
Faculty of Business, Economics and Law
Faculty of Automotive Systems and Production

Module Catalog of the Degree Program Supply Chain and Operations Management

Master of Science

[This is a translation of the original German document. For all legal purposes, only the German version of the module catalog shall be considered binding.]

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Cologne, 10.02.2022

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Module Catalog | Supply Chain and Operations Management, Master of Science

1 Study Objectives

The aim of the Master's program is to consecutively develop additional, more in-depth and research-based strategies, processes, methods and systems of supply chain and operations management after having completed a first university degree. In line with the modern interpretation of logistics as the holistic management of flows of objects (goods, persons, information, etc.) in networks, a special focus is placed on the internal and external logistics and logistics-related activities and processes of companies (networks).

The Master of Science Supply Chain and Operations Management is a research-oriented Master's program in which students permeate scientific theories, approaches and methods in a problem-oriented way and independently deepen their knowledge in their own virtual research projects until the Master's thesis.

For this purpose, existing knowledge of logistics, production or operation and supply chain management, which was acquired in an already completed economic or engineering degree program with the required minimum degree of "Bachelor of Engineering", "Bachelor of Arts" or "Bachelor of Science" with relevant logistics or supply chain management relevance, is systematically deepened in a scientifically sound and practice-oriented manner.

For an understanding of supply chain and operations management as a cross-sectional or meta-leadership function in the company and in company networks or supply chains, a comprehensive and interdisciplinary approach is necessary. To this end, the individual elements from the strategy to a concrete implementation are considered from a business management and an engineering perspective.

The interdisciplinary approach of the program does not lead to a mere sum of partial aspects learned from the imparted disciplines - it rather enables the students to take a new level of consideration of supply chains through the targeted adoption of different perspectives: During their studies students learn in a practice-oriented way how to adopt the necessary different perspectives and which aspects are of particular importance. They thereby gain a new perspective on the tasks and challenges in their later professional life and can successfully master the tasks described above as an integrating element of the flow of goods and information within and between companies.

The range of tasks in supply chain and operations management has grown continuously in recent years, confronting scientists and managers with ever-growing challenges. Progressive globalization, reduction of the vertical range of manufacturing, the dislocation of production and service resources and processes, modern information and communication technologies, and the formation of cooperative productive networks combined with the implementation of new approaches like Industry 4.0 or Logistics 4.0 are currently causing a huge upheaval in both the interconnection of companies in supply chain management and operations management, i.e. the management of processes and resources in productive systems for the manufacturing of goods and services. In the degree program Supply Chain and Operations Management these developments are addressed thematically and supported methodically.

In a highly exciting and attractive professional environment, supply chain and operations managers operate as "highly specialized generalists":

- various players in company networks, such as suppliers, producers, traders and (logistics) service providers;
- different functions/departments, such as procurement, production and sales, and
- different disciplines like economics and engineering.

In the Master's program, students train their function-oriented and system-oriented, interdisciplinary thinking. They acquire skills that enable them to recognize and evaluate complex supply chain and operations management issues and tasks, to develop engineering and business solutions and finally combine them to create holistic solutions. Furthermore, they learn to use scientific methods to solve problems, to apply them to practical problems and to develop them further for specific applications to make technical and scientific progress in research and development.

As creative problem solvers, who are equipped for innovation activities in companies as well as for scientific research on partly or completely unknown terrain, graduates of this program will be able to work independently and in a targeted, problem-oriented manner on demanding supply chain and operations management tasks in research and the development of new products and processes as well as to implement socially and economically responsible management. Therefore, professional development opportunities for graduates arise in logistics or supply chain and operations (management) research at universities and institutes, as well as in supply chain and operations management at logistics service providers or in the supply chain and operations departments or sectors in industry and trade, and in the civil service at public authorities with logistical or similar responsibilities. Furthermore, the Master's program provides the basis for a further academic qualification in the context of a doctoral program.

2 Curriculum

The Master's program in Supply Chain and Operations Management is an on-site program that focuses on research-based learning.

The steps of research-based learning are implemented through course formats such as lectures, exercises and student projects.

The focus of the curriculum is on the students' learning process and the structure of the subjects enables the implementation of research-based learning. In accordance with this concept, students complete the research cycle from problem identification and description to the selection of suitable methods and the development of a solution. The proportion of lectures offered in the English language in this Master's program is 25 to 50%.

The program begins in the summer semester. The duration of study is three semesters, of which two semesters are spent on lectures and one semester on the Master's thesis.

In terms of content, the concept of a consecutive Master's degree allows the students to get a top-down holistic view, starting with the development of a sustainable strategy and continuing with the "toolset" of processes and methods for the management of systems and resources. In the second semester, students also can choose between industry-specific specializations or the topic "Insurance in Logistics and Customs and Foreign Trade Law".

Competence Areas and Modules	1. sem	2. sem	3. sem	
	CP	CP	CP	CP
Supply Chain and Operations Management – Strategy	6	6	0	12
Strategic Supply Chain Management and Logistical Networks	6			6
Sustainable Technical Solutions in Logistics		6		6
Supply Chain and Operations Management – Processes and Methods	12	0	0	12
Operations Research	6			6
Process Management	6			6
Supply Chain and Operations Management - Systems	0	6	0	6
IT-Systems of Logistics and Supply Chain Management		6		6
Resource Management in the Supply Chain	6	6	0	12
Management Areas and (Support) Functions of Logistics Service Providers	6			6
Relationship Management in Supply Chains		6		6
Research	6	6	0	12
Proseminar Research Methods	6			6
Supply Chain and Operations in Research and Practice		6		6
Required Electives (of which one module must be selected)	0	6	0	6
Branch-Specific Supply Chain and Operations Management		6		6
Insurance in Logistics and Customs and Foreign Trade Law		6		6
Mobility and Logistics in Urban Areas		6		6
Master's Thesis	0	0	30	30
Master's Thesis			26	26
Final Oral Examination ("Kolloquium")			4	4
Credit Points (CP)	30	30	30	90

Scientific Work in Research-Based Learning

In order to make the learning process the focus of the degree program, the cycle of research-based learning is used as a framework. The first phases are (1) the identification of an initial problem, (2) the determination of a suitable research question, (3) the elaboration of information and theoretical approaches and (4) the selection and acquisition of suitable methods.

These four phases are completed in the first semester: in the modules, practice-relevant questions are defined, and suitable methods are developed. The first part of the research cycle is anchored in the curriculum through the "Proseminar Research Methods" and the contents of the other modules are specifically covered in this proseminar.

In the second semester these questions will be further developed and the following phases will be put into practice: (5) development of a research design, (6) performance of a research activity, (7) development and presentation of the results and (8) reflection of the entire process.

This research cycle is institutionalized after the "Proseminar Research Methods" (1st semester, phases 1-4) in the module "Supply Chain and Operations in Research and Practice" (2nd semester, phases 5-8). In the other modules, the content is developed in a correspondingly competence-oriented way: the modules of the first semester provide input for the modules of the second semester and thus follow the logic of research-based learning.

Consequently, at the end of the second semester, the students have made their own sound experience of the research cycle with all its obstacles and progress enabling them to select an adequate, professionally and personally relevant topic for the Master's thesis from the contents of all courses. The entire research process is then carried out again in the Master's thesis.

The modules of the program build on each other as follows:

1. semester		2. semester
Strategic Supply Chain Management and Logistical Networks	→	Sustainable Technical Solutions in Logistics
Operations Research	→	IT-Systems of Logistics and Supply Chain Management
Process Management	→	Relationship Management in Supply Chains
Management Areas and (Support) Functions of Logistics Service Providers	→	

In the electives in the 2nd semester ("Branch-specific Supply Chain and Operations Management" and "Insurance in Logistics and Customs and Foreign Trade Law") further input for the research cycle is elaborated together with the students and, if necessary, completed in the Master's thesis. The Master's thesis that students complete in the third semester thus contains current research and practice-oriented issues. In the thesis, the competences and knowledge acquired during the program are applied independently and on a case-related basis, taking into account scientific methods and techniques. It can also be written in English.

3 Learning Outcomes / Module Objectives

A classification scheme is assigned to the learning outcomes and learning objectives in the module descriptions of the M. Sc. Supply Chain and Operations Management degree program. This is essentially based on the taxonomy of learning objectives in the cognitive area according to BLOOM¹. The focus is on learning objectives such as thinking, knowledge and problem solving. The learning objectives are hierarchically categorized according to BLOOM¹ in six taxonomy levels, whereby according to SITTE and WOHLSCHLÄGL² each lower category is an element of the higher one. The levels of competence can be formulated by using specific verbs in the module descriptions. This makes the learning progress of the students externally visible and empirically comprehensible through their actions.

K1	Knowledge	Reproduction of knowledge, terms, definitions, procedures, contexts, etc. Typical verbs: <i>describe, present, report, name.</i>
K2	Understanding	Transform knowledge and express it in the student's own words in a way that preserves its meaning. Typical verbs: <i>interpret, define, phrase, derive.</i>
K3	Application	Apply rules, methods or calculation procedures in concrete situations. Typical verbs: <i>perform, calculate, plan, design, elaborate.</i>
K4	Analysis	Decompose problems into elements in order to be able to work out principles, structures, commonalities or contradictions based on a comparison. Typical verbs: <i>select, categorize, examine, compare, analyze.</i>
K5	Synthesis	Combining individual elements into a complete, new whole. Typical verbs: <i>design, assign, conceive, construct, develop.</i>
K6	Evaluation	Making an evaluative judgement. Typical verbs: <i>judge, decide, give reasons, evaluate, classify.</i>

In the Master's program Supply Chain and Operations Management, either the taxonomy levels are completed or the program is built upon the contents of the preceding relevant degree program. Since the competences synthesis and evaluation are achieved in the courses of the Master's program, students are thus enabled to prioritize new challenges, to develop appropriate methods and to make scientifically sound decisions, even for unknown problems and approaches.

