Programme and Course Description für TYPO 3

Automotive Production Engineering – Master APE

Faculty of Mechanical Engineering

As per: Sommersemester 2019

This program and course description becomes effective on 15.03.2019. It supplements the program and examination regulations and secures the offerings in courses. Additionally, it contains detailed information about courses, contents, assessments and examinations

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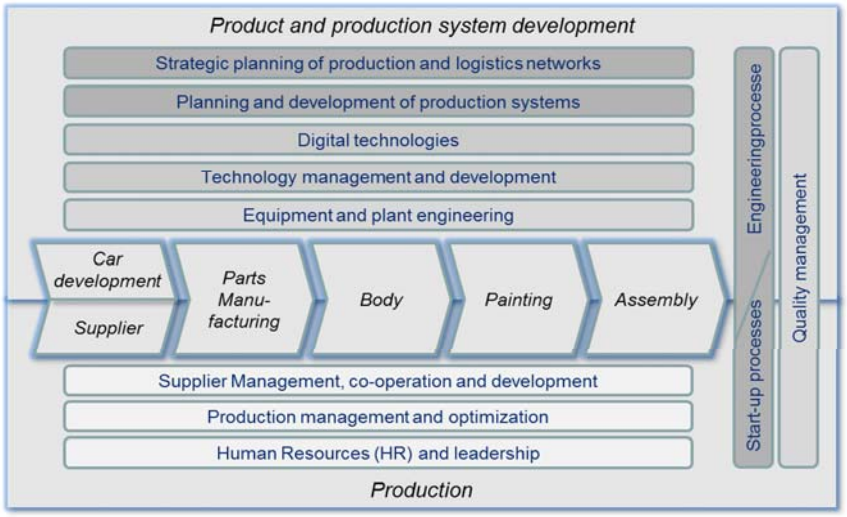
Content

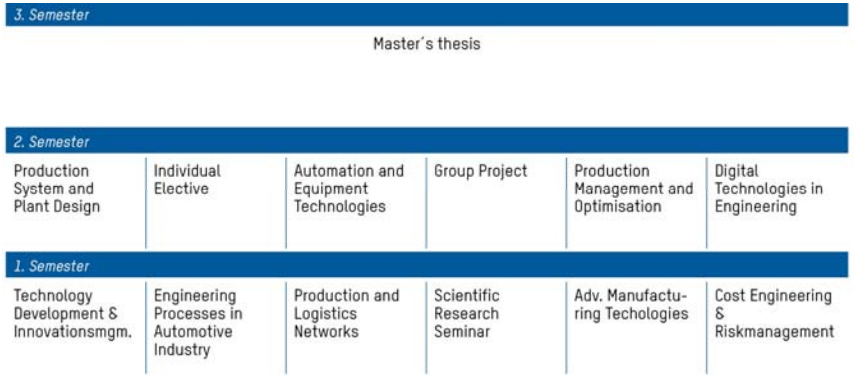
Introduction

1.1 Programme structure

The standard period of study for Master´s programmes amounts to three theoretical semesters whereby the third semester shall be primarily for the completion of the Master's thesis. The programme shall beoffered as a full-time course (Picture 1). 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 with regard to product development.



Picture 1: Programme structure



Picture 2: Programme structure

In the first semester (see Picture 2), knowledge, skills and competencies in the field of Technology Development & Innovation Management, Engineering Processes, Production and Logistics Networks, Scientific Research Seminar, Advanced Manufacturing Technologies and Cost Engineering & Rik Management in Automotive are conveyed.

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

Additionally Individual Elective, can be selected either in the first or second semester.

The Master´s programme 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 programme, e.g. by providing project and thesis topics set by partner companies (especially for the dual programme).

In preparation for the Master´s programme, there is an optional annual preparatory course on offer for international students in advance with courses on German language and culture and on self-reliant academic working methods. Language and culture courses are offered throughout while the university is in session. German students have the opportunity to learn another foreign language.

In the course of the dual study programme, students having entered a contract with a company, are advised to spend their internships there during their semester breaks with the option of complementing their practical experience with an entire semester before their Master´s thesis. The companies are responsible for organising and devising the internship, but are advised to refer to the curriculum.

