaktstunden:	47 h	
	Selbststudium:	79 h	
	Gesamtaufwand:	126 h	
Subjects of the module:	Entrepreneurship Coaching (MVM_EC)		
Lecture types:	SU/Ü-Seminaristischer Unterricht/Übung		
Examinations:	LN-mdl. Prüfung		
Usability for other study programs:	Keine		
Prerequisites according examination regulation:			
Keine			
Recommended prerequisites:			
Keine			
Objectives:			
<p>Nach erfolgreicher Teilnahme an der Modulveranstaltung sind die Studierenden in der Lage,</p> <ul style="list-style-type: none">eine Geschäftsidee selbst zu entwickeln, zu beurteilen und zu einem konsistenten Businessplan auszu-differenzieren.die Erfolgsfaktoren für bestimmte Geschäftsarten zu identifizieren und entsprechende Maßnahmen für die Umsetzung abzuleiten.die Umsetzung konsequent vorzubereiten und die Geschäftsidee durch eine Gründung im Markt anzubahnen bzw. tatsächlich einzuführen.sich auf die Teilnahme in Gründungswettbewerben gezielt vorzubereiten und die dort auftauchenden Herausforderungen zu erfüllen.			
Content:			
<ul style="list-style-type: none">IdeationValue Proposition DesignBusiness Model CanvasBusiness Model InnovationMinimal Viable Product & Preto-/PrototypingBusiness Planning			

- Pitching

Literature:

- AULET, Bill, Thomas DEMMIG und Marius URSACHE, 2013/2016. *Disciplined entrepreneurship (Engl.) / Startup mit System: In 24 Schritten zum erfolgreichen Entrepreneur*. Hoboken, NJ: Wiley. ISBN 978-1-118-69228-8, 978-1-118-72088-2
- BAYSTARTUP GBMH, *Handbuch Businessplan-Erstellung, Der Weg zum erfolgreichen Unternehmen* [online]. 2022 [Zugriff am: 18.07.2022]. Verfügbar unter: <https://www.baystartup.de/startups/handbuch-businessplan-erstellung>; https://www.baystartup.de/fileadmin/Dokumente/Downloads/Handbuch_Businessplan_Erstellung.pdf
- KAWASAKI, Guy, 2015. *The art of the start 2.0: The time-tested, battle-hardened guide for anyone starting anything*. London: Portfolio Penguin. ISBN 978-0-241-18726-5, 978-1-59184-811-0
- RIES, Eric, 2017. *The lean startup: how today's entrepreneurs use continuous innovation to create radically successful businesses*. New York: Currency. ISBN 978-1-5247-6240-7
- FUEGLISTALLER, U. und andere, 2019. *Entrepreneurship: Modelle – Umsetzung – Perspektiven mit Fallbeispielen aus Deutschland, Österreich und der Schweiz*. 5. Auflage. Wiesbaden: Springer Gabler. ISBN 978-3-658-26799-5
- GASSMANN, Oliver, Karolin FRANKENBERGER und Michaela CSIK, 2017. *Geschäftsmodelle entwickeln: 55 innovative Konzepte mit dem St. Galler Business Model Navigator*. 2. Auflage. München: Hanser. ISBN 978-3446451759
- GASSMANN, Oliver, Karolin FRANKENBERGER und Michaela CHOUDURY, 2020. *Business Model Navigator: The Strategies Behind the Most Successful Companies*. 2. Auflage. Harlow: Pearson. ISBN 978-1292327129
- OSTERWALDER, Alexander und Yves PIGNEUR, 2010. *Business Model Generation: Ein Handbuch für Visionäre, Spielveränderer und Herausforderer*. ISBN 978-3-593-39474-9
- OSTERWALDER, Alexander und Yves PIGNEUR, 2014. *Value Proposition Design: How to Create Products and Services Customers Want*. ISBN 978-1118968055

Additional remarks:

Das Coaching wird (soweit möglich) in Kooperation mit einem Business-Partner als Wirtschaftspaten durchgeführt. Durch diese Kooperation erhält jedes Team neben der Betreuung durch den THI-Dozierenden einen Praxis-Paten.

International Management			
Module abbreviation:	WMod_Int_Mgt_M-APE	SPO-No.:	10
Curriculum:	Programme	Module type	Semester
	Automotive Production Engineering (SPO WS 20/21)	Individual Elective	
Modulattribute:	Language of instruction	Duration of module	Frequency of offer
	Englisch	1 semester	only winter term
Responsible for module:	Schneider, Yvonne		
Lecturers:	Schneider, Yvonne		
Credit points / SWS:	5 ECTS / 4 SWS		
Workload:	Kontaktstunden:	47 h	
	Selbststudium:	78 h	
	Gesamtaufwand:	125 h	
Subjects of the module:	International Management (WMod_Int_Mgt_M-APE)		
Lecture types:	SU/Ü-Lecture with integrated exercises		
Examinations:	mdIP - mündliche Prüfung 15 Minuten (WMod_Int_Mgt_M-APE)		
Usability for other study programs:	None		
Prerequisites according examination regulation:			
None			
Recommended prerequisites:			
None			
Objectives:			
<p>By actively participating in this course, students should be able to</p> <ul style="list-style-type: none">• understand key terms and challenges while conducting international business;• analyse how international firms are embedded in the global economy and contribute to international trade and foreign direct investment;• compare options firms have and how they can operate internationally;• determine the complexity of relationships between headquarters and subsidiaries;• differentiate between challenges of the environment that multinational enterprises face, incl. cultural differences, political influence, international trade agreements;• evaluate options for managing organisational structure and culture in an international environment;• explain the multi-dimensional nature of internationalization strategies;• assess how the international dimension of strategy can help to build a company's competitive advantage;• gain ability to critically reflect upon internationalization, its antecedents and consequences. <p>Cases and examples are integrated through the course to reinforce and clarify major topics.</p>			
Content:			
This module provides a general overview on principles and challenges of International Management. Among others, the following aspects will be discussed:			

- Introduction into globalization and international business
- International business environment: culture, politics, economy
- International trade and investment: government influence, cross-national cooperation
- Internationalization strategies (process, market entry modes, etc.)
- Internationalization and corporate social responsibility and business ethics
- Specifics of multinational companies, such as
- Organizational structure of multinational companies
- Leadership and human resource management in multinational companies
- Strategic management of multinational corporations
- Cultural differences and impact as cause for differences