¹ Cf. BLOOM, B. S., Taxonomie von Lernzielen im kognitiven Bereich, Beltz Verlag, Weinheim, 1976.

² Cf. SITTE, W., Beiträge zur Didaktik des „Geographie und Wirtschaftskunde“ Unterrichts. Wien, 564 Seiten, WOHLSCHLÄGL, H. (Hrsg.), Materialien zur Didaktik der Geographie und Wirtschaftskunde, vol. 16).

The following table illustrates how the learning objectives are accomplished in the degree program.

Competence Levels of the Modules

Semester	Module	K1	K2	K3	K4	K5	K6
1	Management Areas and (Support) Functions of Logistics Service Providers						
1	Operations Research						
1	Proseminar Research Methods						
1	Process Management						
1	Strategic Supply Chain Management and Logistical Networks						
2	Relationship Management in Supply Chains						
2	Branch-Specific Supply Chain and Operations Management						
2	IT-Systems of Logistics and Supply Chain Management						
2	Mobility and Logistics in Urban Areas						
2	Sustainable Technical Solutions in Logistics						
2	Supply Chain and Operations in Research and Practice						
2	Insurance in Logistics and Customs and Foreign Trade Law						
3	Master's Thesis and Kolloquium						

4 Module Examinations

The module examinations of the degree program must be taken throughout the course of study after the completion of the respective modules. The structure of the modules is adjusted to the competence-related requirements. The type and number of module examinations are documented in the module catalog and in the examination regulations.

In the Master's program Supply Chain and Operations Management there are – apart from examinations, term papers and the final thesis with a final oral examination (“Kolloquium”) – the following types of examinations in the table below, which every student gets to know during the course of the degree program.

Further Types of Examinations
<ul style="list-style-type: none"> • IT-Systems of Logistics and Supply Chain Management (performance audit) • Management Areas and (Support) Functions of Logistics Service Providers (term paper and presentation) • Relationship Management in Supply Chains (portfolio) • Proseminar Research Methods (performance testing and term paper) • Supply Chain and Operations in Research and Practice (portfolio)

As shown in the chart above, possible types of examinations are written and oral examinations as well as other forms such as term papers, performance tests, portfolios and oral contributions.

A term paper (e.g. case study, research) serves to determine whether the student can independently complete a practice-oriented task as a written elaboration within a given period of time using scientific and practical methods.

Within the framework of a performance test, realistic, typical scenarios are simulated and the students must cope with professional situations like in a role play. In addition, oral and written parts of the examination can be combined with the actual performance. The creation of a portfolio can also be part of the performance examination. A portfolio is a collection of papers to document the student's work and learning progress. It expresses the independently and autonomously carried out learning processes of the examinee to achieve the competence objectives of a module.

An oral contribution (e.g. presentation, negotiation, moderation) shows whether the student can work on a practice-oriented task within a given period of time using scientific and practical methods and to present it independently by means of verbal communication.

The examination regulations state that the examination requirements must be based on the learning outcomes and the content of the respective courses which are offered according to the module catalog for the module in question. Relevant subject content and competences imparted in previous modules are a prerequisite. The examinations determine whether the students have mastered the competences, content and methods of the modules as well as the essential interrelationships and can independently apply the acquired knowledge and skills to comparable questions.

Students are required to submit a written Master's thesis and the associated final oral examination (“Colloquium”) as their final thesis. Details are defined in the program's examination regulations.

5 Modules

Supply Chain and Operations Management - Strategy

5.1 Strategic Supply Chain Management and Logistical Networks

Module code:	1110
Module title:	Strategic Supply Chain Management and Logistical Networks (German title: Strategisches Supply Chain Management und logistische Netzwerke)
Type of module:	obligatory module
ECTS credits:	6
Language:	English
Duration:	one Semester
Recommended semester:	1st Semester
Frequency:	once a year in the summer semester
Module coordinator:	Prof. Dr. Hartmut Reinhard
Lecturers:	Prof. Dr. Helmut Schulte Herbrüggen, Herr Kamal Rhaouat (associate lecturer)
Learning outcome:	<p>The students are able to assess, evaluate and prioritize challenges in Strategic Management as well as analyse and develop the matching Supply Chains and Logistics structures.</p> <p>Therefore, an adequate set of methods covering strategic management and strategic controlling as well as strategic network management will be developed and evaluated in the lectures.</p> <p>The ability to independently recognize strategic options and to assign the right decisions is a key competence in the students' later professional life. The module delivers content for further research in the learning process especially for "Sustainable Technical Solutions in Logistics" as well as methodological basics for upcoming additional modules in the 2nd semester.</p>
Module content:	<p>Strategic Planning:</p> <ul style="list-style-type: none"> ● basics and definitions of strategic and operational controlling, strategic planning process, levels through strategic planning and action, strategic business units ● analysis of Markets and Operators (by e.g. SWOT and GAP analysis) ● business strategies, strategic approaches, cost competition, quality competition, time competition ● corporate strategies, portfolio concepts, competitor matrix, concept of core competency, Balanced Scorecard, implementation and control of strategies and methods ● early detection systems for analysis and forecast, application of scenarios <p>Strategic Supply Chain Management and Networks:</p> <ul style="list-style-type: none"> ● fundamentals and definitions of Supply Chain Management Systems and logistics ● goals and strategies of International Supply Chain Management Systems ● SCOR (Supply Chain Operations Reference) Model ● Supply Chain and Logistics Analysis and Design focussing on LEAN concepts through prevention of waste, minimization and optimization of interfaces, standardization and modularization, integrated quality assurance, transparency and visualization concepts, motivation concepts, internationalization, network design, partnering, sustainability and continuous improvement / Kaizen) ● Supply Chain Collaboration to reduce bullwhip effects and support logistical integration of Supply Chain resources ● International Logistics ● controlling of Supply Chain Systems ● supply Chain Event and Risk Management

	<ul style="list-style-type: none"> • innovative and integrative concepts for Supply Chain Management Systems
Teaching and learning methods:	<p>Lecture in form of a seminar including discussions, teamwork, independent presentation, case studies and assignments are carried out in student teams</p> <p>Interactive, project-oriented lecture, integrating different forms of interactivity like exercises, brainstorming, brain writing, group work, world café, business game and videos that are all discussed under selected 'headlines' and that are often followed by little presentations.</p>
Assessment method:	written examination (90 minutes)
Workload (25 - 30 h $\hat{=}$ 1 ECTS credit):	180 h
Contact hours: 4 SWS	<p>32 h lecture</p> <p>16 h exercise</p> <p>16 h project</p> <hr/> <p>64 h</p>
Self-study:	<p>10 h lecture</p> <p>58 h exercise</p> <p>48 h project</p> <hr/> <p>116 h</p>
Recommended prerequisites:	—
Required prerequisites:	—
Recommended reading:	<p>Alter, Roland: Strategisches Controlling, Unterstützung des strategischen Managements, 2. Auflage, München: Oldenburg Wissenschaftsverlag, 2013</p> <p>Baum, Heinz-Georg; Coenenberg, Adolf G.; Günther, Thomas: Strategisches Controlling, 5. Auflage, Stuttgart: Schäffer-Poeschel, 2013.</p> <p>Bowersox, Donald, J./ Closs, David, J./ Cooper, M. Bixby/ Bowersox, John C. (2013); Supply Chain Logistics Management; 4. International ed., Singapore: McGraw Hill</p> <p>Coyle, John J./ Langley, C. John/ Novack, Robert A./ Gibson, Brian J. (2013): Managing Supply Chains: A Logistics Approach, 9. International ed., Canada: South Western, Cengage Learning</p> <p>Küpper, Hans-Ulrich: Controlling, 6. Auflage, Stuttgart: Schäffer-Poeschel, 2013.</p> <p>Mangan, John/ Lalwani, Chandra/ Butcher, Tim/ Javadpour, Roya (2012): Global Logistics and Supply Chain Management, 2. ed., Chichester: John Wiley & Sons Ltd.</p> <p>Müller-Stewens, Günter; Lechner, Christoph: Strategisches Management, 4. Auflage, Stuttgart: Schäffer-Poeschel, 2011</p> <p>Harrison, A./ van Hoek, R. (2014): Logistics Management & Strategy – Competing Through the Supply Chain, 5. ed., Harlow: Pearson Education</p> <p>Russell, R.S./ Taylor, R.W. (2014): Operations and Supply Chain Management, International Student Version, 8. ed., John Wiley & Sons Singapore Pte. Ltd.</p> <p>Weber, Jürgen; Schäffer, Utz: Einführung in das Controlling – Übungen und Fallstudien mit Lösungen, 12. Auflage, Stuttgart: Schäffer-Poeschel, 2014.</p> <p>Weber, Jürgen; Schäffer, Utz: Einführung in das Controlling, 14. Auflage, Stuttgart: Schäffer-Poeschel, 2014.</p> <p>Further course related literature (books, journals or articles) might be communicated at the beginning of the module.</p>
Use of the module in other degree programs:	—
Particularities:	—
Last update:	02/2022

