Technische Hochschule Ingolstadt

Program and Course Description

Automotive Production Engineering

Master of Engineering (M. Eng.)

Study regulation: WS 2024/25

as per: 30.07.2024

Contents

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's degree in engineering, aptitude test and proof of English proficiency level B2 level or higher
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 coverts 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).
- Successful participation in an aptitude test for the master's degree program "Automotive Production Engineering" (M. Eng.).
- Proof of English proficiency level B2 or higher.

The binding regulations for this curriculum can be found in:

- Study and Examination Regulations (SPO) for the Master´s degree program "Automotive Production Engineering" (M. Eng.) of 18.07.2016 in the version including the amendment statutes of 02.10.2023.
- "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 program 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 amount 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.

3. Semester					
Master Thesis					
2. Semester					
Automation and Equipment Technologies	Technology Development & Innovation Management	Digital Technologies in Engineering	Production System and Plant Design	Group Project	Individual Elective 2
1. Semester					
Engineering Processes in Automotive Industry	Production and Logistics Networks	Advanced Manufacturing Technologies	Cost Engineering & Risk Management	Scientific Research Seminar	Individual Elective 1

Picture 1: Program structure

In the first semester (see Picture 1) there are conveyed 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 two Individual Electives.

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 two Individual Electives. 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.

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 (see the Study and Examination Regulations as of 18.07.2016 in the version including the amendment statutes of 02.10.2023).

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 and Equipment Technologies
- Production System and Plant Design
- Production and 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 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 program creates future competence.
- It creates a spirit of innovation and teaches entrepreneurial thinking.
- It is an interdisciplinary program, 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 program 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 program is fully taught in English, addresses international students, and creates intercultural competences.
- In this way, the program 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 program, 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 program 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 program is international and intercultural. Hence, the program 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:

- can organize themselves and manage their time.
- have analytical and outcome-oriented intellectual power.
- work target-oriented and autonomously.
- can 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 Study and Examination Regulations for Master Automotive Production Engineering, Appendix 1.

Below is an overview of the different examination formats with German acronym (as used in the “Studien- und Prüfungsordnung”), the English translation and a description.

Acronym	English title	Description
schrP	Written examination	The written examination is a written examination lasting 90 minutes, unless explicitly stated otherwise.
mdlP	Oral examination	The oral examination is an interview lasting 15 minutes per person, unless explicitly stated otherwise.
prP	Practical examination	Based on "real actions" of the student, it should be demonstrated that the student has mastered the practical application of the competences taught. The practical examination lasts 15 minutes unless explicitly stated otherwise.
StA	Student research project	Based on "real actions" of the student, it should be demonstrated that the student has mastered the practical application of the competences taught. The practical examination lasts 15 minutes unless explicitly stated otherwise.
SA	Seminar paper	The seminar paper is a term paper with an oral presentation. A term paper comprises a minimum of 3000 to a maximum of 6000 words (approx. 10 to 20 pages: Word document approx. 8 to 15 pages or Power Point approx. 15 to 20 slides). The oral presentation has a total length of 15-20 minutes and can also take place during the semester.
Proj	Project work	The project work is a group assignment in which several students work on a joint task as a team and present the results orally and in writing. Each student must contribute individually to the joint task and deliver an oral presentation lasting 15 minutes. The written part has a length of approx. 5-25 pages.
MA	Master thesis	Written thesis in the master's degree programme: Maximum processing time (= period between registration of the Master's thesis and submission) of 6 months / length 60-80 pages
Coll	Colloquium	The colloquium is an oral examination lasting 10-15 minutes in which the student defends the results of his or her thesis.

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	++	++	++	++
Individual Electives	depends on the elective			
Scientific Research Seminar	++	++	+	+
Master Thesis	++	++	++	++

3.3 Possible professional fields

Graduates of the master's program "Automotive Production Engineering" get all necessary skills to work as engineers in the development of a production system for any company. They can work as production planners (with strategic, technological, managerial and process-related focus), plant engineers/engineers for equipment technologies as well as plant developers, planning/production managers and manufacturing developers. Graduates of this master's program are in great demand. There is a wide field of application in specialist or management roles in national or international companies and organizations.