Literature:

- DERESKY, Helen, 2016. *International Management: Managing Across Borders and Cultures*. ISBN 1-292-15354-7, 978-1-292-15354-4
- HILL, Charles W. L., 2021. *International business: competing in the global marketplace*. 13. Auflage. New York, NY: McGraw-Hill Education. ISBN 978-1-260-57586-6, 1-260-57586-1
- MORSCHETT, Dirk, Hanna SCHRAMM-KLEIN und Joachim ZENTES, 2015. *Strategic International Management: Text and Cases*. 3. Auflage. Wiesbaden: Springer Gabler. ISBN 978-3-658-07883-6, 3-658-07883-9

Additional remarks:

None

Internationales Projekt			
Module abbreviation:	WMod_InternProj_M-APE	SPO-No.:	10
Curriculum:	Programme	Module type	Semester
	Automotive Production Engineering (SPO WS 20/21)	Individual Elective	
Modulattribute:	Language of instruction	Duration of module	Frequency of offer
	Deutsch/Englisch	1 semester	only winter term
Responsible for module:	Hecht, Dirk		
Lecturers:	Hecht, Dirk; Hofbauer, Günter		
Credit points / SWS:	5 ECTS / 4 SWS		
Workload:	Kontaktstunden:	47 h	
	Selbststudium:	78 h	
	Gesamtaufwand:	125 h	
Subjects of the module:	Internationales Projekt (WMod_InternProj_M-APE)		
Lecture types:	S-Seminar		
Examinations:	Projekt mit schriftlicher Ausarbeitung von 5 - 25 Seiten (WMod_InternProj_M-APE)		
Usability for other study programs:	Please see the subject recognition list of SCS (Study Service Center).		
Prerequisites according examination regulation:			
None			
Recommended prerequisites:			
None			
Objectives:			
<p>Die Studierenden können selbstständig ein abgegrenztes Thema aus dem internationalen Kontext nach wissenschaftlichen Anforderungen bearbeiten und Lösungsvorschläge präsentieren.</p> <p>Students can independently work on a delimited topic from the international context according to scientific requirements and present proposed solutions.</p>			
Content:			
<p>Die Inhalte werden jeweils an das entsprechende Land adaptiert und mit aktuellen Aspekten der Internationalität bzw. Globalisierung abgerundet.</p> <p>The contents are adapted to the respective country and rounded off with current aspects of internationality or globalisation.</p>			
Literature:			
Will be specified at the beginning.			
Additional remarks:			
Blockseminar / Compact seminar.			

Management Accounting & International Taxation			
Module abbreviation:	WMod_MgtAcc_IntTax_M-APE	SPO-No.:	10
Curriculum:	Programme	Module type	Semester
	Automotive Production Engineering (SPO WS 20/21)	Individual Elective	
Modulattribute:	Language of instruction	Duration of module	Frequency of offer
	Englisch	1 semester	only winter term
Responsible for module:	Eisenberg, Andrea		
Lecturers:	Albrecht, Tobias; Eisenberg, Andrea		
Credit points / SWS:	5 ECTS / 4 SWS		
Workload:	Kontaktstunden:	47 h	
	Selbststudium:	78 h	
	Gesamtaufwand:	125 h	
Subjects of the module:	Management Accounting & Int. Taxation (WMod_MgtAcc_IntTax_M-APE)		
Lecture types:	SU/Ü-Lecture with integrated exercises		
Examinations:	schrP90 - schriftliche Prüfung, 90 Minuten (WMod_MgtAcc_IntTax_M-APE)		
Usability for other study programs:	Please see the subject recognition list of SCS (Study Service Center).		
Prerequisites according examination regulation:			
None			
Recommended prerequisites:			
None			
Objectives:			
<p>Students are capable to</p> <ul style="list-style-type: none">• understand the importance of international taxation systems for strategic decision-making;• achieve sound understanding of the most important aspects of international company taxation;• understand the core concepts of cost and management accounting;• use advanced management accounting concepts as a base for strategic management in global companies.			
Content:			
<ul style="list-style-type: none">• Economics of public sector, the tax systems• International taxation: taxation of global groups, Value added tax, withholding tax, transfer pricing• Principles of Cost Accounting• Advanced management accounting systems• Budgeting and strategic planning as a base for strategic decisions making			
Literature:			
Will be specified at the beginning.			

Additional remarks:
None

Special Topics in Financial Modelling			
Module abbreviation:	SpecTopFinMod_M-EGM	SPO-No.:	10
Curriculum:	Programme	Module type	Semester
	Automotive Production Engineering (SPO WS 20/21)	Individual Elective	
Modulattribute:	Language of instruction	Duration of module	Frequency of offer
	Deutsch	1 Semester	nur Wintersemester
Responsible for module:	Albrecht, Tobias		
Lecturers:	Albrecht, Tobias		
Credit points / SWS:	5 ECTS / 4 SWS		
Workload:	Kontaktstunden:	47 h	
	Selbststudium:	78 h	
	Gesamtaufwand:	125 h	
Subjects of the module:	Special Topics in Financial Modelling (SpecTopFinMod_M-EGM)		
Lecture types:	SU/Ü-Lecture with integrated exercises		
Examinations:	LN - schriftliche Prüfung, 90 Minuten (SpecTopFinMod_M-EGM)		
Usability for other study programs:	Keine		
Prerequisites according examination regulation:			
None			
Recommended prerequisites:			
None			
Objectives:			
<p>The students get to know:</p> <ul style="list-style-type: none">• how to create a Excel-Tool for company valuation;• the important aspects of company valuation;• how to create the financial model of a Business Plan via Excel;• the important aspects of business plan modelling.			
Content:			
<ul style="list-style-type: none">• Create a business plan for a company• Budgeting of different departments of a company• Decision making in the financial planning process• Instruments of company valuation• What financial figures have a major impact on company valuation• Where to get the appropriate Data for company valuation• Do all the calculations via Excel			
Literature:			
<ul style="list-style-type: none">• REES, Michael, 2018. <i>Principles of Financial Modelling: Model Design and Best Practices Using Excel and VBA</i>. 1. Auflage. ISBN 978-1118904015			

Additional remarks:

Keine Anmerkungen

Transformation Processes and Change Management			
Module abbreviation:	TrProChanMana_M-GFT	SPO-No.:	10
Curriculum:	Programme	Module type	Semester
	Automotive Production Engineering (SPO WS 20/21)	Individual Elective	2
Modulattribute:	Language of instruction	Duration of module	Frequency of offer
	Englisch	1 semester	only winter term
Responsible for module:	Bechthold, Laura		
Lecturers:	Bechthold, Laura		
Credit points / SWS:	5 ECTS / 4 SWS		
Workload:	Kontaktstunden:	47 h	
	Selbststudium:	78 h	
	Gesamtaufwand:	125 h	
Subjects of the module:	Transformation Processes and Change Management (TrProChanMana_M-GFT)		
Lecture types:	SU/Ü-Lecture with integrated exercises		
Examinations:	LN - Studienarbeit 8-15 Seiten ohne mündliche Präsentation (TrProChanMana_M-GFT)		
Usability for other study programs:	None		
Prerequisites according examination regulation:			
None			
Recommended prerequisites:			
None			
Objectives:			
After attending the course, the students:			
<ul style="list-style-type: none">• know basics of systems thinking and apply this knowledge on different levels (e.g., transformation of sociotechnical systems, organizations, or teams);• can recognize wicked problems and know how to the manage them;• can define and explain the concept of sociotechnical systems and related transformation pathways;• know how to design transition processes for sociotechnical systems;• understand the principles and process of transformation and change processes within organizations;• know how to approach and orchestrate transformation processes from a managerial perspective;• understand and can critically reflect current trends in organizational design and related management approaches (e.g., organizational ambidexterity and objective and key results);• understand the psychological dynamics in transformation processes;• understand the relevance of stakeholder inclusion and can apply participatory methods to design multi-stakeholder processes;• can anticipate opportunities and risks of operational and social transformation processes;• know principles and practices of successful leadership in transformation processes.			

Content:

The course is structured in two overarching blocks:

Block I: The transformation of socio-technical systems

- Wicked problems;
- Fundamentals of systems thinking (including workshop on agent-based models);
- Sociotechnical systems and their transition pathways;
- Transition Design

Block II: The transformation of organizations

- Enterprise Transformation Cycle;
- Stakeholder theory and participatory methods;
- Current trends in organizational design and how to implement them;
- Current trends in organizational leadership and how to implement them;
- Leadership in change and transformation processes;
- Dealing with conflicting goals and team dynamics during change processes.

The second part of the course is complemented by an in-class simulation game to transform a fictitious company.

Literature:

- BECHTHOLD, L., M. LUDE und R. PRÜGL, 2021. Crisis Favors the Prepared Firm: How Organizational Ambidexterity Relates to Perceptions of Organizational Resilience. In: Glowka, G. ZEHRE, A., *Resiliency Models and Addressing Future Risks for Family Firms in the Tourism Industry*, S. 178-205.
- GEELS, F. W., 2002. Technological transitions as evolutionary reconfiguration processes: A multi-level perspective and a case-study. In: *Research Policy*. 31(8), S.1257–1274.
- GEELS, F. W., SCHOT, J., 2007. Typology of sociotechnical transition pathways. In: *Research Policy*. 36(3), S.399–417.
- HEALY, P. M., 2017. Case study: How much should a new CEO shake things up? In: *Harvard Business Review*. 2017(January-February), S.2–8.
- KOTTER, J. P., 1995. Leading Change: Why Transformation Efforts Fail. In: *Harvard Business Review*.
- O'REILLY, C. A., TUSHMAN, M. L., 2013. Organizational Ambidexterity: Past, Present, and Future. In: *Academy of Management Perspectives*. 27(4), S.324–338.
- LALOUX, Frédéric, 2014. *Reinventing organizations: a guide to creating organizations inspired by the next stage of human consciousness*. Brussels: Nelson Parker. ISBN 978-2-960133-50-9, 2-9601335-0-1
- FRAEDRICH, E., BEIKER, S., LENZ, B., 2015. Transition pathways to fully automated driving and its implications for the sociotechnical system of automobility. In: *European Journal of Futures Research*. 3(1)
- GEELS, F. W., 2011. The multi-level perspective on sustainability transitions: Responses to seven criticisms. In: *Environmental Innovation and Societal Transitions*. 1(1), S.24–40.
- OSSENBRINK, J., HOPPMANN, J., HOFFMANN, V. H., 2019. Hybrid ambidexterity: How the environment shapes incumbents' use of structural and con-textual approaches. In: *Organization Science*. 30(6)

Additional remarks:

A voluntary bonus system is offered:

In the course, topics on methods and tools of transformation processes are offered for individual processing and presentation, which lead to bonus points for the examination performance for each qualitatively processed task. The creditability as well as maximum crediting of bonus points takes place according to the APO.

Selected Topics in Digitalization			
Module abbreviation:	SelTop_Digi_M-APE	SPO-No.:	10
Curriculum:	Programme	Module type	Semester
	Automotive Production Engineering (SPO WS 20/21)	Individual Elective	1
Modulattribute:	Language of instruction	Duration of module	Frequency of offer
	Englisch	1 semester	only winter term
Responsible for module:	Zehbold, Cornelia		
Lecturers:	Zehbold, Cornelia		
Credit points / SWS:	5 ECTS / 4 SWS		
Workload:	Kontaktstunden:	47 h	
	Selbststudium:	78 h	
	Gesamtaufwand:	125 h	
Subjects of the module:	Selected Topics in Digitalization		
Lecture types:	SU/Ü-Seminar with integrated exercises		
Examinations:	LN - Studienarbeit 8-15 Seiten ohne mündliche Präsentation		
Usability for other study programs:	Please see the subject recognition list of SCS (Study Service Center).		
Prerequisites according examination regulation:			
none			
Recommended prerequisites:			
Basics of Business Information Systems			
Objectives:			
<p>Students:</p> <ul style="list-style-type: none">• get to know the drivers of digitalization as well as the typical phases, from digitizing existing processes to new digital business models and ecosystems;• gain insights into the possible effects of digitalization in society;• understand that it is no longer acceptable to just look at processes and data in isolation;• work with current software;• practice digital collaboration in teams;• can analyse problems in the field of digitalization, using a systematic approach, and to present alternative solutions.			
Content:			
<ul style="list-style-type: none">• Disruptive technologies• Drivers of digitalization• Dimensions of digitalization at a glance: business models, processes, products, integration and communication of products with the environment, human-machine interface• Digital business models and value networks• Digital business processes			