1.2 Objectives of the study programme

On the basis of their completed Bachelor's programme, 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, recognise, plan and execute tasks, assess the need and scope for action as well as take part in developing and managing. They are in a position to recognise the interdependency of technical, strategic, managerial, social and further non-technical topics and integrate their actions responsibly. In particular, students acquire following knowledge, skills and competencies during their studies:

1. Knowledge

Graduates of the Master´s programme Automotive Production Engineering acquire in-depth knowledge of production technologies and systems, engineering, project and process management as well as personnel and leadership.

Following modules convey the technologies essentially relevant to the field of production:

- Advanced Manufacturing Technologies
- Automation and Equipment Technologies

Knowledge of entire production systems including logistics, competence and supply chain strategies and therefore also relevant managerial knowledge are conveyed by following modules:

- Production and Logistics Networks,
- Procurement, Cost and Innovation Management

These modules convey in-depth knowledge of process management focussing on engineering during the development of production systems in connection with simultaneous product development including quality management:

- Engineering Processes in Automotive Industry
- Digital Technologies in Engineering (specialised compulsory elective module)
- Technology Development and Management (specialised elective module)

Following modules convey the knowledge of planning, operating and optimising production systems and plants

- Production System and Plant Design

- Production Management and Optimisation (specialised elective module)

Students acquire experience and knowledge of engineering-oriented working techniques and methods as well as project management and execution in connection with extra sociological skills enabling them to manage projects and staff

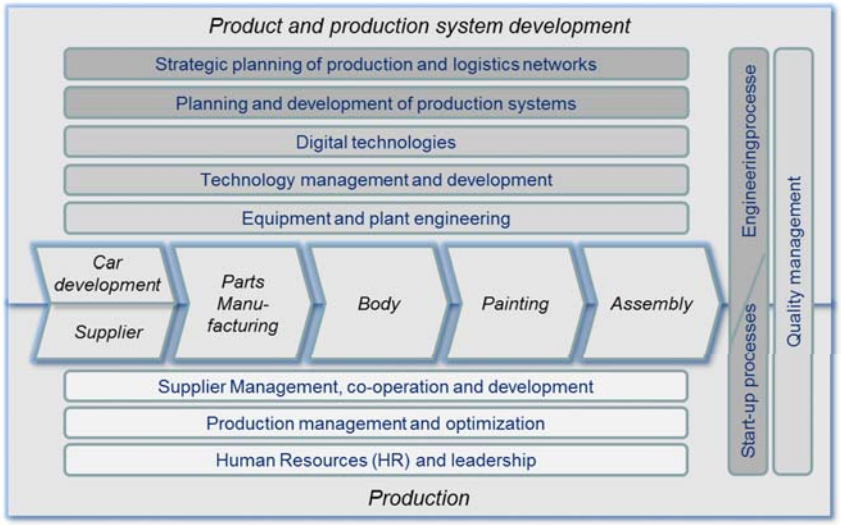
- Scientific Research Seminar
- Project II (Group Project)
- Personnel and Leadership (specialised elective module)

In the last module students acquire in-depth knowledge in the field of research/development as well as theoretical scientific models and independent scientific working methods including scientific reasoning and documentation:

- Master´s thesis

The knowledge and skills which are conveyed in the individual modules, are interlinked in such a way, that graduates are getting to know the entire system production in its complex structure and interconnectedness via strategy (company, product, production, competencies, etc.), technologies, personnel, management, and processes.

On one hand they are to gain a deeper understanding of planning, development, structure, start-up and quality management of production systems in connection with product development. On the other hand they acquire knowledge and skills about the company, the organisation, management and optimisation of such a product system for technically challenging products (Picture 3).



Picture 3: Structure of programme contents

2. Skills

Graduates of the Master´s programme 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.