5.2 Sustainable Technical Solutions in Logistics

Module code:	1120								
Module title:	Sustainable Technical Solutions in Logistics (German title: Nachhaltige technische Lösungen in der Logistik)								
Type of module:	obligatory module								
ECTS credits:	6								
Language:	German								
Duration:	one semester								
Recommended semester:	2nd Semester								
Frequency:	once a year in the winter semester								
Module coordinator:	Prof. Dr. Kathrin Hesse								
Lecturers:	Prof. Dr. Kathrin Hesse, Prof. Dr. Hartmut Reinhard								
Learning outcome:	Students are able to independently describe relevant logistical project tasks, develop alternatives and make decisions by independently assessing results of current challenges of the progressive use of technology in the area of supply chain and operations management (incl. Industry 4.0, materials handling, environmental management systems) and thus redesign essential areas of a logistics system on a model basis in order to evaluate the generated solutions with regard to their sustainability within the technical conception.								
Module content:	<ul style="list-style-type: none"> • requirements, general conditions and objectives for the planning and use of technical systems in logistics, • current technology trends in logistics, including industry 4.0, • basic principles of sustainability and environmental assessment methods (life cycle assessment, carbon footprint analyses) up to measures for CO2 avoidance of individual modes of transport for a holistic representation of "Green Logistics" 								
Teaching and learning methods:	<p>Combination of seminar and project-based teaching with workshop elements and coaching by the supervising professor.</p> <p>Development of a research design for sustainable technical solutions including the elaboration and presentation of the research results.</p>								
Assessment method:	presentation (25%) and paper (75%)								
Workload	180 h								
(25 - 30 h $\hat{=}$ 1 ECTS credit):	<table border="0"> <tr> <td>42 h</td> <td>lecture</td> </tr> <tr> <td>21 h</td> <td>project</td> </tr> <tr> <td colspan="2"><hr/></td> </tr> <tr> <td>63 h</td> <td></td> </tr> </table>	42 h	lecture	21 h	project	<hr/>		63 h	
42 h	lecture								
21 h	project								
<hr/>									
63 h									
Contact hours:	138 h								
Self-study:	—								
Recommended prerequisites:	—								
Required prerequisites:	—								
Recommended reading:	<p>Bauernhansl, T.; ten Hompel, M.; Vogel-Heuser, B. [Hrsg.] (2014): Industrie 4.0 in Produktion, Automatisierung und Logistik: Anwendung, Technologien, Migration, Berlin.</p> <p>Jodin, D.; ten Hompel, M. (2012): Sortier- und Verteilsysteme: Grundlagen, Aufbau, Berechnung und Realisierung, 2. Aufl., Berlin.</p>								

<p>Martin, H. (2012): Praxiswissen Intralogistikplanung: Reale Projekte mit Ist-Situation, Zielsetzung, Planungen und Wirtschaftlichkeitsbetrachtungen, Wiesbaden.</p> <p>Martin, H. (2014): Transport- und Lagerlogistik: Planung, Struktur, Steuerung und Kosten von Systemen der Intralogistik, 9. Aufl., Wiesbaden.</p> <p>ten Hompel, M.; Büchter, H.; Franzke, U. (2008): Identifikationssysteme und Automatisierung, Berlin.</p> <p>ten Hompel, M.; Sadowsky, V.; Beck, M. (2011): Kommissionierung: Materialflusssysteme 2 - Planung und Berechnung der Kommissionierung in der Logistik, Heidelberg.</p> <p>Integrierte Forschungsagenda Cyber-Physical Systems, Eva Geisberger / Manfred Broy, Armin Grunwald, Jürgen Kopfmüller. Nachhaltigkeit. Verlag: Campus Verlag; Auflage: 2 (12. März 2012)</p> <p>Kranke, Andre; Schmied, Martin; Schön, Andrea Dorothea– CO2-Berechnung in der Logistik, Verlag: Vogel, Heinrich; Auflage: 1., Aufl., Stand 08/2011</p> <p>Rodt et. al: CO2-Emissionsminderung im Verkehr in Deutschland. Mögliche Maßnahmen und ihre Minderungspotenziale. UBA-Texte 05/2010. 2010</p> <p>Additional recommended reading might be communicated in the lecture.</p>	<hr/> <p>Use of the module in other degree programs: —</p> <hr/> <p>Last update: 02/2022</p> <hr/>
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Supply Chain and Operations Management - Processes and Methods

5.3 Operations Research

Module code:	1210
Module title:	Operations Research (German title: Operations Research)
Type of module:	obligatory module
ECTS credits:	6
Language:	German
Duration:	one semester
Recommended semester:	1st semester
Frequency:	once a year in the summer semester
Module coordinator:	Prof. Dr. Marc Kastner
Lecturers:	Prof. Dr. Marc Kastner
Learning outcome:	<p>Students are able to</p> <p>select operations research methods and models according to the situation and evaluate their suitability for problem solving, by analyzing and modeling business and, in particular, logistics optimization problems, in order to make optimal decisions in a company as future managers (especially in logistics) by means of quantitative analyses.</p> <p>In particular, the subject provides input for the module "IT Systems of Logistics and Supply Chain Management" in the 2nd semester.</p>
Module content:	<ol style="list-style-type: none"> 1. introduction to operations research 2. fundamentals of linear programming 3. extensions of linear programming 4. linear optimization problems with special structure 5. integer and combinatorial optimization 6. dynamic programming 7. nonlinear optimization 8. optimization in graphs 9. queueing theory and simulation methodology 10. game theory
Teaching and learning methods:	Seminar-based teaching including independent analysis, modeling and evaluation of selected optimization problems
Assessment method:	examination
Workload (25 - 30 h $\hat{=}$ 1 ECTS credit):	180 h
Contact hours:	64 h (lecture)
Self-study:	116 h
Recommended prerequisites:	Fundamentals of quantitative modeling
Required prerequisites:	—
Recommended reading:	Berens, W., Delfmann, W., Schmitting, W.: Quantitative Planung, 4. Aufl., Stuttgart (Schäffer-Poeschel) 2004

Domschke, W., Drexl, A., Klein, R., Scholl, A.: Einführung in Operations Research, 9. Aufl., Berlin (Springer) 2015

Domschke, W., Drexl, A., Klein, R., Scholl, A., Voß, S.: Übungen und Fallbeispiele zum Operations Research, 8. Aufl., Berlin (Springer) 2015

Günther, H., Tempelmeier, H.: Supply Chain Analytics: Operations Management und Logistik, 13. Aufl., Norderstedt (Books on Demand) 2020

Günther, H., Tempelmeier, H.: Übungsbuch Supply Chain Analytics: Operations Management und Logistik, 10. Aufl., Norderstedt (Books on Demand) 2020

Steglich, M., Feige, D., Klaus, P.: Logistikkentscheidungen. Modellbasierte Entscheidungsunterstützung in der Logistik mit Logisticslab, 2. Aufl., Berlin (de Gruyter Oldenbourg) 2016

Steglich, M., Feige, D.: Übungsbuch Logistikkentscheidungen, Berlin (de Gruyter Oldenbourg) 2017

Tempelmeier, H.: Analytics im Bestandsmanagement, 7. Aufl., Norderstedt (Books on Demand) 2020

Tempelmeier, H.: Analytics in Supply Chain Management und Produktion: Übungen und Mini-Fallstudien, 7. Aufl., Norderstedt (Books on Demand) 2020

Additional recommended reading might be communicated in the lecture.

Use of the module in other degree programs:

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Last update:

02/2022

5.4 Process Management

Module code:	1220
Module title:	Process Management (German title: Prozessmanagement)
Type of module:	obligatory module
ECTS credits:	6
Language:	German
Duration:	one semester
Recommended semester:	1st semester
Frequency:	once a year in the summer semester
Module coordinator:	Prof. Dr.-Ing. C. Zoller
Lecturers:	Prof. Dr.-Ing. C. Zoller
Learning outcome:	The students are able to develop optimization measures for direct and indirect company processes by selecting the process management methods appropriate to the respective area in order to optimize and control processes sustainably later on in everyday professional life and to provide specifically suitable questions and methods for in-depth study in the 2nd semester, in particular the module "IT Systems of Logistics and Supply Chain Management".
Module content:	<ul style="list-style-type: none"> • introduction and basic understanding of process management • process analysis and visualization and their optimization • aggregation of process data, development of key figure cockpits • derivation of process strategies and goals (Hoshin Kanri) • agile methods for process control (Kanban, Scrum) • implementing process improvements (improvement kata, office floor management)
Teaching and learning methods:	lecture, business games, working in groups, student presentations
Assessment method:	examination, presentation in groups
Workload (25 - 30 h $\hat{=}$ 1 ECTS credit):	180 h
Contact hours:	32 h lecture 32 h exercise 64 h
Self-study:	76 h
Exam preparation:	40 h
Recommended prerequisites:	—
Required prerequisites:	—
Recommended reading:	Lecture script Wildemann, H. Lean Management 2009 Varenkamp, R. Produktionsmanagement 2004 Nippel, H.: Qualitätsmanagement in der Logistik 1995