<ul style="list-style-type: none">• Process mining and Robotic process automation (RPA)
Literature:
<ul style="list-style-type: none">• MORABITO, Vincenzo, 2016. <i>The Future of Digital Business Innovation: Trends and Practices</i> [online]. Switzerland: Springer PDF e-Book. ISBN 978-3-319-26874-3, 978-3-319-26873-6. Verfügbar unter: https://doi.org/10.1007/978-3-319-26874-3.
Additional remarks:
None

Global Sourcing & Market Analytics			
Modulkürzel:	GlobSour&MaA_M-APE	SPO-Nr.:	10
Zuordnung zum Curriculum:	Studiengang u. -richtung	Art des Moduls	Studiensemester
	Automotive Production Engineering (SPO WS 20/21)	Individual Elective	1
Modulattribute:	Unterrichtssprache	Moduldauer	Angebotshäufigkeit
	Deutsch	1 Semester	nur Wintersemester
Modulverantwortliche(r):	Hecht, Dirk		
Dozent(in):	Martens, Bernd		
Leistungspunkte / SWS:	5 ECTS / 4 SWS		
Arbeitsaufwand:	Kontaktstunden:	47 h	
	Selbststudium:	78 h	
	Gesamtaufwand:	125 h	
Lehrveranstaltungen des Moduls:	Global Sourcing & Market Analytics		
Lehrformen des Moduls:	SU/Ü - seminaristischer Unterricht/Übung		
Prüfungsleistungen:	LN - mündliche Prüfung, 15 Minuten		
Verwendbarkeit für andere Studiengänge:	Siehe die Fächeranerkennungsliste des SCS.		
Voraussetzungen gemäß SPO:			
Keine			
Empfohlene Voraussetzungen:			
Keine			
Angestrebte Lernergebnisse:			
<ul style="list-style-type: none">• verstehen die Bedeutung der strategischen Beschaffung;• können die Ansätze und Erfolgskritikalität der Standardisierung und frühzeitige Lieferanteneinbindung nachvollziehen;• lernen die Umsetzung der Gleichteile / Modulbaukasten in der Automobilbranche kennen;• verstehen Inhalte des Global Sourcing und sind in der Lage Problemstellungen eines Landes auf ein anderes zu projizieren;• können Methoden der Marktanalyse in strategischen Einkaufsfragen zielführend einsetzen.			
Inhalt:			
<ul style="list-style-type: none">• Grundkenntnisse der Beschaffungsstrategien• Rolle der Beschaffung im PEP• Modulbaukästen• Sourcing von Innovationen• Chancen und Risiken des Global Sourcing an verschiedenen Beispielen• Marktanalysen• Fallstudien			

Literatur:

- LEMME, Markus, 2009. Erfolgsfaktor Einkauf: durch gezielte Einkaufspolitik Kosten senken und Erträge steigern. 2. Auflage. Berlin: Cornelsen Scriptor. ISBN 978-3-589-23657-2
- GABATH, Christoph Walter, 2008. *Gewinn Garant Einkauf: nachhaltige Kostensenkung ohne Personalabbau* [online]. Wiesbaden: Gabler PDF e-Book. ISBN 978-3-8349-0590-1, 3-8349-0590-9. Verfügbar unter: <https://doi.org/10.1007/978-3-8349-9576-6>.
- BÜSCH, Mario, 2013. *Praxishandbuch strategischer Einkauf: Methoden, Verfahren, Arbeitsblätter für professionelles Beschaffungsmanagement* [online]. Wiesbaden: Springer Gabler PDF e-Book. ISBN 978-3-8349-4566-2, 978-3-8349-4567-9. Verfügbar unter: <https://doi.org/10.1007/978-3-8349-4567-9>.
- HEß, Gerhard, 2010. *Supply-Strategien in Einkauf und Beschaffung: systematischer Ansatz und Praxisfälle*. 2. Auflage. Wiesbaden: Gabler. ISBN 978-3-8349-1991-5, 3-8349-1991-8
- HOFBAUER, Günter, 2013. *Technisches Beschaffungsmanagement: [der Beschaffungsprozess]*. Berlin: Uni-Ed. ISBN 978-3-942171-94-6
- HECHT, Dirk, 2022. *Modernes Beschaffungsmanagement in Lehre und Praxis*. 1. Auflage. Stuttgart: Verlag W. Kohlhammer. ISBN 978-3-17-039953-2, 3-17-039953-5

Anmerkungen:

Keine Anmerkungen.

Future Business Modelling			
Module abbreviation:	FuBuMo_M-APE	SPO-No.:	10
Curriculum:	Programme	Module type	Semester
	Automotive Production Engineering (SPO WS 20/21)	Individual Elective	2
Modulattribute:	Language of instruction	Duration of module	Frequency of offer
	Englisch	1 semester	winter and summer term
Responsible for module:	Wrobel, Stefanie		
Lecturers:	Wrobel, Stefanie		
Credit points / SWS:	5 ECTS / 4 SWS		
Workload:	Kontaktstunden:	47 h	
	Selbststudium:	78 h	
	Gesamtaufwand:	125 h	
Subjects of the module:	Future Business Modelling		
Lecture types:	SU/Ü-Lecture with integrated exercises.		
Examinations:	schrP90 - schriftliche Prüfung, 90 Minuten		
Usability for other study programs:	Please see the subject recognition list of SCS (Study Service Center).		
Prerequisites according examination regulation:			
None			
Recommended prerequisites:			
None			
Objectives:			
<p>The students</p> <ul style="list-style-type: none">are familiar with entrepreneurship-related theories, models, and ideas, and can reflect on what entrepreneurship is and what it means to develop an entrepreneurial mindset and cultureknow and can discuss the relationship and meaning of technological, social and environmental trends and scenarios with regard to business model development and innovation as well as the meaning of sustainability in the context of business development and risk managementare familiar with digital, sustainable, disruptive and forward-looking business models, can explain the special features of each and give examples of successful business modelsknow the entrepreneurship process, business modelling tools and key factors of successful business modelscan develop future oriented business models by using different tools and methodsknow the meaning of uncertainty for corporates and entrepreneurs and approaches and methods to deal with uncertainty in the business contextknow the requirements for risk management and the four phases of risk managementcan apply selected risk management tools and methods in the context of future oriented business modelling and develop an enterprise risk management systemcan evaluate business models qualitatively and quantitatively			