Graduates are 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 Description of Modules

4.1 Compulsory Modules

Technology Development & Innovation Management

Module abbreviation:	TDevInnM_M-APE	**SPO-No.:**	1
Curriculum:	**Programme**	**Module type**	**Semester**
	Automotive Production Engineering (SPO SS 24)	Compulsory Subject	2
Module attribute:	**Language of instruction**	**Duration of module**	**Frequency of offer**
	English	1 semester	only winter term

Responsible for module:	Schwarz, Jan Oliver
Lecturers:	Egle, Frank; Ruppert, Max; Schwarz, Jan Oliver
Credit points / SWS:	5 ECTS / 4 SWS
Workload:	Contact hours: 47 h Self-study: 78 h Total workload: 125 h
Subjects of the module:	1: Technology Development & Innovation Management
Lecture types:	SU/Ü-Seminar-based teaching / Exercise
Examinations:	schrP90 - written exam, 90 minutes
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:

Students

- know the significance, methods, elements and processes of innovation and technology management.
- understand the involvement and methods of leadership 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:

- Technology and innovation management
- Technology development: processes, methods, examples
- Benchmarking

Literature:

- BESSANT, John R. and Joseph TIDD, 2015. *Innovation and entrepreneurship*. 1. edition. Chichester: Wiley. ISBN 978-1-118-99309-5

- BIAZZO, Stefano, FILIPPINI, Roberto, 2021. *Product Innovation Management: Intelligence, Discovery, Development* [online]. Cham: Springer PDF e-Book. ISBN 978-3-030-75011-4. Available via: Online verfügbar unter: https://ebookcentral.proquest.com/lib/kxp/detail.action?docID=6661653.
- CORSTEN, Hans, GÖSSINGER, Ralf, MÜLLER-SEITZ, Gordon, SCHNEIDER, Herfried, 2016. *Grundlagen des Technologie- und Innovationsmanagements* [online]. München: Verlag Franz Vahlen PDF e-Book. ISBN 978-3-8006-5133-7. Available via: https://doi.org/10.15358/9783800651337.
- 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. Available via: https://doi.org/10.1057/9781137536976.
- MERTINS, Kai, SIEBERT, Gunnar, KEMPF, Stefan, 1995. *Benchmarking: Praxis in deutschen Unternehmen* [online]. Berlin, Heidelberg: Springer Berlin Heidelberg PDF e-Book. ISBN 978-3-642-79393-6, 978-3-642-79394-3. Available via: https://doi.org/10.1007/978-3-642-79393-6.
- SAVOIA, Alberto, 2019. *The right it: why so many ideas fail and how to make sure yours succeed*. F. edition. New York, NY: HarperOne. ISBN 978-0-06-288465-7, 978-0-06-288466-4
- SCHUH, Günther, 2011. *Handbuch Produktion und Management*. Berlin: Springer.
- SCHWARZ, Jan Oliver, 2023. *Strategic foresight: an introductory guide to practice* [online]. Abingdon, Oxon; New York, NY: Routledge PDF e-Book. ISBN 978-1-00-330273-5. Available via: https://doi.org/10.4324/9781003302735.
- TIDD, Joseph and John R. BESSANT, 2021. *Managing innovation: integrating technological, market and organizational change*. S. edition. Hoboken, NJ: Wiley. ISBN 978-1-119-71330-2
- TROTT, Paul, 2021. *Innovation management and new product development*. S. edition. Harlow, England: Pearson. ISBN 978-1-292-25152-3
- WEINBERG, Ulrich, 2015. *Network Thinking: was kommt nach dem Brockhaus-Denken?* Hamburg: Murmann. ISBN 978-3-86774-469-0, 3-86774-469-6
- PORTER, Michael E., 2004. *Competitive strategy: techniques for analyzing industries and competitors*. F. edition. New York: Free Press. ISBN 0-7432-6088-0, 978-0-7432-6088-6

Additional remarks:

No remarks.