	Additional recommended reading might be communicated in the lecture.
Use of the module in other degree programs:	—
Particularities:	—
Last update:	03/2022

Supply Chain and Operations Management - Systems

5.5 IT Systems of Logistics and Supply Chain Management

Module code:	1320
Module title:	IT Systems of Logistics and Supply Chain Management (German title: IT-Systeme der Logistik und des Supply Chain Management)
Type of module:	obligatory module
ECTS credits:	6
Language:	German
Duration:	one semester
Recommended semester:	2nd semester
Frequency:	once a year in the winter semester
Module coordinator:	Prof. Dr. Franz-Josef Weiper
Lecturers:	Prof. Dr. Franz-Josef Weiper
Learning outcome:	<p>Students are able to design IT projects for logistics and SCM processes regarding relevant interdependencies by</p> <ul style="list-style-type: none"> constructing detailed process models and diagrams (BPMN) and designing integration scenarios for relevant systems, designing algorithms for specific resource planning and optimization tasks, assessing the impact of potential disruptions in operations and designing appropriate support functions for damage limitation (re-scheduling), <p>to assess the various possibilities and decisions in the implementation of IT projects and thus support the implementation of innovations and process changes in everyday logistics.</p> <p>In particular, the questions and learning outcomes of the courses "Operations Research" and "Process Management" are developed and deepened in a solution-oriented manner.</p>
Module content:	<p>For various problems of Supply Chain Operation Management</p> <ul style="list-style-type: none"> applied "best practice strategies" for problem solving and implementation of IT projects by means of concrete case studies of real IT projects are analyzed, relevant business software solutions and functions are designed, sample sketches for IT projects according to the process models of ITIL (IT Infrastructure Library) are derived and applied.
Teaching and learning methods:	seminars with group work
Assessment method:	Performance assessment (100%): In order to prepare research-based learning for the Master's thesis, 3 assignments from different areas are evaluated during the semester, in which the students independently work on questions, solution concepts, and the selection and implementation of methods and procedures.
Workload (25 - 30 h \triangleq 1 ECTS credit):	180 h
Contact hours:	<p>32 h lecture</p> <p>32 h exercise</p> <hr/> <p>64 h</p>
Self-study:	116 h

Recommended prerequisites:	basic knowledge of logistics IT and ERP systems
Required prerequisites:	—
Recommended reading:	<p>M. Beims, M. Ziegenbein: IT-Service-Management in der Praxis mit ITIL, Carl Hanser Verlag GmbH & Co. KG (2015)</p> <p>N. Ebel: Basiswissen ITIL 2011, Grundlagen und Know-How für das IT Service Management, dpunkt.verlag (2014)</p> <p>M. ten Hompel et al.: Cloud Computing for Logistics, Springer Verlag (2015)</p> <p>M. ten Hompel et al.: IT in der Logistik 2013/2014, Fraunhofer Verlag (2013)</p> <p>H. Stadler et al.: Supply Chain Management und Advanced Planning: Konzepte, Modelle und Software, Springer Verlag (2010)</p> <p>H. Tempelmeier, H. Günther: Produktion und Logistik: Supply Chain und Operations Management, Books on Demand (2014)</p> <p>H. Tempelmeier, H. Günther: Übungsbuch Produktion und Logistik, Books on Demand (2013)</p> <p>Wöfle, R. und Schubert, P.: Integrierte Geschäftsprozesse mit Business Software: Praxislösungen im Detail, Carl Hanser Verlag GmbH & Co. KG (2005)</p> <p>Wöfle, R. und Schubert, P.: Prozessexzellenz mit Business Software: Praxislösungen im Detail, Carl Hanser Verlag GmbH & Co. KG (2006)</p> <p>Wöfle, R. und Schubert, P.: Business Collaboration: Standortübergreifende Prozesse mit Business Software: Praxislösungen im Detail (2007)</p> <p>Additional recommended reading might be communicated in the lecture.</p>
Use of the module in other degree programs:	—
Particularities:	—
Last update:	02/2022

Resource Management in Supply Chains

5.6 Management Areas and (Support) Functions of Logistics Service Providers

Module code:	1410
Module title:	Management Areas and (Support) Functions of Logistics Service Providers (German title: Managementbereiche und -(Support)funktionen von Logistikdienstleistungsunternehmen)
Type of module:	obligatory module
ECTS credits:	6
Language:	German
Duration:	one semester
Recommended semester:	1st semester
Frequency:	once a year in the summer semester
Module coordinator:	Prof. Dr. Thomas Krupp
Lecturers:	Prof. Dr. Stephan Freichel, Prof. Dr. Thomas Krupp, Uwe Veres-Homm (associate lecturer), Kamal Rhaouat (associate lecturer)
Learning outcome:	<p>The students are able to</p> <ul style="list-style-type: none"> assess logistics service sub-sectors and companies regarding strengths and weaknesses as well as opportunities and risks, developing starting points for improvements or designing guidelines for the management tasks of the companies <p>by</p> <ul style="list-style-type: none"> classifying logistics service companies (LDL) in the concept of business logistics and naming the specific service characteristics and the derived properties of LDL, describing and understanding why industry and commercial enterprises, as customers of LDL, outsource certain tasks and what trends exist in this regard, understanding the basic procedures and critical success factors of tendering and awarding processes, describing and analyzing different transport mode-specific and cross-transport mode institutions and their tasks and challenges for the management of the LDL, discussing the institution-specific basic business management functions and management tasks of individual LDLs and assess companies regarding strategic product-market positions <p>with the purpose</p> <ul style="list-style-type: none"> to evaluate the attractiveness of LDL sectors, e.g. in everyday professional life (e.g. as a project manager at LDL, industry or trade, or as a management consultant) and to evaluate recommendations for action, e.g. for acquisitions or market entry, to master and further develop – in later management positions, e.g. in LDL companies – the industry- and company-specific characteristics of business management functions such as operations, disposition and tender management, or financial planning, recruitment or warehouse IT, and to integrate the interdisciplinary interrelations, to deliver suitable questions and methods for the consolidation in the 2nd semester, especially in the course "Relationship Management in Supply Chains".
Module content:	Block seminars with obligatory attendance are held to assess the discussion and presentation performance. Short protocols of the meetings are to be written and presented in teams. Within the scope of 2 extensive case studies in self-study, 2

	<p>presentations with written elaboration will be carried out in teams as an examination paper.</p> <ul style="list-style-type: none"> • Conception and functions of LDL: classification of LDL in the logistics conception and functions of LDL, workshop on the role of LDL in the economy, based on current specialist and daily topics. • Outsourcing and collaboration: make-or-buy, forms and management of inter-organizational relationships. • Institutions and business models: economic characteristics of the transport carriers, freight forwarders, CEP services. • Trends, strategies and management functions: market trends, requirements, basic business administration and management functions (operations, business development, HR, IT, finance/planning and control, organization). • Human resources management in logistics: human resources and corporate strategy, development and implementation of human resources strategies, "war for talents", recruitment in tight markets, motivation and retention of know-how carriers, employee development. • Management of real estate in logistics: types, life cycle, provision and financing of logistics real estate. <p>Case Study A) analysis of company types / LDL sub-sectors (such as freight forwarders, railway companies, road haulage companies, heavy goods, textile, refrigerated goods specialists, CEPs etc.) Case Study B) company analyses regarding the functions of the LDL and the management tasks of the company management</p>
Teaching and learning methods:	on-site teaching and seminars working in small groups independent research and case study development
Assessment method:	development of case studies as term paper (50%) and presentation (50%), the four case studies result in equal shares (25% each) of the overall grade
Workload (25 - 30 h $\hat{=}$ 1 ECTS credit):	180 h
Contact hours:	32 h lecture 32 h exercise 64 h
Self-study:	76 h 40 h exam preparation
Recommended prerequisites:	fundamentals of logistics
Required prerequisites:	—
Use of the module in other degree programs:	—
Recommended reading:	<p>Pfohl, H.-Chr.: Logistiksysteme. Betriebswirtschaftliche Grundlagen. 9., neu bearbeitet und aktualisierte Auflage, Springer Verlag, Berlin u.a., 2018.</p> <p>Eßig, M. / Hofmann, E. / Stölzle, W.: Supply Chain Management. 2., neu bearbeitet und aktualisierte Auflage, Vahlen Verlag, München, 2022.</p> <p>Freichel, S.L.K.: Organisation von Logistikservice-Netzwerken. Reihe: Logistik und Unternehmensführung, hrsg. von Prof. Dr. H.-Chr. Pfohl, Bd. 4., Berlin, 1993.</p> <p>Aberle, G.: Transportwirtschaft. Einzelwirtschaftliche und gesamtwirtschaftliche Grundlagen, 5. überarbeitete und erweiterte Auflage, Oldenbourg Wissenschaftsverlag, München 2013.</p> <p>Buchholz, J./Clausen, U./Vastag, A. (Hrsg): Handbuch der Verkehrslogistik, Springer Verlag, Heidelberg, 1998.</p> <p>Corsten, H. / Gössinger R.: Dienstleistungsmanagement, 6. Vollständig überarbeitete und aktualisierte Auflage, De Gruyter, Oldenbourg, 2015.</p> <p>Müller-Daupert, B. (Hrsg.): Logistik-Outsourcing, 2. überarbeitete und aktualisierte Auflage, Vogel, München, 2009.</p>

Ihde, G. B.: Transport, Verkehr, Logistik. Gesamtwirtschaftliche Aspekte und einzelwirtschaftliche Handhabung, 3. völlig überarbeitete und erweiterte Auflage, Vahlen, München, 2001.

van Suntum, U.: Verkehrspolitik, Vahlen, München 1986.