Content:

General introduction

- Business Development, sustainability, and future orientation of corporates

Introduction into Entrepreneurship

- development of entrepreneurship as a research discipline
- types of entrepreneurships
- entrepreneurial mindset and culture
- entrepreneurship process
- business opportunities

Future oriented business modeling and business modeling tools

- types of different business models (social, sustainable, digital, disruptive business models, business model patterns)
- sources of business ideas, ideation, ideation tools
- business modeling, business model innovation
- business model evaluation
- business planning
- aspects of finance and accounting
- risk management

Business environment and business organization

- economic systems
- technical, social and environmental environment
- traditional and alternative business forms

Trends in entrepreneurship

- dealing with global challenges, megatrends, VUCA and uncertainty (design thinking, lean startup approach, effectuation)
- data driven business models
- disciplined entrepreneurship

Literature:

- GEDEON, S., 2010. What is entrepreneurship? In: Entrepreneurial Practice Review. 1(3), S.16-35.
- GASSMANN, Oliver, Karolin FRANKENBERGER und Michaela CHOUDURY, 2020. *The business model navigator: the strategies behind the most successful companies*. Harlow, England: Pearson. ISBN 978-1-292-32712-9
- OSTERWALDER, Alexander und Yves PIGNEUR, 2010. *Business model generation: a handbook for visionaries, game changers, and challengers*. Hoboken, NJ: Wiley. ISBN 978-0-470-87641-1, 0-470-87641-7
- RIES, Eric, 2019. *The lean startup: how constant innovation creates radically successful businesses*. London [u.a.]: Penguin Business. ISBN 978-0-670-92160-7
- SARASVATHY, Sara, 2001. Causation and effectuation: Toward a theoretical shift from economic inevitability to entrepreneurial contingency. http://entrepreneurscommunicate.pbworks.com/f/2001_Sarasvathy_Causation+adn+effectuation.pdf. In: *Academy of Management Review*. 26(2), S.243-263.
- HAHN, Rüdiger, 2022. *Sustainability management: global perspectives on concepts, instruments, and stakeholders*. Fellbach: Rüdiger Hahn. ISBN 978-3-9823211-0-3, 3-9823211-0-7
- AULET, Bill, 2013. *Disciplined entrepreneurship: 24 steps to a successful start-up*. Hoboken, NJ: Wiley. ISBN 978-1-118-69228-8, 978-1-118-72088-2
- HUNZIKER, Stefan, 2021. *Enterprise Risk Management: modern approaches to balancing risk and reward*. 2. Auflage. Wiesbaden: Springer Gabler. ISBN 978-3-658-33522-9, 3-658-33522-X
- OSTERWALDER, Alexander und andere, 2014. *Value proposition design: how to create products and services customers want*. Hoboken: John Wiley & Sons. ISBN 978-1-118-96806-2, 1-118-96806-9

- SCHIRMER, J., R. EBER und I. BOURDON, 2021. 32 ways to innovate business models through data: Emerging data-driven solution business model patterns from a study of 471 late-stage data-driven start-ups. (<https://scholarspace.manoa.hawaii.edu/handle/10125/71226>). In: *Proceedings of the 54th Hawaii International Conference on System Sciences*, S. 4996-5005.
- UEBERNICKEL, Falk und andere, 2020. *Design thinking: the handbook*. Singapore: World Scientific. ISBN 978-981-120-214-8, 978-981-12-0350-3
- VANINI, Ute, RIEG, Robert, 2021. *Risikomanagement: Grundlagen - Instrumente - Unternehmenspraxis* [online]. Stuttgart: Schäffer-Poeschel Verlag PDF e-Book. ISBN 978-3-7910-4527-6, 978-3-7910-4526-9. Verfügbar unter: <https://doi.org/10.34156/9783791045269>.

Additional remarks:

Additional literature and self-study resources will be announced and provided throughout the course.

Corporate Social Responsibility & Leadership			
Module abbreviation:	WMod_CorpSocResp_M-APE	SPO-No.:	10
Curriculum:	Programme	Module type	Semester
	Automotive Production Engineering (SPO WS 20/21)	Individual Elective	
Modulattribute:	Language of instruction	Duration of module	Frequency of offer
	Englisch	1 semester	only winter term
Responsible for module:	Bechthold, Laura		
Lecturers:	Bechthold, Laura; Moser, Christina; Wrobel, Stefanie		
Credit points / SWS:	5 ECTS / 4 SWS		
Workload:	Kontaktstunden:	47 h	
	Selbststudium:	78 h	
	Gesamtaufwand:	125 h	
Subjects of the module:	Corporate Social Responsibility & Leadership (WMod_CorpSocResp_M-APE)		
Lecture types:	SU/Ü-Seminar with integrated exercises		
Examinations:	mdIP - mündliche Prüfung 15 - 30 Min. (WMod_CorpSocResp_M-APE)		
Usability for other study programs:	None		
Prerequisites according examination regulation:			
None			
Recommended prerequisites:			
None			
Objectives:			
<p>After attending the course, students can</p> <ul style="list-style-type: none">• explain the fundamentals principles and pillars of sustainable development;• differentiate the most important conceptualizations of Corporate Social Responsibility (CSR);• understand the different opportunities and challenges regarding CSR;• can compare, contrast and critically reflect contemporary approaches to integrate CSR within corporate strategy and can apply them in an exemplary company;• demonstrate a multi-stakeholder perspective in viewing CSR issues;• understand and demonstrate the intrinsic interdependence between Corporate Social Responsibility (CSR), Corporate Governance (CG) and leadership;• know fundamental principles of leadership and the evolvement of the concept over time;• understand and discuss the importance of leadership in transformation processes towards corporate sustainability;• understand, analyse, rationalize (defend) and formulate CSR mandates for companies.			
Content:			
<ul style="list-style-type: none">• Environmental, social, and economic foundations of sustainable development• Global approaches (e.g., SDGs) and organizational solutions (e.g., CSR) for sustainable development			

- History, definition and development of CSR and Sustainability Management
- Strategic frameworks for CSR
- CSR Regulations and integrated reporting standards
- Decarbonization and climate strategies
- Multi-stakeholder approaches
- Fundamentals of leadership and motivation theories
- Leadership in transformation processes

Literature:

- CHANDLER, David und W.B. WERTHER, 2020. *Strategic corporate social responsibility: sustainable value creation*. 5. Auflage. Los Angeles; London; New Delhi; Singapore; Washington, DC; Melbourne: Sage. ISBN 978-1-5443-7222-8
- DALY, H., 2015. *Economics for a Full World. Great Transition Initiative*. [online]. , 06.2015 [Zugriff am: 08.07.2022]. Verfügbar unter: <http://www.greattransition.org/publication/economics-for-a-full-world>
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- ECCLES, R.G., PERKINS, K.M., SERAFEIM, G., 2012. How to become a sustainable company. In: *MIT Sloan Management Review*, 53(4), S.43. ISSN 1532-9194
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Additional remarks:

No remarks.