Advanced Manufacturing Technologies

Module abbreviation:	AdManT_M-APE	**SPO-No.:**	2
Curriculum:	**Programme**	**Module type**	**Semester**
	Automotive Production Engineering (SPO SS 24)	Compulsory Subject	1
Module attribute:	**Language of instruction**	**Duration of module**	**Frequency of offer**
	English	1 semester	only summer term

Responsible for module:	Bednarz, Martin
Lecturers:	Bednarz, Martin
Credit points / SWS:	5 ECTS / 4 SWS
Workload:	Contact hours: 47 h Self-study: 78 h Total workload: 125 h
Subjects of the module:	2: Advanced Manufacturing Technologies
Lecture types:	SU/Ü - Seminar-based teaching / Exercise
Examinations:	SA+Koll - written elaboration 8-15 pages, presentation 15-20 slides; oral exam 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:

- 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.
- They are capable to effectively communicate in international and intercultural teams.

Content:

Advanced Manufacturing Technologies e.g.:

- Additive Manufacturing
- Laser Technologies
- Technologies for Battery production
- Manufacturing Technologies for fibre reinforced plastics

Literature:

- GROOVER, Mikell P., 2013. *Fundamentals of modern manufacturing: materials, processes, and systems*. 5. edition. Hoboken, NJ: Wiley. ISBN 978-1-118-231463

- BRECHER, Christian, 2015. *Advances in production technology* [online]. Cham [u.a.]: Springer PDF e-Book. ISBN 978-3-319-12304-2, 978-3-319-12303-5. Available via: http://dx.doi.org/10.1007/978-3-319-12304-2.
- KALPAKJIAN, Serope and Steven R. SCHMID, 2014. *Manufacturing engineering and technology*. 7. edition. Singapore [u.a.]: Pearson. ISBN 978-0-13-312874-1, 978-981-06-9406-7

Additional remarks:

No remarks.

Cost Engineering & Risk Management

Module abbreviation:	CostERiskM_M-APE	**SPO-No.:**	3
Curriculum:	**Programme**	**Module type**	**Semester**
	Automotive Production Engineering (SPO SS 24)	Compulsory Subject	1
Module attribute:	**Language of instruction**	**Duration of module**	**Frequency of offer**
	English	1 semester	only summer term

Responsible for module:	Hecht, Dirk
Lecturers:	Hecht, Dirk; Horák, Jiří; Ruppert, Max
Credit points / SWS:	5 ECTS / 4 SWS
Workload:	Contact hours: 47 h Self-study: 78 h Total workload: 125 h
Subjects of the module:	3: Cost Engineering & Risk Management
Lecture types:	SU/Ü- Seminar-based teaching / Exercise
Examinations:	schrP90 - written exam, 90 minutes
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

- 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

Literature:

- VDI, 2011. *Wertanalyse - das Tool im Value Management: Idee, Methode, System* [online]. Berlin [u.a.]: Springer PDF e-Book. ISBN 978-3-540-79516-2, 978-3-540-79517-9. Available via: https://doi.org/10.1007/978-3-540-79517-9.
- VENKATARAMAN, Ray R. and Jeffrey K. PINTO, 2023. *Cost and value management in projects*. s. edition. Hoboken, N.J.: John Wiley & Sons. ISBN 978-1-119-93354-0
- HECHT, Dirk, 2022. *Modernes Beschaffungsmanagement in Lehre und Praxis*. 1. edition. Stuttgart: Verlag W. Kohlhammer. ISBN 978-3-17-039953-2, 3-17-039953-5
- WOLKE, Thomas, 2016. *Risikomanagement*. 3. edition. Berlin; Boston: De Gruyter Oldenbourg. ISBN 978-3-11-035386-0
- KEITSCH, Detlef, 2007. *Risikomanagement*. Stuttgart: Schaeffer-Poeschel. ISBN 978-3-7910-2713-5, 3-7910-2713-1
- HOPKIN, Paul, 2013. *Risk management*. London [u.a.]: Kogan Page Limited. ISBN 978-0-7494-6838-5
- BABBAGE, Charles, 2010. *On the economy of machinery and manufactures*. r. edition. Memphis, Tenn.: General Books. ISBN 978-0-217-26690-1
- BHIMANI, Alnoor and others, 2019. *Management and Cost Accounting*. 7. edition. ISBN 978-1-292-23266-9
- DOMANSKI, Chris, 2021. *Cost Engineering: A Practical Method for Sustainable Profit Generation in Manufacturing*. 1. edition. ISBN 9781032243306