Additional recommended reading might be communicated in the lecture.

Particularities:

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Last update:

02/2022

5.7 Relationship Management in Supply Chains

Module code:	1420
Module title:	Relationship Management in Supply Chains (German title: Beziehungsmanagement in Supply Chains)
Type of module:	obligatory module
ECTS credits:	6
Language:	English
Duration:	one Semester
Recommended semester:	2nd Semester
Frequency:	once a year in the winter semester
Module coordinator:	Prof. Dr. Zelal Ates
Lecturers:	Prof. Dr. Zelal Ates
Learning outcome:	<p>By the end of this course, students will be able to design and conduct (primary or secondary) market research for investigating innovative questions of relationship management in supply chains as well as decide on managerial recommendations by</p> <ul style="list-style-type: none"> • identifying, assessing and segmenting actors in supply chains and networks; • applying relationship and network theories and variables to real business cases, • analyzing and contrasting theoretical marketing and management approaches to practical viewpoints in relationship management in business markets, <p>in order to formulate and determine relationship management strategies for supply chains.</p>
Module content:	<ul style="list-style-type: none"> • Inter-Firm Relationships and Networks <ul style="list-style-type: none"> ○ Uncertainties in Supply Chains ○ Relationship Theories and Variables <ul style="list-style-type: none"> ▪ Principal-Agent Theory ▪ Transaction Cost Theory ▪ Resource Dependence View ▪ Social Exchange Theory ▪ Interaction Perspective ○ Network Analysis and Management • Strategy as the management of relationships and networks <ul style="list-style-type: none"> ○ The Resource-Based View ○ Supply Chain Collaboration ○ CSR and Sustainability ○ Customer Value and Relationship Value • Integrating Service Quality and Productivity Strategies <ul style="list-style-type: none"> ○ Service Quality ○ SERVQUAL ○ Gaps Model ○ Blueprinting
Teaching and learning methods:	seminar-based classes in blocks with integrated practical cases
Assessment method:	Group presentation (20%) and individual research paper (80%). Both examination parts must be passed separately.
Workload	180 h

(25 - 30 h \triangleq 1 ECTS credit):	
Contact hours: 4 SWS	32 h lecture 32 h project <hr/> 64 h
Self-study:	76 h
Exam preparation:	40 h
Recommended prerequisites:	Module "Strategic Supply Chain Management and Logistical Networks"
Required prerequisites:	—
Recommended reading:	<p>Brennan, R., Canning, L. and McDowell, R. (2017): Business-To-Business Marketing, 4th Ed., London: Sage.</p> <p>Cachon, G. (2003): Supply Chain Coordination with Contracts, in: de KoK, A. G.; Graves, S. C. [Hrsg.] (2003): Handbooks in Operations Research and Management Science, Vol. 11: Supply Chain Management: Design, Coordination and Operation, Amsterdam: Elsevier, pp. 229–340.</p> <p>Cachon, G., Larivière, M. (2005): Supply Chain Coordination with Revenue Sharing Contracts, in: Management Science 51 (2005), No. 1, pp. 30–44.</p> <p>Cachon, G.; Larivière, M. (2001): Contracting to Assure Supply: How to Share Demand Forecasts in a Supply Chain, in: Management Science, Vol. 47 (2001), No. 5, pp. 629–646.</p> <p>Cachon, G.; Netessine, S. (2004): Game Theory in Supply Chain Analysis, in: Simchi-Levi, D; Wu, S. D.; Shen, Z.-J. [Hrsg.] (2004): Handbook of Quantitative Supply Chain Analysis: Modeling in the eBusiness Era, New York: Springer Science and Business Media, pp. 13–66.</p> <p>Cachon, G.; Terwiesch, C. (2012): Matching Supply with Demand: Matching Supply with Demand: An Introduction to Operations Management, 3rd ed., New York et al: McGraw-Hill/ Irwin.</p> <p>Dwyer, F. R. and Tanner, J. F. (2009): Business Marketing, 4th Ed., McGraw Hill.</p> <p>Harrison, A.; van Hoek, R., Skipworth, H. (2014): Logistics Management & Strategy: Competing Through the Supply Chain, 5th ed., Harlow: Pearson.</p> <p>O'Brien, J. (2014): Supplier Relationship Management: Unlocking the hidden value in your supply base, London: Kogan Page.</p> <p>Swink, M. (2017): Managing Operations Across the Supply Chain, 3rd ed., New York: McGraw-Hill Education.</p> <p>Further course related literature (books, journals or articles) might be communicated at the beginning of the course.</p>
Use of the module in other degree programs:	—
Particularities:	—
Last update:	02/2022

Research

5.8 Proseminar Research Methods

Module code:	1510
Module title:	Proseminar Research Methods (German title: Proseminar Methoden der Forschung)
Type of module:	obligatory module
ECTS credits:	6
Language:	German
Duration:	one Semester
Recommended semester:	1st Semester
Frequency:	once a year in the summer semester
Module coordinator:	Prof. Dr.-Ing. C. Zoller
Lecturers:	Prof. Dr. Thomas Krupp, Prof. Dr.-Ing. C. Zoller, Dr. Bernhard Albert (associate lecturer)
Learning outcome:	<p>Students are able to</p> <ul style="list-style-type: none"> • systematically develop and evaluate innovations for the field of logistics or supply chain in industry and commerce as well as in the service sector, • detect and eliminate the various sorts of waste in production and services, asses their impact and hence implement lean management and slim production processes <p>by applying the set of methods taught during the lectures within the concepts of corporate foresight, futurology and open innovation through the involvement of customers, employees and experts in order to establish entirely new ways.</p> <p>Hence students are able to accelerate innovation processes faster and set impulses for further development later in their professional life. Particularly, in the lecture "Supply Chain and Operations in Research and Practice" students deliver the decisive relevant input for the continuation of the research cycle of research-based learning.</p>
Module content:	<p>Fundamental research:</p> <ul style="list-style-type: none"> • overview of methods of structured literature analysis • definition of the scope of analysis • procedure for the literature search: <ul style="list-style-type: none"> ○ documentation of the search queries ○ conceptualization of the topics ○ the "right" databases ○ forward and backward search • analysis and synthesis • creation of research map, research question, plan <p>Assignment fields in future research and open innovation in companies</p> <ul style="list-style-type: none"> • basic approaches to innovation and innovation management in SCOM: <ul style="list-style-type: none"> ○ "from inside out" ○ "out of the box" – creativity and impulses "from outside" • selected methods of creating innovations in supply chains • corporate foresight process • futurology – concepts and procedures • open innovation in logistics – concepts and procedures • methods of qualitative social research in open innovation and futurology • collection of information, i.e. expert interviews or group moderation

	<ul style="list-style-type: none"> basics of information analysis, particular hermeneutic and qualitative content analysis creativity techniques, particularly group-based methods like world café, synectics 										
Teaching and learning methods:	<p>Within the didactical approach of research-based learning the pro-seminar research methods functions as the methodical framework for the courses within the first semester: Based on the content of this seminar the following steps will be targeted:</p> <ul style="list-style-type: none"> guidance to a problem statement based on supply chain and operations management verbalization of a suitable research question development of existing solution approaches choice and acquisition of appropriate methods <p>This cycle will then be further deepened in the second semester, especially in "Supply Chain and Operations in Research and Practice" and finally entirely concluded with the research of the master thesis.</p> <p>Applied methods of learning:</p> <ul style="list-style-type: none"> seminar-based teaching (communication of an overview over the methods) and coaching, independent research and evaluation of data, statistics and literature. <p>Conceptualisation, implementation and result analysis of a workshop in small groups with the goal to develop a report (documentation of the results).</p> <p>In the implementation of the workshop - according to the ProfIL² philosophy - the involvement of other students and lecturers from different departments is planned.</p> <ul style="list-style-type: none"> practice and exercise the methods in case studies (work groups, business game, etc.) individual discussions blended learning 										
Assessment method:	Research paper fundamental research (term paper) (50%) and research paper futurology (portfolio) (50%)										
Workload (25 - 30 h $\hat{=}$ 1 ECTS credit):	180h										
Contact hours: 4 SWS	<table> <tr> <td>32 h</td> <td>lecture</td> </tr> <tr> <td>16 h</td> <td>exercise</td> </tr> <tr> <td>16 h</td> <td>project</td> </tr> <tr> <td colspan="2"><hr/></td> </tr> <tr> <td>64 h</td> <td></td> </tr> </table>	32 h	lecture	16 h	exercise	16 h	project	<hr/>		64 h	
32 h	lecture										
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Self-study:	<table> <tr> <td>10 h</td> <td>lecture</td> </tr> <tr> <td>58 h</td> <td>exercise</td> </tr> <tr> <td>48 h</td> <td>project</td> </tr> <tr> <td colspan="2"><hr/></td> </tr> <tr> <td>116 h</td> <td></td> </tr> </table>	10 h	lecture	58 h	exercise	48 h	project	<hr/>		116 h	
10 h	lecture										
58 h	exercise										
48 h	project										
<hr/>											
116 h											
Exam preparation:	—										
Recommended prerequisites:	—										
Required prerequisites:	—										
Recommended reading:	<p>Atteslander, P. (2010): Methoden der empirischen Sozialforschung. Berlin: Erich Schmidt Verlag GmbH & Co.</p> <p>Chesbrough, H. (2003): The Era of Open Innovation, MIT Sloan Management Review, Spring 2003, p. 35-41.</p> <p>Chesbrough, H. (2006): Open Innovation: The New Imperative for Creating And Profiting from Technology, Harvard Business Review Press.</p>										

Chesbrough, H. (2011): Open Services Innovation: Rethinking Your Business to Grow and Compete in a New Era, John Wiley & Sons.