Creativity Methods in Business			
Module abbreviation:	CreaMetho_M-APE	SPO-No.:	10
Curriculum:	Programme	Module type	Semester
	Automotive Production Engineering (SPO WS 20/21)	Individual Elective	1
Modulattribute:	Language of instruction	Duration of module	Frequency of offer
	Englisch	1 Semester	nur Wintersemester
Responsible for module:	Rothbucher, Bernhard		
Lecturers:	Rothbucher, Bernhard		
Credit points / SWS:	6 ECTS / 4 SWS		
Workload:	Kontaktstunden:	47 h	
	Selbststudium:	103 h	
	Gesamtaufwand:	150 h	
Subjects of the module:	Creativity Methods in Business		
Lecture types:	SU/Ü-Seminar with integrated exercises		
Examinations:	LN - Praktische Prüfung (15 min.)		
Usability for other study programs:	Please see the subject recognition list of SCS (Study Service Center).		
Prerequisites according examination regulation:			
None			
Recommended prerequisites:			
None			
Objectives:			
<p>After attending the course, the students can</p> <ul style="list-style-type: none">• define and explain the concept, principles, and process of creativity methods;• compare and contrast different methods of creativity methods and evaluate their suitability for different purposes;• apply methods of creativity methods on projects in product and service design;			
Content:			
<ul style="list-style-type: none">• Perceptual Psychology• Human Behaviour• Creation Methods• Visualisation Methods• Analysis Methods			
Literature:			
<ul style="list-style-type: none">• LIDWELL, William, KIRKIN HOLDEN und JILL BUTLER, 2003. Universal principles of design: 100 ways to enhance usability, influence perception, increase appeal, make better design decisions, and tech through design. Gloucester, Mass.: Rockport. ISBN 1-592-53007-9			

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- CLARK, Tim, Alexander OSTERWALDER und Yves PIGNEUR, 2012. *Business model you: a one-page method for reinventing your career*. Hoboken, N.J.: Wiley. ISBN 978-1-118-15631-5, 1-118-15631-5
- OSTERWALDER, Alexander und andere, 2014. *Value proposition design: how to create products and services customers want*. Hoboken: John Wiley & Sons. ISBN 978-1-118-96806-2, 1-118-96806-9
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- KIRK, Andy, 2019. *Data visualisation: a handbook for data driven design*. 2. Auflage. Los Angeles; London; New Delhi; Singapore; Washington DC; Melbourne: Sage. ISBN 978-1-5264-6892-5, 978-1-5264-6893-2

Additional remarks:

No remarks.

Project Interdisciplinary Innovation			
Module abbreviation:	PJ_IntInno_M-APE	SPO-No.:	1
Curriculum:	Programme	Module type	Semester
	Automotive Production Engineering (SPO WS 20/21)	Individual Elective	1
Modulattribute:	Language of instruction	Duration of module	Frequency of offer
	Englisch	1 Semester	winter semester
Responsible for module:	Rothbucher, Bernhard		
Lecturers:	Rothbucher, Bernhard		
Credit points / SWS:	6 ECTS / 5 SWS		
Workload:	Kontaktstunden:	58 h	
	Selbststudium:	92 h	
	Gesamtaufwand:	150 h	
Subjects of the module:	Project Interdisciplinary Innovation		
Lecture types:	SU/Ü-Seminar with integrated exercises		
Examinations:	PA - Projektarbeit mündliche Präsentation (15 min) schriftliche Ausarbeitung 5-25 Seiten		
Usability for other study programs:	Please see the subject recognition list of SCS (Study Service Center)		
Prerequisites according examination regulation:			
None			
Recommended prerequisites:			
None			
Objectives:			
<p>The students:</p> <ul style="list-style-type: none">• can work independently and successfully on a complex design task based on a specific task at the interface between design and technology;• gain further experience in the development of products;• develop routine in the development and design of products with CAD tools and in 3D printing of objects;• optimize a process that includes the steps of ideation, conception, draft, construction and elaboration;• can independently familiarize themselves with a topic that is new to them and work on it systematically using engineering and design methods;• improve their skills in working autonomously and developing solutions to individual complex problems from business environment;• are able to organise and structure themselves and their resources in a complex project;• improve their communication and presentation skills with regard to different stakeholders (e. g. from science, economics, communities);• students learn to work in a team, to organize teamwork and to solve conflicts in the team.			

Content:
<ul style="list-style-type: none">• Roleplay• Reflection• Teambuilding• Project management
Literature:
<ul style="list-style-type: none">• MASTROGIACOMO, Stefano und andere, 2021. High-Impact Tools for Teams: 5 Tools to Align Team Members, Build Trust, and Get Results Fast. Newark: John Wiley & Sons, Incorporated. ISBN 978-1-119-60280-4• HEUFLEER, Gerhard, Michael LANZ und Martin PRETTENTHALER, 2020. <i>Design basics: from ideas to products</i>. 2. Auflage. Salenstein: niggli. ISBN 978-3-7212-0988-4, 3-7212-0988-5• KNAPP, Jake, John ZERATSKY und Braden KOWITZ, March 2016. <i>Sprint: how to solve big problems and test new ideas in just five days</i>. F. Auflage. New York; London; Toronto; Sydney; New Delhi: Simon & Schuster Paperbacks. ISBN 978-1-5011-4080-8
Additional remarks:
No remarks.