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 SS 24)	Compulsory Subject	1
Module attribute:	**Language of instruction**	**Duration of module**	**Frequency of offer**
	English	1 semester	only summer term

Responsible for module:	Meyer, Roland
Lecturers:	Meyer, Roland; Neumann, Alexander
Credit points / SWS:	5 ECTS / 4 SWS
Workload:	Contact hours: 47 h Self-study: 78 h Total workload: 125 h
Subjects of the module:	4: Engineering Processes in Automotive Industry
Lecture types:	SU/Ü - Seminar-based teaching / Exercise
Examinations:	schrP90 - written exam, 90 minutes
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

- 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:

- 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 commonsense guide to AQP and APQP*. 1. edition. New York, NY: Productivity Press. ISBN 1-56327-258-X
- COOPER, Robert G., 2017. *Winning at new products: creating value through innovation*. F. edition. New York, NY: Basic Books. ISBN 0-465-09332-9, 978-0-465-09332-8
- WOMACK, James P., Daniel T. JONES and Daniel ROOS, 2007. *The machine that changed the world: [how lean production revolutionized the global car wars]*. [. edition. London [u.a.]: Simon & Schuster. ISBN 978-1-84737-055-6, 1-8473-7055-1
- WOMACK, James P. and 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 and John SHOOK, 2009. *Learning to see: value-stream mapping to create value and eliminate muda*. Version 1. edition. Cambridge, Mass.: Lean Enterprise Inst. ISBN 978-0-9667843-0-5, 0-9667843-0-8
- MORGAN, James M. and 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*. Amsterdam [u.a.]: Elsevier. ISBN 978-0-12-401745-0
- MITAL, Anil, 2014. *Product development: a structured approach to consumer product development, design, and manufacture*. 2. edition. Amsterdam [u.a.]: Elsevier. ISBN 978-0-12-799945-6

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 SS 24)	Compulsory Subject	2
Module attribute:	**Language of instruction**	**Duration of module**	**Frequency of offer**
	English	1 semester	only winter term

Responsible for module:	Meyer, Roland	
Lecturers:	Luhede, Thoren; Meyer, Roland	
Credit points / SWS:	5 ECTS / 4 SWS	
Workload:	Contact hours:	47 h
	Self-study:	78 h
	Total workload:	125 h
Subjects of the module:	5: Production System and Plant Design	
Lecture types:	SU/Ü - Seminar-based teaching / Exercise	
Examinations:	schrP90 - written exam, 90 minutes	
Usability for other study programs:	None	

Prerequisites according examination regulation:

None

Recommended prerequisites:

None

Objectives:

After this lecture subject, students are able to:

- 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:

- Basics of production systems
- Process organization strategies and shopfloor management
- Machine tools in production systems
- Technical capacity, MTM, REFA target time determination
- Design for manufacturing and assembly (DFMA)

- Manufacturing and assembly planning
- Industry 4.0 applications in production systems
- Lean Leadership
- Production training

Literature:

- BOKRANZ, Rainer and Kurt LANDAU, 2006. *Produktivitätsmanagement von Arbeitssystemen: MTM-Handbuch*. Stuttgart: Schäffer-Poeschel. ISBN 3-7910-2133-8, 978-3-7910-2133-1
- BRUNNER, Franz J., 2017. *Japanische Erfolgskonzepte: KAIZEN, KVP, Lean Production Management, Total Productive Maintenance, Shopfloor Management, Toyota Production System, GD3 - Lean Development*. 4. edition. München: Hanser. ISBN 978-3-446-45428-6, 3-446-45428-4
- WESTKÄMPER, Engelbert and Carina LÖFFLER, 2016. *Strategien der Produktion: Technologien, Konzepte und Wege in die Praxis*. Berlin, Heidelberg: Springer Vieweg. ISBN 3-662-48913-9, 978-3-662-48913-0
- WIENDAHL, Hans-Peter and others, 2015. *Handbook factory planning and design*. Berlin [und 4 weitere]: Springer. ISBN 3-662-46390-3, 978-3-662-46390-1
- FREIVALDS, Andris and Benjamin W. NIEBEL, 2014. *Niebel's Methods, standards, and work design*. 13. edition. New York, NY: McGraw-Hill. ISBN 978-0-07-337636-3, 0-07-337636-1
- BELLGRAN, Monica and Kristina SÄFSTEN, 2010. *Production Development*. 1. edition. London: Springer. ISBN 978-1-84882-495-9
- KALPAKJIAN, Serope and Steven SCHMID, 2020. *Manufacturing Engineering and Technology*. 7. edition. ISBN 978-1-292-37289-1

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 and Logistics Networks

Module abbreviation:	ProdLogis_M-APE	**SPO-No.:**	6
Curriculum:	**Programme**	**Module type**	**Semester**
	Automotive Production Engineering (SPO SS 24)	Compulsory Subject	1
Module attribute:	**Language of instruction**	**Duration of module**	**Frequency of offer**
	English	1 semester	only summer term

Responsible for module:	Jattke, Andreas	
Lecturers:	Jattke, Andreas	
Credit points / SWS:	5 ECTS / 4 SWS	
Workload:	Contact hours:	47 h
	Self-study:	78 h
	Total workload:	125 h
Subjects of the module:	6: Production and Logistics Networks	
Lecture types:	SU/Ü - Seminar-based teaching / Exercise	
Examinations:	schrP90 - written exam, 90 minutes	
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

- 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
- Supply chain management in line with industry 4.0 (digitalisation)

Literature:

- ERRASTI, Ander and Tim BAINES, 2013. *Global production networks: operations design and management*. 2. edition. Boca Raton, Fla. [u.a.]: CRC Press. ISBN 978-1-4665-6292-9
- ZHENG, Li, POSSEL-DÖLKEN, Frank, 2002. *Strategic Production Networks* [online]. Berlin, Heidelberg: Springer Berlin Heidelberg PDF e-Book. ISBN 978-3-540-24812-5. Available via: https://doi.org/10.1007/978-3-540-24812-5.
- ABELE, Eberhard, 2008. *Global production: a handbook for strategy and implementation* [online]. Berlin [u.a.]: Springer PDF e-Book. ISBN 978-3-540-71653-2. Available via: https://doi.org/10.1007/978-3-540-71653-2.
- STADTLER, Hartmut, KILGER, Christoph, MEYR, Herbert, 2015. *Supply chain management and advanced planning: concepts, models, software, and case studies* [online]. Berlin, Heidelberg: Springer Berlin Heidelberg PDF e-Book. ISBN 978-3-642-55309-7. Available via: https://doi.org/10.1007/978-3-642-55309-7.

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 SS 24)	Compulsory Subject	2
Module attribute:	**Language of instruction**	**Duration of module**	**Frequency of offer**
	English	1 semester	only winter term

Responsible for module:	Großmann, Daniel	
Lecturers:	Bednarz, Martin; Großmann, Daniel	
Credit points / SWS:	5 ECTS / 4 SWS	
Workload:	Contact hours:	47 h
	Self-study:	78 h
	Total workload:	125 h
Subjects of the module:	7: Automation and Equipment Technologies	
Lecture types:	SU/Ü- Seminar-based teaching / Exercise	
Examinations:	schrP90 - written exam, 90 minutes	
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

- 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 (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.

- get to know the tool machines used in automotive production and can assess these both technologically and economically (e.g. for procurement processes).