Higgins, J. M. / Wiese, G. (1996): Innovationsmanagement. Kreativitätstechniken für den unternehmerischen Erfolg. Berlin: Springer

Jungk, R. / Müllert, N. R. (1993): Zukunftswerkstätten. Mit Phantasie gegen Routine und Resignation. 3. Aufl. München: Heyne.

Mayring, P. / Gläser-Zikuda, M. [Hg.](2005): Die Praxis der qualitativen Inhaltsanalyse. Weinheim und Basel: Beltz Verlag.

Schnell, R. / Hill, P. / Esser, E. (2005): Methoden der empirischen Sozialforschung. 7. Aufl. Berlin: Oldenbourg Verlag.

Strübing, J. (2018): Qualitative Sozialforschung: Eine komprimierte Einführung. 2. Auflage. Berlin, Boston. De Gruyter Oldenbourg Verlag.

Treptow, C. (2012): Methoden und Techniken für kreative Lösungen und Bewertungen von Ideen. Ein Merkblatt der Industrie- und Handelskammer Hannover. Hg. v. Industrie- und Handelskammer Hannover.

Von der Gracht, H / Albert, B. / Krupp, T. (2013): „Zukunftsforschung im Mittelstand. Erfahrungen der Zukunfts-Werkstatt 2020 der Stückgutkooperation System Alliance“, 231-248, in: Popp, R. / Zweck, A. „Zukunftsforschung im Praxistest“, Berlin: Springer.

Further course related literature (books, journals or articles) might be communicated at the beginning of the course.

Use of the module in other degree programs:

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Particularities:

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Last update:

03/2022

5.9 Supply Chain and Operations in Research and Practice

Module code:	1520
Module title:	Supply Chain and Operations in Research and Practice (German title: Supply Chain and Operations in Forschung und Praxis)
Type of module:	obligatory module
ECTS credits:	6
Language:	German
Duration:	one semester
Recommended semester:	2nd semester
Frequency:	once a year in the winter semester
Module coordinator:	Prof. Dr. Thomas Krupp
Lecturers:	All professors of the Faculty of Automotive Systems and Production (faculty 08) and the Faculty of Business, Economics and Law (faculty 04) are entitled to function as thesis supervisors.
Learning outcome:	<p>The students are able to</p> <p>to assess existing gaps in research and to design a concrete research project based on this by using the tools from the lecture and the proseminar "Proseminar Methods of Research" to justify the benefit of the research project for companies and society, evaluate the state of research and decide on a suitable research approach and funding opportunities.</p> <p>In this way, they will be able to carry out research projects in their profession both in science and in practice in a beneficial and successful way from the point of view of research and company practice. They will be able to evaluate the usefulness or transferability of research findings in logistics / supply chain and operations management to their own professional world.</p>
Module content:	<ul style="list-style-type: none"> • fundamentals of the theory of science and the importance of applied research in business practice • exemplary overview of the research landscape and activities in logistics • principles of research funding in Germany and EU public funding for companies • development of research and innovation priorities from a microeconomic and macroeconomic perspective • strategic analysis • controlling of research and development • methods of market and company analyses in logistics • empirical analyses: questionnaires and expert interviews • strategy process in the company • overview of alternative research, analysis and optimization methods • research cycle - development and analysis of concrete research questions and transfer into a suitable research design up to evaluation
Teaching and learning methods:	<p>Within the didactic approach of research-based learning, "Supply Chain and Operations in Research and Practice" together with the "Pro-seminar Research Methods" serve as a methodological bracket for the modules of the first semester: Based on the contents of these courses, the following steps are worked towards:</p> <ol style="list-style-type: none"> 1. development of a "suitable" research design, 2. performance of a research activity, 3. preparation and presentation of the results and 4. reflection on the whole process. <p>This cycle is then completed with the Master's thesis.</p> <p>Seminar-based teaching (selection and explanation of the research project) and coaching.</p>

	Research project in small groups with preparation of a report, for the joint development of the research project small group discussions and elements of the group puzzle.
Assessment method:	project portfolio (100%), for explanation: e.g. brief descriptions of selected optimization methods; protocols of courses, definitions of project relevant terms; development of suitable models (operationalization, scaling), comparison of alternative evaluation and solution methods, evaluation of data on given questions, presentation of analysis results and derivation of recommendations for action.
Workload (25 - 30 h $\hat{=}$ 1 ECTS credit):	180 h
Contact hours:	—
Self-study:	—
Exam preparation:	—
Recommended prerequisites:	attendance of first semester lectures, especially "Strategic Supply Chain Management and Logistics Networks" and "Proseminar Research Methods"
Required prerequisites:	—
Recommended reading:	<p>Bohlmann, B.; Krupp, T. [Hrsg.] (2007): „Strategisches Management für Logistikdienstleister: Grundlagen und Praxisberichte“, Hamburg: Deutscher Verkehrs-Verlag</p> <p>Deutsche Verkehrszeitung / LOG..Kompass [Hrsg.]: Forschungsagenda Logistik, jeweils aktuelle Auflage, DVV Media Group</p> <p>„Logistics Research“ (peer-reviewed open access journal), Springer Open, http://www.springer.com/engineering/production+engineering/journal/12159</p> <p>von der Gracht, H. A. (2008). The Future of Logistics – Scenarios for 2025. Wiesbaden.</p> <p>Publikationen und Präsentationen aktueller Forschungsprojekte der Logistik an der TH Köln, stellvertretend</p> <p>Krupp, T.; Suntrop, C.; Veres-Homm, U.; Wauben, D. (2014) „Chemielogistik im Rheinland - Angebot, Nachfrage und Infrastruktur“, Studie von ChemCologne, Würzburg: Vogel Business Media.</p> <p>Krupp, T.; Suntrop, C.; Veres-Homm (2017): „Leveraging Supply Chain for strategic advantage in the Chemical Industry“. Recklinghausen. RDN Verlag.</p> <p>Krupp, T.; Bernd, U.; Albert, B.; von der Gracht, H. (2013): „Zukunftsreport 2.0 der System Alliance“, Niederaula: System Alliance.</p> <p>Reinhard, H.; Krupp, T. (2015): „Stadtmobilität aus Sicht der Wirtschaft am Beispiel Köln“, IHK Köln.</p> <p>Reinhard, H.; Krupp, T. et al. (2017): „Potentiale des Baustellenmanagements im Bezirk der IHK Köln“, IHK Köln.</p> <p>Additional recommended reading might be communicated in the lecture.</p>
Use of the module in other degree programs:	—
Last update:	02/2022

Required Electives

5.10 Branch-Specific Supply Chain and Operations Management

Module code:	2010
Module title:	Branch-Specific Supply Chain and Operations Management (German title: Branchenspezifisches Supply Chain and Operations Management)
Type of module:	obligatory elective
ECTS credits:	6
Language:	English
Duration of module:	one Semester
Recommended semester:	2nd Semester
Frequency:	once a year in the winter semester
Module coordinator:	Prof. Dr. Schulte Herbrüggen
Lecturers:	Prof. Dr. Stephan Freichel, Prof. Dr. Kathrin Hesse, Prof. Dr. Thomas Krupp, Prof. Dr. Schulte Herbrüggen
Learning outcome:	<p>The students optimize and evaluate new branch-specific Supply Chain and operations processes with an interdisciplinary approach. Perspectives are chemical industries and chemical process engineering, production processes and SCM in the automotive sector or the specific characteristics of the spare parts logistics and the specific characteristics of the SCOM in the automotive aftermarket sector</p> <p><i>Therefore, they can</i></p> <ul style="list-style-type: none"> • apply tailored analytical framework for branch specific Supply Chain and Operations Management, • evaluate the importance of sector-specific analysis for logistics service providers and the SC and operations departments in industry and trade <p><i>by</i></p> <ul style="list-style-type: none"> • planning, realizing and controlling automotive logistics systems, • organizing the phases of automotive logistics focusing on lean structures and processes, • integrating technical and organizational systems meeting customers' requirements professionally and profitably through Kaizen principles, • adapting the concepts of logistics and supply chain management regarding the specifics of automotive after sales, • coordinating and integrating strategies, systems and skills of an enterprise as well as those of its partners in order to be able to flexibly respond to the after sales requirements of the customers. <p>This branch-specific logistics approach enables the students to use their interdisciplinary skills at the interface between natural sciences (chemistry), process engineering and production as well as business management logistics.</p>
Module content:	<p>Supply Chain and Operations Management in Chemical Industries</p> <ul style="list-style-type: none"> • importance of branch-specific analysis in logistics • overview - supply chains in the chemical industry <ul style="list-style-type: none"> ○ characteristics of chemical logistics - specifics and heterogeneity ○ top „market player“ in chemical industries and logistics service providers in Germany, Europe and worldwide ○ supply chain types in chemical industries ○ business models by industry and LSPs • branch-specific approaches and perspectives on chemical supply chains <ul style="list-style-type: none"> ○ industry: value creation from feedstock to finished products ○ structure: producers, site operators, logistics service providers, distributors