Smart Mobility: Trends in Intelligent and Sustainable Mobility Systems			
Module abbreviation:	SmartMobility_M-EGM	SPO-No.:	10
Curriculum:	Programme	Module type	Semester
	Automotive Production Engineering (SPO WS 20/21)	Individual Elective	
Modulattribute:	Language of instruction	Duration of module	Frequency of offer
	Englisch	1 semester	only winter term
Responsible for module:	Gerner, Jeremias		
Lecturers:	Gerner, Jeremias		
Credit points / SWS:	5 ECTS / 4 SWS		
Workload:	Kontaktstunden:	47 h	
	Selbststudium:	78 h	
	Gesamtaufwand:	125 h	
Subjects of the module:	Smart Mobility: Trends in Intelligent and Sustainable Mobility Systems (SmartMobility_M-EGM)		
Lecture types:	SU/Ü-Lecture with integrated exercises		
Examinations:	LN - Seminararbeit mit Präsentation vor PZ (SmartMobility_M-EGM)		
Usability for other study programs:	None		
Prerequisites according examination regulation:			
None			
Recommended prerequisites:			
None			
Objectives:			
<p>Objective of the course is to give an overview of innovative mobility concepts and intelligent transportation systems and to show the influence of digitalization and artificial intelligence on mobility systems. Different scientific areas (transportation theory, machine learning & ICT, user experience, sustainability) are combined for a holistic view on the subject and worked on in an interactive way.</p> <p>After finishing this course including the seminar paper/presentation students can</p> <ul style="list-style-type: none">• Know fundamental concepts of transportation theory• Explain certain innovative mobility concepts and their properties• Explain and evaluate the role of digitalization and artificial intelligence in mobility• Know stakeholders, their interplay and resulting challenges in mobility systems			
Content:			
<ul style="list-style-type: none">• Fundamentals of transportation theory• Intelligent transportation systems (ITS)• Stakeholders in a mobility system• User centric perspective on mobility (demand, acceptance, satisfaction, mobility patterns etc.)• Mobility data: Collection, usage, data management & quality• Public transport			

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|--|
| <ul style="list-style-type: none">• Mobility on demand and mobility as a service• Routing and the role of routing apps in a mobility system• Micromobility• Urban Air Mobility• Mobility platforms |
| Literature: |
| Will be specified at the beginning. |
| Additional remarks: |
| Literature will be provided by the lecturer. |

Data Engineering and Analytics			
Module abbreviation:	AI_DataEng	SPO-No.:	10
Curriculum:	Programme	Module type	Semester
	Automotive Production Engineering (SPO WS 20/21)	Individual Elective	1
Modulattribute:	Language of instruction	Duration of module	Frequency of offer
	Englisch	1 semester	only winter term
Responsible for module:	Schmidtner, Stefanie		
Lecturers:	Schmidtner, Stefanie		
Credit points / SWS:	5 ECTS / 4 SWS		
Workload:	Kontaktstunden:	47 h	
	Selbststudium:	79 h	
	Gesamtaufwand:	126 h	
Subjects of the module:	Data Engineering and Analytics (AI_DataEng)		
Lecture types:	SU/Ü-Lecture with integrated exercises		
Examinations:	schrP90 - schriftliche Prüfung, 90 Minuten		
Usability for other study programs:	None		
Prerequisites according examination regulation:			
None			
Recommended prerequisites:			
None			
Objectives:			
<p>Data analytics and data engineering are fundamental fields for the development of automated systems. The aim of the lecture is to give students a sound understanding of data analytics methods and to convey fundamentals in data engineering.</p> <p>After finishing this course including exercises students can</p> <ul style="list-style-type: none">• choose and calculate appropriate metrics and visualizations for describing a data set.• understand and master fundamental data analysis and machine learning methods.• have deep knowledge about model assessment and inference techniques for linear and non-linear models.• know fundamentals of data engineering.			
Content:			
<ul style="list-style-type: none">• Data visualization• Data cleaning and data quality• Fundamentals of statistical learning and machine learning• Linear Regression• Classification• Model assessment, selection and inference: Cross-Validation & Bootstrap• Decision Trees			

<ul style="list-style-type: none"> • Unsupervised Learning • Neural networks (ANN, ResNet, CNN) • Fundamentals of data engineering (data modeling, data warehouse, data lake, parallel and distributed computing, data pipelines)
Literature:
<ul style="list-style-type: none"> • WILKE, Claus, March 2019. Fundamentals of data visualization: a primer on making informative and compelling figures. 1. Auflage. Beijing: O'Reilly. ISBN 978-1-492-03108-6 • JAMES, Gareth, WITTEN, Daniela, HASTIE, Trevor, TIBSHIRANI, Robert, TAYLOR, Jonathan, 2023. <i>An Introduction to Statistical Learning: with Applications in Python</i> [online]. Cham: Springer International Publishing PDF e-Book. ISBN 978-3-031-38747-0. Verfügbar unter: https://doi.org/10.1007/978-3-031-38747-0. • HASTIE, Trevor, Robert TIBSHIRANI und Jerome H. FRIEDMAN, 2017. <i>The elements of statistical learning: data mining, inference, and prediction</i>. Second edition, corrected at 12. Auflage. New York, NY: Springer. ISBN 978-0-387-84857-0, 0-387-84857-6 • BISHOP, Christopher M., 2016. <i>Pattern recognition and machine learning</i>. softcover reprint of the original 1st edition 2006. New York, NY: Springer. ISBN 978-1-4939-3843-8 • LESKOVEC, Jure, Anand RAJARAMAN und Jeffrey D. ULLMAN, 2020. <i>Mining of massive datasets</i>. Cambridge University Press. ISBN 978-1-108-47634-8 • RYZA, Sandy und andere, 2017. <i>Advanced analytics with Spark: patterns for learning from data at scale</i>. Beijing: O'Reilly. ISBN 978-1-4919-7295-3
Additional remarks:
No remarks.