Content:

- Robotics, automation and control technology in automotive manufacturing
- Equipment manufacturing: system manufacturing, tool and mould making, tool machines

Literature:

- JOHN, Karl-Heinz, TIEGELKAMP, Michael, 2010. *IEC 61131-3: programming industrial automation systems: concepts and programming languages, requirements for programming systems, decision-making aids* [online]. Berlin; Heidelberg: Springer PDF e-Book. ISBN 978-3-642-12015-2. Available via: https://doi.org/10.1007/978-3-642-12015-2.
- LAMB, Frank, 2013. *Industrial automation: hands-on*. New York, NY [u.a.]: McGraw-Hill. ISBN 978-0-07-181645-8, 0-07-181645-3
- BARTELT, Terry, 2011. *Industrial automated systems: instrumentation and motion control*. Clifton, NY: Delmar Cengage Learning. ISBN 978-1-4354-8888-5, 1-4354-8888-1
- STEPHENS, Matthew P. and Fred E. MEYERS, 2019. *Manufacturing facilities design & material handling*. S. edition. West Lafayette, Indiana: Purdue University Press. ISBN 978-1-55753-859-8
- THIEDE, Sebastian, 2012. *Energy efficiency in manufacturing systems*. Heidelberg: Springer. ISBN 978-3-642-25914-2, 978-3-642-25913-5
- HOFFMAN, Edward G., 2004. *Jig and fixture design*. 5. edition. New York: Thomson. ISBN 1-4018-1107-8
- GIBSON, Ian, ROSEN, David, STUCKER, Brent, KHORASANI, Mahyar, 2021. *Additive manufacturing technologies* [online]. Cham: Springer PDF e-Book. ISBN 978-3-030-56127-7. Available via: https://doi.org/10.1007/978-3-030-56127-7.
- Without author, 2011. *Cyber-Physical Systems: Driving force for innovation in mobility, health, energy and production* [online]. Berlin; Heidelberg: Springer PDF e-Book. ISBN 978-3-642-29090-9. Available via: https://doi.org/10.1007/978-3-642-29090-9.
- UHL, Axel and Lars Alexander GOLLENIA, 2020. *Digital enterprise transformation: a business-driven approach to leveraging innovative IT*. f. edition. London; New York: Routledge, Taylor & Francis Group. ISBN 978-0-367-67005-4, 978-1-4724-4854-5
- BAUERNHANSL, Thomas, TEN HOMPEL, Michael, VOGEL-HEUSER, Birgit, 2014. *Industrie 4.0 in Produktion, Automatisierung und Logistik: Anwendung, Technologien, Migration* [online]. Wiesbaden: Springer Vieweg PDF e-Book. ISBN 978-3-658-04682-8. Available via: https://doi.org/10.1007/978-3-658-04682-8.

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 SS 24)	Compulsory Subject	2
Module attribute:	**Language of instruction**	**Duration of module**	**Frequency of offer**
	English	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:	Contact hours:	47 h
	Self-study:	78 h
	Total workload:	125 h
Subjects of the module:	8: Digital Technologies in Engineering	
Lecture types:	SU/Ü- Seminar-based teaching / Exercise	
Examinations:	SA+Koll - written elaboration 8-15 pages, presentation 15-20 slides; oral exam 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:

The students

- 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.

- are able to communicate and cooperate in small diverse teams with different cultural backgrounds.

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. Available via: http://deposit.d-nb.de/cgi-bin/dokserv?id=2842151&prov=M&dok_var=1&dok_ext=htm.
- 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. Available via: 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. Available via: 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. Available via: 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. Available via: http://dx.doi.org/10.1007/978-3-540-88973-1.
- BENDSOE, Martin Philipp and Ole SIGMUND, 2004. *Topology Optimization: Theory, Methods and Applications*. ISBN 9783662050866
- WHITELEY, Jonathan, 2017. *FEM: Theory: A practical guide*. 1. edition. ISBN 978-3-319-49971-0

Additional remarks:

No remarks.