This is a selection of skills:

- analysis, understanding and design of complex technical and non-technical systems in the field of production
  All modules;
- understanding, design and calculation of manufacturing methods and technologies and there interdependency with vehicle concepts
  Modules: *Manufacturing Technologies in Automotive Industry*; *Automation and Equipment Technologies*;
- management, layout and development of manufacturing technologies and processes

Modules: *Technology Development and Management, Production Management and Optimisation, Production System and Plant Design;*

- technical and managerial planning and design of production facilities - factories, manufacturing areas, plants, automation, equipment, personnel, etc.
  Modules: *Procurement, Cost and Innovation Management; Engineering Processes in Automotive Industry; Digital Technologies in Engineering Engineering; Production System and Plant Design; Automation and Equipment Technologies; Production and Logistics Networks;*
- planning, collaboration, controlling as well as management of projects and processes in complex and multilayered development processes
  Modules: *Production and Logistics Networks; Procurement, Cost and Innovation Management; Engineering Processes in Automotive Industry; Digital Technologies in Engineering Engineering; Individual Project; Group Project; Personnel and Leadership; Master's Thesis;*
- understanding, execution and design of engineering processes such as simultaneous engineering, that is the simultaneously interlinked development of product and production system with construction suitable for production by means of product impact
  Modules: *Engineering Processes in Automotive Industry; Digital Technologies in Engineering Engineering; Technology Development and Management; Production System and Plant Design; Production and Logistics Networks; Procurement, Cost and Innovation Management*
- understanding and application of computer systems relevant to production such as digital planning and CAx-systems (CAD, CAE, process simulation, manufacturing simulation, digital factory, etc.), PLM-/PDM-systems, data base and process management systems and further IT-systems
  Modules: *Digital Technologies in Engineering Engineering; Automation and Equipment Technologies*
- understanding and design of competency strategies and procurement processes
  Modules: *Production and Logistics Networks; Procurement, Cost and Innovation Management; Technology Development and Management*
- understanding and execution of managerial calculations for example for investment and other decisions

Modules: *Production and Logistics Networks; Procurement, Cost and Innovation Management*

- understanding, execution and design of quality and start-up management in production in connection with vehicle and product development
  Modules: *Engineering Processes in Automotive Industry; Automation and Equipment Technologies; Production Management and Optimisation; Production System and Plant Design*
- co-operation within and management of intercultural and interdisciplinary teams
  Modules: *Group Project; Personnel and Leadership; Master's Thesis*
- academic research and others by collecting and interpreting relevant technical and managerial data as well as information from primary and secondary sources with scientific methods
  Modules: I*ndividual Project, Group Project; Master's Thesis*

3. Competencies

Graduates of the Master´s programme Automotive Production Engineering are able to apply their in-depth knowledge in complex tasks with regard to the development and operation of production systems. On the basis of their completed Bachelor´s programme, their first professional qualification, they acquire amongst others following competencies:

- Analysis and evaluation skills: The graduates are able to analyse 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.
- Problem solving skills: The graduates 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. They are in the position to formulate and abstract problems and to put problem solving techniques into practice.
- Planning and development skills: The Master's graduates 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 inc. suppliers. They can structure tasks from planning and development and store as well as process work contents and also control these in a team environment.

- (Engineer) methodological skills: The graduates can use tried-and-tested and new production, planning, engineering, procurement, logistics, project management and staff management methods, as well as their use in production systems development and operation. Amongst others, creativity techniques, technology management methods, methodical development and construction, materials technology, digital planning and CAx systems (CAD, CAE, process simulation, production simulation, digital factory, etc.), PLM/PDM systems, database and process management systems and other IT systems belong to further working methods and techniques for engineers.
- Skills for academic work and research: The graduates have the ability to quickly, methodically and systematically learn the ropes of a new, unfamiliar field of activity as well as to organise, select, interpret and present varied information. They can develop academic ideas, establish theories, and check and further develop these with academic methods.
- Decision-making and responsibility skills: The graduates can easily get around strongly networked processes in particular, understand, plan and carry out tasks, assess the need for action and scope as well as contribute to the shaping of tasks in a managing role, too. They are in the position to understand interactions of technical, strategic, economic, social and other non-technical issues and to include these in their action responsibly.
- Generic skills, intercultural skills, social competence and leadership skills: The graduates of this course of studies are able to manage national and international teams, which can consist of different disciplines and levels. In the practical seminars (e.g. project), the students develop their skills in the areas of project, conflict and time management, team building, moderating and presenting. The technical seminar presentations also require their rhetoric skills, creativity and endurance in addition to their academic expertise.