- management: design, planning and processing of supply chains
- processes: procurement, production, distribution, Management of innovations, cost management, management of service providers, supply chain strategy
- special aspects in chemical industries: production systems, hazardous substances / assets, assets and equipment
- practices / processes, degree of development and potential for improvements
 - operational
 - tactical
 - strategic
- future trends and developments in chemical supply chains

Automotive Supply Chain and Operations Management

- fundamentals of automotive logistics systems
- just-in-time, just-in-sequence and mass customization concepts for automotive procurement logistics and production logistics systems
- customer-oriented distribution logistics systems
- green/ closed loop/ reverse automotive logistics systems
- integrative automotive supply chain systems avoiding Bullwhip effects
- optimization concepts and methods concerning lean structures and processes for permanently improving automotive logistics systems

Automotive Aftersales Supply Chain and Operations Management

- aftersales related SCOM basics and concepts
- specifics, functional disciplines of the spare parts supply chain and the importance of the aftersales business
- automotive aftersales market structures
- designing and running Automotive Aftersales Supply Chain Networks and Operations (CDC, RDCs, LDCs)
- case studies, trends and developments to be continued by teamwork studies on selected cases and key issues.

Teaching and learning methods:	case-study examples, selected expert lectures and company visits
Assessment method:	Exam: portfolio of three scientific presentations: Supply Chain and Operations Management in Chemical Industries (33%) Automotive Supply Chain and Operations Management (33%) Automotive Aftersales Supply Chain and Operations Management (33%)
Workload (25 - 30 h $\hat{=}$ 1 ECTS credit):	180 h
Contact hours: 4 SWS	32 h lecture 16 h exercise 16 h project <hr/> 64 h
Self-study:	10 h lecture 58 h exercise 48 h project <hr/> 116 h
Recommended prerequisites:	—
Required prerequisites:	—

Recommended reading:	<p>Amecke, H.: Chemiewirtschaft im Überblick – Produkte, Märkte, Strukturen, VCH Verlagsgesellschaft mbH, Weinheim, 1987.</p> <p>Bretzke, Wolf-Rüdiger: Logistische Netzwerke, 4. Auflage, Springer, Heidelberg, 2020.</p> <p>Dangelmaier, W./ Emmrich, A./ Gajewski, T.; Referenzmodell zur Serviceproduktgestaltung in der Automobilzulieferindustrie: Geschäftsstrategien für Servicemanagement und Ersatzteillogistik, in: Barkawi, K./ Baader, A./ Montanus, S. (Editors); Erfolgreich mit After Sales Services: Geschäftsstrategien für Servicemanagement und Ersatzteillogistik, Berlin/ Heidelberg/ New York 2006. Springer, pp. 153-177.</p> <p>Hecker, F. / Hurth, J. / Seeba, H.-G. (Hrsg.): Aftersales in der Automobilwirtschaft. 3. Auflage. Springer Verlag, München, 2017.</p> <p>Klug, F.; Logistikmanagement in der Automobilindustrie: Grundlagen der Logistik im Automobilbau, Springer Verlag, Heidelberg, Dordrecht, London, New York, 2010.</p> <p>Krupp, T.; Suntrop, C.; Veres-Homm, U.: Supply Chain in the Boardroom – 5 Levers to Boost a Chemical Company`s Bottom Line, DHL, Bonn, 2015.</p> <p>Krupp, T.; Suntrop, C.; Veres-Homm, U.: Chemielogistik im Ruhrgebiet, ChemSite, Herten, 2016.</p> <p>Krupp, T.; Suntrop, C.; Veres-Homm, U.; Wauben, D.: Chemielogistik im Rheinland – Angebot, Nachfrage und Infrastruktur, ChemCologne, Köln, 2015.</p> <p>Krupp, T.; Suntrop, C.; Kille, Christian; Veres-Homm, U.; Heeg, L.: Chemielogistik – Bedeutung, Strukturen, Dynamik, Deutscher Verkehrsverlag, Hamburg, 2013.</p> <p>Suntrop, C.: Chemielogistik: Markt, Geschäftsmodelle, Prozesse, Wiley VCH, Weinheim, 2011.</p> <p>Verband der chemischen Industrie (VCI) [Hrsg.] (2022 bzw. jeweils aktuelle Ausgabe): Chemiewirtschaft in Zahlen, VCI, Frankfurt, 2022.</p> <p>Further course related literature (books, journals or articles) might be communicated at the beginning of the module.</p>
Use of the module in other degree programs:	—
Particularities:	—
Last update:	02/2022

5.11 Insurance in Logistics and Customs and Foreign Trade Law

Module code:	2020
Module title:	Insurance in Logistics and Customs and Foreign Trade Law (German title: Versicherung in der Logistik und Zoll- und Außenhandelsrecht)
Type of module:	obligatory elective
ECTS credits:	6
Language:	German
Duration:	one semester
Recommended semester:	2nd semester
Frequency:	once a year in the winter semester
Module coordinator:	Prof. Dr. Thomas Krupp
Lecturers:	Dr. Marcus Kirchhof (associate lecturer), Reinhard Fischer (associate lecturer)
Learning outcome:	<p>The students are able</p> <ul style="list-style-type: none"> • to select liability law basics for logistics companies as well as customs and foreign trade regulations on export and import requirements in companies according to the situation and to evaluate their advantage for problem solving, • by taking precautions to analyze the necessary transport insurance as well as the embargo and denied parties on the one hand and to identify deficits in the secure supply chain and to select and assign measures to eliminate them on the other, • to make optimal decisions in and for the company as future junior managers (especially in logistics).
Module content:	<p>Insurance in Logistics</p> <ul style="list-style-type: none"> • liability law basics <ul style="list-style-type: none"> ○ liability of the carriers for domestic transports (carriers, forwarding agents, warehousemen) ○ liability for cross-border transport (land transport, rail transport, air transport) ○ liability for sea transport ○ liability from contracts for work and services ○ General German Forwarding Agent Conditions • basics of the insurance <ul style="list-style-type: none"> ○ general information ○ liability insurances ○ property insurance ○ transport insurance ○ recourse • transport liability insurance <ul style="list-style-type: none"> ○ the „VHV“-insurance ○ the „AVB“ logistics ○ special terms and conditions ○ business liability insurance <p>Customs and Foreign Trade Law</p> <ul style="list-style-type: none"> • legal bases in cross-border trade of goods <ul style="list-style-type: none"> ○ legislation in the European Union ○ the new provisions of the Union Customs Code and its delegate and implementing acts • clearance procedure <ul style="list-style-type: none"> ○ the German customs IT procedure ATLAS ○ simplified customs declaration procedures ○ single authorization in the European Union • proof of status in the European Union • transit procedure

- detailed study of the NCTS and TIR procedures
- customs exemptions
 - tariff and non-tariff duty exemptions in cross-border trade
- inward processing
 - special case constellations from the chemical and automotive industries
- outward processing
 - selected examples from the textile industry
- temporary use
 - special applications
- customs warehouse
 - investigation of warehouse types A to E
 - deepening the storage and retrieval scenarios
- Authorized Economic Operator (AEO) advantages in cross-border trade of goods
 - approval procedure
 - re-certification
 - temporary suspension and withdrawal
- customs valuation
 - deepening of the individual customs valuation methods
- relationship between customs duties and value added tax
 - value added tax in the EU internal market
 - selected case studies from eCommerce logistics
- prohibitions and restrictions
 - special examples from the field of brand protection and pharmaceuticals in eCommerce logistics
- origin of goods and preferences
 - deepening the calculation of preferences with the application of multilateral cumulation
- foreign trade law
 - export procedure
 - selected examples of embargo measures
- authorization procedures, types of authorization and certificates

Teaching and learning methods:	seminar-based classes, integrated case exercises
Assessment method:	examination (100%), 90 minutes
Workload (25 - 30 h $\hat{=}$ 1 ECTS credit):	180 h
Contact hours:	64 h
Self-study:	116 h
Recommended prerequisites:	—
Required prerequisites:	—
Recommended reading:	Wieske, Thomas: Transportrecht schnell erfasst, 3. Auflage, Heidelberg, Springer, 2012 Gesetzestexte (HGB, BGB, VVG) Internationale Übereinkommen (CMR, COTIF/CIM, CMNI, MÜ, HVR) Allgemeine Geschäftsbedingungen des Speditionsgewerbes Fischer, R./Reinhard, H.: Ein Ziel – Zwei Wege? Der Vergleich zwischen Authorized Economic Operator und Customs-Trade Partnership Against Terrorism. In: AW-Prax, 16. Jahrgang, 4/2010, S. 119-156. Drees, F. J. u. a.: Zoll & Export 2011: Alles, was Sie jetzt wissen müssen! Bundesanzeiger, 2011. Witte, P./Wolffgang, H.-M.: Lehrbuch des Europäischen Zollrechts, 6. Auflage, nwb Verlag, 2009. Witte, P./Henke, R.: Fallstudien Europäisches Zollrechts, 3. Auflage, nwb Verlag, 2010. Further literature might be communicated at the beginning of the module.