Power Supply and Energy Distribution			
Module abbreviation:	IAE_PSED	SPO-No.:	10
Curriculum:	Programme	Module type	Semester
	Automotive Production Engineering (SPO WS 20/21)	Individual Elective	1
Modulattribute:	Language of instruction	Duration of module	Frequency of offer
	Englisch	1 semester	only winter term
Responsible for module:	Pforr, Johannes		
Lecturers:	Pforr, Johannes		
Credit points / SWS:	5 ECTS / 4 SWS		
Workload:	Kontaktstunden:	47 h	
	Selbststudium:	78 h	
	Gesamtaufwand:	125 h	
Subjects of the module:	Power Supply and Energy Distribution (IAE_PSED)		
Lecture types:	SU/Ü-Lecture with integrated exercises		
Examinations:	schrP90 - schriftliche Prüfung, 90 Minuten (IAE_PSED)		
Usability for other study programs:	None		
Prerequisites according examination regulation:			
None			
Recommended prerequisites:			
None			
Objectives:			
After successfully completing the module the students should			
<ul style="list-style-type: none">• have good knowledge in the field of modern energy distribution systems in cars and of the components used in the automotive energy nets• understand why energy management systems are important for the operation of electric energy nets in cars• understand the operation principle of power electronic converters for automotive applications• understand and to use methods to develop steady-state and dynamic models of power electronic converters for given type of problems• analyse and judge the steady-state and dynamic performance of automotive electrical energy nets with power electronic components according to given targets• understand the operation principle of modern electric machines for electric and hybrid electric vehicles including the control of the electric machines• be able to use steady-state and dynamic models of electric machines to analyse the energy flow in automobile electrical energy nets dependent on the operation strategy of the vehicle• be able to derive models of given automotive energy nets and the components and to perform simulations for optimization purposes			

Content:

Introduction, background and design of vehicular electrical energy distribution networks and power electronic systems and devices:

- Power Devices and Converter Topologies
- 14V / 48V Power Supply and Energy Distribution
- Generation of electric Power in Vehicles
- Energy management Systems
- High Voltage electric Energy Distribution for Hybrid Vehicles
- Electric motor Drives and motion Control
- Starter / Generator
- Simulation

Literature:

- VELTMAN, André, PULLE, Duco W. J., DE DONCKER, Rik W., 2016. Fundamentals of Electrical Drives [online]. Cham: Springer International Publishing PDF e-Book. ISBN 978-3-319-29409-4, 978-3-319-29408-7. Verfügbar unter: <https://doi.org/10.1007/978-3-319-29409-4>.
- ERICKSON, Robert W. und Dragan MAKSIMOVIĆ, 2004. *Fundamentals of power electronics*. 2. Auflage. Dordrecht: Kluwer. ISBN 0-7923-7270-0, 978-0-7923-7270-7
- LEONHARD, Werner, 2001. *Control of electrical drives*. 3. Auflage. Berlin [u.a.]: Springer. ISBN 3-540-41820-2
- EHSANI, Mehrdad, Yimin GAO und Ali EMADI, 2010. *Modern electric, hybrid electric, and fuel cell vehicles: fundamentals, theory, and design*. 2. Auflage. Boca Raton, FL [u.a.]: CRC Press, Taylor & Francis Group. ISBN 978-1-4200-5400-2, 978-1-4200-5398-2

Additional remarks:

Power Train			
Module abbreviation:	IAE_PT	SPO-No.:	10
Curriculum:	Programme	Module type	Semester
	Automotive Production Engineering (SPO WS 20/21)	Individual Elective	1
Modulattribute:	Language of instruction	Duration of module	Frequency of offer
	Englisch	1 semester	only winter term
Responsible for module:	Birkner, Christian		
Lecturers:	Birkner, Christian		
Credit points / SWS:	5 ECTS / 4 SWS		
Workload:	Kontaktstunden:	47 h	
	Selbststudium:	78 h	
	Gesamtaufwand:	125 h	
Subjects of the module:	Power Train (IAE_PT)		
Lecture types:	SU/Ü-Lecture with integrated exercises		
Examinations:	schrP90 - schriftliche Prüfung, 90 Minuten (IAE_PT)		
Usability for other study programs:	None		
Prerequisites according examination regulation:			
None			
Recommended prerequisites:			
None			
Objectives:			
<p>After successfully completing the module the students</p> <ul style="list-style-type: none">• know details about legal framework conditions for current and future powertrain developments (CO2- and emission legislation, test procedures, test cycles, ...)• understand advantages and disadvantages of different drivetrain concepts according to driving performance and energy consumption• show detailed knowledge of internal combustion engine design principles and operation strategies• can explain the operating principles of different gearbox constructions and know advantages and disadvantages of the different concepts• have a detailed understanding of hybrid drivetrain architectures and know about the potentials of hybrid drivetrain technology• know different energy storage systems for vehicle applications and their advantages and disadvantages• can set up models and evaluate results from dynamic drivetrain simulations focussing on the impact of operation principles on factors like driving performance and efficiency			
Content:			
<ul style="list-style-type: none">• basics of vehicle movement and driving resistances• market-specific test procedures for series-production vehicles / certification• design principles of internal combustion engines (ICE)• advantages/disadvantages of different IC-engine concepts (diesel/gasoline, ...)			

- concepts for fuel consumption reduction in modern IC-engines
- emission generation in IC-engines / exhaust gas aftertreatment
- gearbox concepts and start-up elements
- hybrid and electric drivetrain concepts
- potentials of electrified drivetrains according to fuel consumption and emission generation
- energy storage systems for vehicle applications
- modelling and simulation of different drivetrain concepts

Literature:

- MASHADI, Behrooz, CROLLA, David, 2012. Vehicle powertrain systems [online]. Chichester: Wiley PDF e-Book. ISBN 978-0-470-66602-9, 978-1-11-995836-9. Verfügbar unter: <http://online-library.wiley.com/book/10.1002/9781119958376>.
- TODSEN, Uwe, 2012. *Verbrennungsmotoren* [online]. München: Hanser PDF e-Book. ISBN 978-3-446-42846-1, 978-3-446-41843-1. Verfügbar unter: <http://www.hanser-elibrary.com/action/show-Book?doi=10.3139%2F9783446428461>.
- KLEMENT, Werner, 2011. *Fahrzeuggetriebe* [online]. München: Hanser PDF e-Book. ISBN 978-3-446-42807-2, 978-3-446-42600-9. Verfügbar unter: <http://www.hanser-elibrary.com/action/show-Book?doi=10.3139%2F9783446428072>.
- HOFMANN, Peter, 2014. *Hybridfahrzeuge: ein alternatives Antriebskonzept für die Zukunft* [online]. Wien [u.a.]: Springer PDF e-Book. ISBN 978-3-7091-1780-4. Verfügbar unter: <http://dx.doi.org/10.1007/978-3-7091-1780-4>.

Additional remarks:

No remarks.