1.3 Objectives of the study programme - Dual option

The dual variant of the master programme has a special focus on practical stages in companies or industry partners of our university. In particular, dual students acquire following knowledge, skills and competencies during their dual studies:

1. Knowledge

Graduates of the Master´s programme "Automotive Production Engineering" – Dual option acquire in-depth practical knowledge of minimum one of the following thematic fields: production, automation and equipment technologies, production systems, logistics, technical procurement, engineering, digital technologies/engineering, project and process management, production planning, technology development, production (operational), personnel and leadership. They acquire and deepen their knowledge by cooperating with employees from different departments or individually working on one of the subjects mentioned above. Dual students learn to combine the practical experiences with the theoretical knowledge they acquire during the regular period of study. In particular, dual students acquire knowledge about operational integration and practical administration as well as about different levels of developing and/or applying knowledge in the thematic fields, about everyday management and development steps including the interdependency of different thematic fields in the practical activities.

2. Skills

Dual students develop during their practical activities in companies the ability to solve engineering tasks and problems in an industrial environment. In particular they are able to analyse, design solutions and solve practical problems by using their theoretical background and knowledge of research methodology. There are also developed a wide range of skills that help dual graduates to reach specific results within well-defined time budgets and by working within hierarchic structures in intercultural, interdisciplinary teams.

3. Competencies

Dual students extend their competencies mentioned above (s. chapter 1.2) by the capacity to apply their knowledge, skills and competencies in the practical industrial environment. In this respect they extend the following competencies:

- Analysis and assessment in industrial environment;

- Solving problems in industrial environment;
- Planning and developing in industrial environment;
- Engineering methods in industrial environment;
- Scientific work and research in industrial environment;
- Decision-making and resolute action in industrial environment;
- Interdisciplinary and intercultural competencies, communication and leading competencies in industrial environment.

A special focus lies on the advanced competencies of dual graduates to work in real/practical processes strongly connected to each other, to recognize, design and organize tasks, to appreciate the need and the room for action as well as to be able to play a decisive role in the organization processes. Dual students extend their practical capacities in the fields of project, conflict and time management, team development, moderation and presentation.

The exact breakdown of the module aims and contents can be found in the next chapter **"Course descriptions".**

1.4 Übersicht über das Vorlesung Angebot der Pflicht-Module Master-APE SS 2019

(Start erstmals ab SS 2017)

SPO Nr.	Pflichtmodule gemäß SPO Master Automotive Production Engineering M_APE			
	Pflichtmodule Master M_APE	**Vorlesungen SS 2019**	**Vorlesungen WS 2019/20**	**ECTS**
1	Technology Development & Innovations Managemet		4 SWS	5
2	Advanced Manufacturing Technologies	4 SWS		5
3	Cost Engineering & Riskmanagement	4 SWS		5
4	Engineering Processes in Automotive Industry	4 SWS		5
5	Production System and Plant Design		4 SWS	5
6	Production and Logistics Networks	4 SWS		5
7	Automation and Equipment Technologies		4 SWS	5
8	Production Management and Optimisation		4 SWS	5
9	Digital Technologies in Engineering		4 SWS	5
10	Group Project		4 SWS	5
11	Individuelle Wahlpflichtmodule[1]	4 SWS		5
12	Scientific Research Seminar	2,5 SWS		5
13	Masterarbeit			30
	Summe	**46,5 SWS**		**90 ECTS**

[1] Aus den Individuellen Wahlpflichtmodulen ist insg. nur **1 Fach mit 4 SWS abzulegen**. Bei den LN kann es sich um eine: schriftl. Prüfung, mündl. Prüfung, Studienarbeit, Seminararbeit oder Projektarbeit handeln.

Nr. 11 Individuelle Wahlpflichtmodule Master APE

SPO Nr. 11	Individuelle Wahlpflichtmodule [1]		Vorlesungs-Angebot im	
	Angebot für Master_APE	**Sprache**	**SS 2019**	**ECTS**
11	**Software Engineering**	d	4 SWS	5
11	**Korrosion- und Oberflächentechnik**	d	4 SWS	5
11	**Personnel Management and Leadership**	**e**	4 SWS	5
11	**Integrated Safety and Assistance Systems** (aus Fakultät EI, Dozent Prof. Hagerer)	**e**	4 SWS	5
11	**Business Analysis and Evaluation** (aus THBS, Dozentin Prof. Sinha)	**e**	3 SWS	5
11	**Entrepreneurship-Coaching** (aus THBS Dozent Prof. Bader)	**e**	4 SWS	5