Group Project

Module abbreviation:	Project_M-APE	**SPO-No.:**	9
Curriculum:	**Programme**	**Module type**	**Semester**
	Automotive Production Engineering (SPO SS 24)	Compulsory Subject	2
Module attribute:	**Language of instruction**	**Duration of module**	**Frequency of offer**
	English	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:	Contact hours: 47 h Self-study: 78 h Total workload: 125 h
Subjects of the module:	9: Group Project
Lecture types:	S-Seminar
Examinations:	Proj - Project work (5-25 pages) with oral presentation (15 minutes)
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

- 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.
- have developed distinctive methodological and social skills in areas such as teamwork, communication, intercultural cooperation, leadership, creativity techniques, project management and time management.

Content:

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 organize, carry out, document and present a project is promoted. Key qualifications in teamwork, project management as well as social skills are consolidated.
Literature:
• Will be specified at the beginning of the project.
Additional remarks:
No remarks.

Scientific Research Seminar

Module abbreviation:	SciResSem_M-APE	**SPO-No.:**	12
Curriculum:	**Programme**	**Module type**	**Semester**
	Automotive Production Engineering (SPO SS 24)	Compulsory Subject	1
Module attribute:	**Language of instruction**	**Duration of module**	**Frequency of offer**
	English	1 semester	only summer term

Responsible for module:	Axmann, Bernhard	
Lecturers:	Axmann, Bernhard	
Credit points / SWS:	5 ECTS / 2.5 SWS	
Workload:	Contact hours:	30 h
	Self-study:	95 h
	Total workload:	125 h
Subjects of the module:	12: Scientific Research Seminar	
Lecture types:	S-Seminar	
Examinations:	StA - Student research project, written elaboration 8-15 pages	
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

- 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 devloped strong methodological, social and intercultural 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.

Typical topics include questions related to production systems, automation technology, software, AI or sustainability in industrial production.

Literature:

- Will be specified at the beginning of the seminar.

Additional remarks:

No remarks.

Master Thesis

Module abbreviation:	Ma_Thes_APE	**SPO-No.:**	13
Curriculum:	**Programme**	**Module type**	**Semester**
	Automotive Production Engineering (SPO SS 24)	Compulsory Subject	3
Module attribute:	**Language of instruction**	**Duration of module**	**Frequency of offer**
	German/English	1 semester	winter and summer term

Responsible for module:	Axmann, Bernhard	
Lecturers:		
Credit points / SWS:	30 ECTS / 0 SWS	
Workload:	Contact hours:	0 h
	Self-study:	750 h
	Total workload:	750 h
Subjects of the module:	13: Master´s Thesis	
Lecture types:	MA-Master Thesis	
Examinations:	Master-Thesis	
Usability for other study programs:	Please see the subject recognition list of SCS (Study Service Center).	

Prerequisites according examination regulation:

The topic of the Master thesis is issued at the beginning of the second study semester at the earliest. The issue of the topic of the Master thesis requires that at least study and examination achievements to the extent of 30 ECTS have been successfully completed.

Recommended prerequisites:

None

Objectives:

- Acquisition and proof of the ability to work independently on complex problems from the field of Automotive Production Engineering at a high academic level using the expert knowledge gained as well as academic methods and knowledge within a specified period.
- 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.
- Students develop and prove communication skills in different settings such as scientific cooperations or in exchange with industry experts.

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 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
Literature:
• Specific to Master thesis topics.
Additional remarks:
No remarks.

4.2 Elective Modules

Starting with winter semester 2024/25, there will be a separate module handbook for the descriptions of the elective modules, which is part of the semester curriculum for the master's degree program "Automotive Production Engineering". This can also be found on the Moodle page of your degree program under Curriculum and Module Handbooks.

Note: Please note that not all modules listed in the module handbook for electives can be selected for your degree program. The current list of selectable modules for your degree program can be found on the Moodle page of your degree program under Information on Electives. Link:

https://moodle.thi.de/course/view.php?id=2625&section=5