SPO Nr. 11	Individuelle Wahlpflichtmodule[1]		Vorschau Vorlesungen	
	Angebot für Master APE	**Sprache**	**WS 2019/20[3]**	**ECTS**
11	**Ausgewählte Kapitel der Digitalisierung**	d	4 SWS	5
11	**Hochleistungswerkstoffe**	d	4 SWS	5
11	**Unfallanalyse (neu ab WS 19/20)**	d	4 SWS	5
11	**Automotive Electronics** (nur für APE) (aus Fakultät EI, Dozent N.N.)	**e**	4 SWS	5
11	**Energy Management and Energy Efficiency**	**e**	4 SWS	5
11	**Sustainability in SCM**	**e**	4 SWS	5
		Summe	**4 SWS**	**5 ECTS**

[1] Aus den Individuellen Wahlpflichtmodulen ist insg. nur **1 Fach mit 4 SWS abzulegen**. Bei den LN kann es sich um eine: schriftl. Prüfung, mündl. Prüfung, Studienarbeit, Seminararbeit oder Projektarbeit handeln.

[3] **Voraussichtliches Angebot im Folgesemester. Änderungen vorbehalten**.

Die Sprachkurse sind ein Zusatzangebot und kein Bestandteil des Studiums. Das Aufzeigen im Modulhandbuch dient nur der Erzeugung einer höheren Transparenz. (Formuliert durch Prof. Axmann 21.6.17)

	German Sprach Angebot für Master APE	Sprache	SS 2019
APE	German A1 intensive	d	4 SWS
APE	German A2 intensive	d	4 SWS
APE	German B1 intensive	d	4 SWS
APE	German B 2 intensive	d	4 SWS
APE	German in the Workcontext	d	4 SWS
APE	Technical German 1	d	2 SWS
APE	Technical German 2	d	2 SWS

2 Description of Modules Master APE im SS 2019

Advanced Manufacturing Technologies

Module abbreviation:	AdManT_M-APE	**Reg.no.: According to SPO from SS 2017**	2
Curriculum:	**Programme**	**Module type**	**Semester**
	Automotive Production Engineering - Master	Compulsory Subject	1

Language of instruction:	English	
Credit points / SWS:	5 ECTS / 4 SWS	
Workload:	Contact hours:	47 h
	Self-study:	48 h
	Exam preparation time	30 h
	Total:	125 h
Subjects of the module:	Advanced Manufacturing Technologies (AdManT_M-APE)	
Lecture types:	AdManT_M-APE: SU - lecture	

Prerequisites according examination regulation:

None

Recommended prerequisites:

None

Objectives:

The students get to:

- Typical industry application
- Advantages and disadvantages
- Process know how und physical functioning
- Trends in the industry

Content:

Advanced Manufacturing Technologies e.g.:

- Additive Manufacturing
- Laser Technologies
- Technologies for Battery production
- Manufacturing Technologies to support light weight design with the focus in carbon fibre plastics

Examinations:

schrP90 - written exam, 90 minutes

Cost Engineering & Risk Management

Module abbreviation:	CostERiskM_M-APE	**Reg.no: According to SPO from SS 2017**	3
Curriculum:	**Programme**	**Module type**	**Semester**
	Automotive Production Engineering - Master	Compulsory Subject	1

Language of instruction:	English	
Credit points / SWS:	5 ECTS / 4 SWS	
Workload:	Contact hours:	47 h
	Self-study:	48 h
	Exam preparation time	30 h
	Total:	125 h
Subjects of the module:	Cost Engineering & Risk Management (CostERiskM_M-APE)	
Lecture types:	CostERiskM_M-APE: SU - lecture	

Prerequisites according examination regulation:

None

Recommended prerequisites:

None

Objectives:

The students

- 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:

- 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
- Alternative methods of Risk Management and mathematical application
-

Examinations:

schrP90 - written exam, 90 minutes

Anmerkung
Modulbeschreibung durch Dozenten für SS 19 aktualisiert (VL ist in engl. Sprache)

Engineering Processes in Automotive Industry

Module abbreviation:	EngineeProcAuto_M-APE	**Reg.no: According to SPO from SS 2017**	4
Curriculum:	**Programme**	**Module type**	**Semester**
	Automotive Production Engineering - Master	General Elective Subject	1

Language of instruction:	English
Credit points / SWS:	5 ECTS / 4 SWS
Workload:	Contact hours: 47 h Self-study: 48 h Exam preparation time 30 h Total: 125 h
Subjects of the module:	Engineering Processes in Automotive Industry (EngineeProcAuto_M-APE)
Lecture types:	EngineeProcAuto_M-APE: SU/Ü - lecture with integrated exercises

Prerequisites according examination regulation:

None

Recommended prerequisites:

None

Objectives:

The students

- Get to know the strongly networked and parallel processes in the product development of automobiles ("product process" and "product development process")
- Can recognise, assess and include in their work interactions between production and product in particular.
- 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 (e.g. master product processes with structured levels of action in terms of decisions and themes, milestone definitions and synchronisation, levels of product maturity, EHPV, 3Ps „Production Preparation Process", etc.) and know the working methods and processes, for example, for networking, decision-making, escalation, theme contributions etc. in large automotive and supplier companies.
- Know the significance of prototype, pilot production and release processes, their tools (e.g. Meisterbock processes, audit scores, process capability evidence, VFF, PVS, etc.) as well as their involvement in the product and engineering process
- know about the significance of Lean Development

Content:

- Product development and quality management (during the product development process) in the automotive industry
- Project and process management in the product development process
- Prototype, pilot production and release processes
- Lean Development, generic principles and application

Examinations:

schrP90 - written exam, 90 minutes
Literature:

- Stamatis, D.H.: Advanced Quality Planning: A Commonsense Guide to AQP and APQP. Productivity Press 2001
- Cooper, R.G.: Winning at New Products: Accelerating the Process from Idea to Launch: Creating Value Through Innovation. New York: Basic Books, 2011
- Womack, J.P., Jones D.T.: The Machine That Changed The World. New York: Harper Collins, 1990
- Womack, J.P., Jones D.T.: Lean Thinking: Banish Waste And Create Wealth In Your Corporation. London: Simon und Schuster, 2003
- Rother, M., Shook, J.: Learning to See: Value Stream Mapping to Create Value and Eliminate Muda. US: Lean Enterprise Institute, 1999
- Morgan, J.M., Liker J.K.: The Toyota Product Development System: Integrating People , Process and Technology. New York: Productivity Press, 2006
- Reinertsen, D.G.: The Principles of Product Development Flow: Second Generation Lean Product Development. Redondo Beach: Celeritas Publishing, 2009
- Mital, A., Desai, Anoop, Subramanian, A., Mital, A.: Product Development. Amsterdam: Elsevier, 2008
- Chang, K.-H.: Product Manufacturing and Cost Estimating. Amsterdam: Elsevier, 2013

Production and Logistics Networks

Module abbreviation:	ProdLogis_M-APE	**Reg.no: According to SPO from SS 2017**	6
Curriculum:	**Programme**	**Module type**	**Semester**
	Automotive Production Engineering - Master	General Elective Subject	1

Language of instruction:	English	
Credit points / SWS:	5 ECTS / 4 SWS	
Workload:	Contact hours:	47 h
	Self-study:	48 h
	Exam preparation time	30 h
	Total:	125 h
Subjects of the module:	Production and Logistics Networks (ProdLogis_M-APE)	
Lecture types:	ProdLogis_M-APE: SU/Ü - lecture with integrated exercises	

Prerequisites according examination regulation:

-

Recommended prerequisites:

Basis Knowledge and/or Experiences with Production and Logistic Systems

Objectives:

The students

- 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 desgin, KPI, transport- and warehousing strategies, make or buy decisions, etc.)

Content:

- Production networks and skills strategies
- Logistics systems and networks
- Logistics concepts in manufacture (intralogistics)
- Supply Chain management design methodologies
- Supply Chain KPIs
- TOPSIM LOGISITCS simulation tool

• Supply chain management in line with industry 4.0 (digitalisation)
Examinations:
schrP90 - written exam, 90 minutes
Anmerkung
Bonussystem: **In lecture there may be tasks, which will lead to bonus points to the exams in case of good execution.** **At maximum 5 bonus points may be given.**

2.1 Individual Elective Master APE im SS 2019

Master: Korrosion- und Oberflächentechnik

Module abbreviation:	WMod_KorOT_M-WT	**Reg.no: According to SPO from SS 2017**	11
Curriculum:	**Programme**	**Module type**	**Semester**
	Master WT	Allgemeines Wahlpflichtfach	1

Language of instruction:	Deutsch
Credit points / SWS:	5 ECTS / 4 SWS
Workload:	Contact hours: 47 h Self-study: 48 h Exam preparation time 30 h Total: 125 h
Subjects of the module:	Korrosion- und Oberflächentechnik (WMod_KorOT_M-WT)
Lecture types:	WMod_KorOT_M-WT: SU/Ü/PR - Seminaristischer Unterricht/Übung/Praktikum

Prerequisites according examination regulation:

Keine

Recommended prerequisites:

Keine

Objectives:

Die Studierenden kennen den Mechanismus der Korrosion einschließlich seiner relevanten thermodynamischen und kinetischen Einflussfaktoren, können verschiedene Korrosionsformen erkennen und den jeweiligen Korrosionsursachen zuordnen.

Die Studierenden kennen die wichtigsten Korrosionsprüfungen einschließlich elektrochemischer Methoden und können ihre Ergebnisse sinnvoll interpretieren.

Die Studierenden kennen wichtige korrosionsbeständige Werkstoffe aus der Gruppe der Leichtmetalle, der hochlegierten Stähle sowie der Nickel und Kupferbasiswerkstoffe. Sie kennen deren Einsatzmöglichkeiten und Grenzen und können auf dieser Basis für konkrete Anwendungsfälle eine technisch und wirtschaftlich sinnvolle Werkstoffauswahl treffen.

Die Studierenden sind informiert über die verbreitetsten Möglichkeiten, wenig korrosionsbeständige Werkstoffe mit Hilfe von Beschichtungen und Überzügen zu schützen. Sie kennen die einschlägigen Methoden und Prozesse und sind in der Lage zu entscheiden, welches Verfahren zu einem gegebenen Bauteil und den dort herrschenden Anforderungen passt.

Die Studierenden kennen die Grundregeln des konstruktiven Korrosionsschutzes und sind daher in der Lage korrosionsbedingte Schwachstellen bereits in der Konzept- und Konstruktionsphase zu vermeiden

Content:

- Theoretische Grundlagen, Methoden der Elektrochemie, Korrosionsprüfung
- Mechanische Einflüsse auf das Korrosionsgeschehen
- Korrosionsbeständige Werkstoffe mit ihren Möglichkeiten, Grenzen und ihren Sonderkorrosionsformen
- Korrosionsschutz durch Beschichtungen, Vorbehandeln und Vorbereiten, Beschichtungsprozesse, Beschichtungsstoffe
- Korrosionsschutz durch Überzüge, Verfahren und Materialien
- Grundbegriffe des konstruktiven Korrosionsschutzes

- Fügetechnik und Korrosion

Examinations:

(gemäß Anlage zur SPO Master WT/TE):
Schriftliche Prüfung: 90 min.

Personnel Management and Leadership

Module abbreviation:	WMod_PersLead	**Reg.no: According to SPO from SS 2017**	11
Curriculum:	**Programme**	**Module type**	**Semester**
		General Elective Subject	1

Language of instruction:	English	
Credit points / SWS:	5 ECTS / 4 SWS	
Workload:	Contact hours:	47 h
	Self-study:	48 h
	Exam preparation time	30 h
	Total:	125 h
Subjects of the module:	Personnel Management and Leadership (WMod_PersLead)	
Lecture types:	WMod_PersLead:	

Prerequisites according examination regulation:

None

Recommended prerequisites:

None

Objectives:

The students analyze different management models and instruments of successful personnel management in the digital age. They critically discuss current questions of managing interdisciplinary and intercultural teams.

Content:

Seminar topics differ from semester to semester, e.g.

- Comparison of traditional and modern management approaches
- Requirements for project managers in the digital age
- Successful management of change processes
- Dimensions, challenges and methods of planning human resources
- Process and instruments of recruiting
- Solving problems and conflicts in teams

Examinations:

LN - seminar paper/presentation
paper (8-10 pages) and oral presentation and discussion (30 min)

Software Engineering

Module abbreviation:	WMod_SWEng_M-WI	**Reg.no: According to SPO from SS 2017**	11
Curriculum:	**Programme**	**Module type**	**Semester**
	Master WI	Allgemeines Wahlpflichtfach	1

Language of instruction:	Deutsch	
Credit points / SWS:	5 ECTS / 4 SWS	
Workload:	Contact hours:	47 h
	Self-study:	48 h
	Exam preparation time	30 h
	Total:	125 h
Subjects of the module:	Software Engineering (WMod_SWEng_M-WI)	
Lecture types:	WMod_SWEng_M-WI: SU/Ü/PR - Seminaristischer Unterricht/Übung/Praktikum	

Prerequisites according examination regulation:

Keine

Recommended prerequisites:

Keine

Objectives:

- Verständnis der Grundlagen des Softwareengineering
- Verständnis und sicherer Umgang mit grundlegenden Begriffen der Softwareentwicklung
- Verständnis der Unterschiede zur klassischen Produktentwicklung
- Kenntnisse der grundlegenden Prinzipien der Softwareentwicklung
- Erlangung von Sicherheit im Umgang mit verschiedenen Entwicklungsumgebungen (IDE) und Methoden
- Programmentwicklung in einer höheren Programmiersprache
- Sinnvoller Einsatz von Sprachkonstrukten dieser Programmiersprache
- Grundlegende Konzepte des objektorientierten Entwurfs
- Praktische Erfahrung bei der Erstellung von Programmen bzw. Softwareanwendungen

Content:

Grundlagen des Software Engineering:

- Fähigkeiten zum Arbeiten mit Computern (Grundlagen)
- Kenntnisse der grundlegenden Prinzipien der Softwareentwicklung (Grundlagen)
- Erlangung von Sicherheit im Umgang mit verschiedenen Softwareentwicklungsumgebungen (IDE), sichere und zielführende Anwendung
- Sicherer Umgang mit Softwaremodellen und Modellierungstools
- Entwurf von Algorithmen (Methodik und Anwendung)
- Erfassen von Benutzungsanforderungen
- Validierung anhand von Benutzungsanforderungen

Examinations:

Gemäß der Anlage zur SPO: SA - Studienarbeit mit Präsentation:

schriftliche Ausarbeitung 8-15 Seiten, Präsentation (15-20 Folien)
Anmerkung:
Modul wurde durch Dozenten für SS 2019 aktualisiert

Scientific Research Seminar

Module abbreviation:	SciResSem_M-APE	**Reg.no: According to SPO from SS 2017**	12
Curriculum:	**Programme**	**Module type**	**Semester**
	Automotive Production Engineering - Master	Compulsory Subject	1

Language of instruction:	English	
Credit points / SWS:	5 ECTS / 2.5 SWS	
Workload:	Contact hours:	30 h
	Self-study:	95 h
	Exam preparation time	0 h
	Total:	125 h
Subjects of the module:	Scientific Research Seminar (SciResSem_M-APE)	
Lecture types:	SciResSem_M-APE:	

Prerequisites according examination regulation:

None

Recommended prerequisites:

in parallel "Personal & Leadership" by Heike Götz

Objectives:

the students:

- 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:

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 (eprox 10-15 pages) and a presentation (eprox 15-30 minutes).

Examinations:

Seminar paper (10-15 pages) and oral presentation (15-30 min)
Modul wurd durch Dozenten für SS 19 aktualisiert

Literature:

Master´s thesis *(Masterarbeit)*

Module abbreviation:	SciResSem_M-APE	**Reg.no: According to SPO from SS 2017**	13
Curriculum:	**Programme**	**Module type**	**Term**
	Automotive Production Engineering - Master	Compulsory Subject	3

Lecturers:	Different lectures with courses in the Master's program	
Language of instruction:	**English**	
Credit points / SWS:	30 ECTS / 4 SWS	
Workload:	Lecture tine (Discussions and seminras):	30 h
	Self-study:	870 h
	Exam preparation time	0 h
	Total:	900 h
Subjects of the module:		
Lecture types:		

Prerequisites according examination regulation:

None

Recommended prerequisites:

None

Objectives:

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.

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.

Content:

- 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
- Use of academic work methods and methodology, i.e. proceeding sys- tematically, analytically and using correct methodology, forming argu- ments logically and concisely, as well working in a targeted manner and time critically and presenting results in a formally correct manner

Examinations:

Written piece of work and participation in Master's seminar