Use of the module in other degree programs: —

Last update: 02/2022

5.12 Mobility and Logistics in Urban Areas

Module code:	2030
Module title:	Mobility and Logistics in Urban Areas (German title: Mobilität und Logistik in urbanen Räumen)
Type of module:	obligatory elective
ECTS credits:	6
Language:	German
Duration:	one semester
Recommended semester:	2nd semester
Frequency:	once per year in the winter semester
Module coordinator:	Prof. Dr. Thomas Krupp
Lecturers:	Dr. Klaus Esser (associate lecturer), Dr. Hendrik Koch (associate lecturer)
Learning outcome:	<p>Students are able to,</p> <ul style="list-style-type: none"> • evaluate the challenges of passenger and freight transportation in urban areas, • by applying analytical grids for problem-related logistics considerations, analyzing the service provision in urban passenger and freight transport and evaluating current and forward-looking approaches, • in order to derive challenges and design solutions.
Module content:	<p>Freight, commercial transport, logistics</p> <p><i>Fundamentals of urban freight transport</i></p> <ul style="list-style-type: none"> • actors of commercial transport - demanders, providers and stakeholders of urban logistics • levels of (urban) freight transport: industrial and commercial freight transport (industrial logistics, construction sites and craftsmen); consumer goods distribution B2B (store deliveries) and B2C (deliveries to private households) • transport infrastructure and management in urban freight transport • stages of urban freight distribution: (main runs), penultimate and last mile, definition and delimitation of last mile transports <p><i>Urban distribution systems</i></p> <ul style="list-style-type: none"> • courier, express and parcel services (CEP) - special features of the logistics market segment: structure and conception; demand structures and market overview • megatrend e-commerce and growth of shipment volumes • general cargo transports, store delivery etc. • (integrated) city logistics concepts • "new" delivery services such as Flaschenpost, Lieferando, Gorillaz, etc. <p><i>Selected best and next practices in urban freight transport</i></p> <ul style="list-style-type: none"> • new vehicle and system technologies • innovative solutions for last mile logistics • innovative concepts: pickshare, freight streetcar, etc. <p><i>Role of and challenges for municipalities</i></p> <ul style="list-style-type: none"> • challenges for municipalities (ensuring the supply of business and population, emission reduction, competition for land, etc.) • consequences of the mobility and traffic transition for urban commercial traffic • sustainable urban logistics as a municipal design task <p><i>Trade and logistics</i></p> <ul style="list-style-type: none"> • interactions between trade and logistics

- effects of changes in retail on logistics flows
- logistics as the "backbone" of commerce

Passenger transport

Fundamentals of mobility and passenger transport logistics

- mobility and transport in the context of current market developments and changing customer needs as well as the development of transport demand (market shares/modal split): status quo, development and forecasts of current trends (effects of Covid19, home office, sharing etc.)
- structures and level of market organization in passenger transport:
- local transport vs. long-distance transport; individual transport vs. public transport vs. shared mobility
- organizational structures in public transport (3-level model): roles and tasks of public & private companies, public authorities/local authorities, transport associations; instruments of planning & control of public passenger transport services and infrastructure (NVP, SUMP etc.)
- connection between mobility and spatial and settlement structures: Current approaches "15-minute-city (Paris)", "Copenhagen way", "Superblocks (Barcelona)".
- traffic transition for sustainability/climate protection and mobility: traffic as a problem of climate change and sustainable mobility as a solution approach

Innovative concepts / developments of passenger (local) transport and urban mobility (services)

- new legal framework for passenger transport (PBfG amendment) and autonomous driving
- shared mobility as a new form of shared public mobility: from eScooters to (autonomous) eCarsharing
- new products and mobility services: New Mobility and autonomous driving
- product policy and pricing in public transport and for shared mobility: flat rates (365 Euro tickets) vs. dynamic "pay per use"
- multi- and intermodality for combining and bundling mobility services in metropolitan areas

Selected best/next practices and new business models in urban passenger transport

- digital mobility platforms as Amazon of mobility
- digital pricing as a basis for new, flexible mobility products
- mobility budgets as an answer to company cars or job tickets in mobility management
- on-demand services, ridehailing and robotaxis

Teaching and learning methods:	on-site and seminar-based teaching, field trips where applicable, independent research and case study preparation
Assessment methods:	elaboration of case studies as term paper (50%) and presentation (50%)
Workload (25 - 30 h $\hat{=}$ 1 ECTS credit) :	180 h
Contact hours: 4 SWS	64 h
Self-study:	116 h
Exam preparation:	40 h
Recommended prerequisites:	—
Required prerequisites:	—
Recommended literature:	Aberle, G.: Transportwirtschaft. Einzelwirtschaftliche und gesamtwirtschaftliche Grundlagen, 4. überarbeitete und erweiterte Auflage, München/Wien 2006. Ackermann, T: Handbuch Marketing im ÖPNV, DVV media 2016 ADL future lab/UITP: The Future of Mobility post-COVID, 4 th edition 2020

<hr/>	<p>Agora Verkehrswende: Mit der Verkehrswende die Mobilität von morgen sichern. 12 Thesen zur Verkehrswende, Berlin 2017</p> <p>BMVI / infas: Mobilität in Deutschland, 2018 (www.mobilitaet-in-deutschland.de)</p> <p>Buchholz, J./Clausen, U./Vastag, A. (Hrsg): Handbuch der Verkehrslogistik, Heidelberg 1998. Clausen, U.; Geiger, C. (2013): Verkehrs- und Transportlogistik, Springer Vieweg</p> <p>Gather, M., Kagermaier, A., Lanzendorf, M. (2008): Geographische Mobilitäts- und Verkehrsforschung, Borntraeger.</p> <p>Henkel, S.; Tomczak, T.; Henkel, S.; Hauner, C. (2015): Mobilität aus Kundensicht, Springer Gabler.</p> <p>KE-CONSULT (2021), Möglichmacher in bewegten Zeiten, KEP-Studie 2021, Analyse des Marktes in Deutschland. Studie für den Bundesverband Paket und Expresslogistik.</p> <p>KE-CONSULT, Prognos, ILS (2018), Smart Cities – Verkehrlich-städtebauliche Auswirkungen des Online-Handels, Studie für das Bundesinstitut für Bau-, Stadt- und Raumforschung, Bonn.</p> <p>KE-CONSULT, Prognos (2020), Marktanalyse urbaner Wirtschaftsverkehr in Deutschland, Studie für die NOW GmbH (Nationale Organisation Wasserstoff- und Brennstoffzellentechnologie).</p> <p>KE-CONSULT (2018), Die Ladezone im Blickpunkt, Anforderungen an die Güterversorgung der Stadt, Studie für die IHK Köln.</p> <p>Pfohl, H.-Chr.: Logistiksysteme. Betriebswirtschaftliche Grundlagen. 9., neu bearbeitete und aktualisierte Auflage, Springer Verlag, Berlin u.a., 2018.</p> <p>Vorlesungsunterlagen der Dozenten mit aktuellen Praxis-Beispielen.</p> <p>Further literature might be communicated at the beginning of the module.</p>
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Use of modules in other degree programs:	—
Particularities:	—
Last update:	02/2022

Master's Thesis

5.13 Master's Thesis and Final Oral Examination (“Kolloquium”)

Module code:	0950/0960
Module title:	Master's Thesis and Final Oral Examination (“Kolloquium”) (German title: Masterthesis und Kolloquium)
Type of module:	obligatory module
ECTS credits:	26 ECTS for the Master's thesis and 4 ECTS for the final oral examination (“Kolloquium”)
Language:	German or English
Duration of module:	one semester
Recommended semester:	3rd semester
Frequency:	twice a year: in the summer and winter semester
Module coordinator:	Prof. Dr. Kathrin Hesse
Lecturers:	All professors of the Faculty of Automotive Systems and Production (faculty 08) and the Faculty of Business, Economics and Law (faculty 04) are entitled to function as thesis supervisors.
Learning Outcome:	<p>Students show in their Master's thesis that they are able to work within a limited time period on a given set of questions/ an academic problem from the various disciplines such as economic, business or engineering science. Within these disciplines students may focus on subjects as logistics, supply chain management or operations management and work on their Master's thesis in an open and creative way, both, in detail concerning the content specific to their discipline as well as with respect to their general view that shows their knowledge of cross-disciplinary scientific work. Hereby students should consider and assess the various methods and contents acquired during their studies and show how to apply these independently according to recent academic standards.</p> <p>Students should be able to</p> <ul style="list-style-type: none"> • work independently, diligently as well as subject- and result-oriented, • apply the subject specific knowledge and methods purposefully and problem oriented in order to give their qualified scientific view/opinion on their topic, • think in a cross-disciplinary context, • elaborate a project plan and the respective time management independently; to organise the implementation of their research project (master thesis) self-responsible and to deliver the results according to the deadline in time, • document and record the results precisely and completely, • present the task, the approach as well as the results in a thesis defence in front of an expert audience. <p>Conclusively, students will be able to classify, evaluate, develop and extend existing logistic systems by means of research-based and well-founded scientific methods, strategies and processes.</p>
Module Content:	<p>The content of the master thesis depends on the respective economic, business or logistics research question which may be specialised in the various fields of sciences such as logistics, supply chain management or operations management. Typically, a master thesis consists of the following elements:</p> <ul style="list-style-type: none"> • the research motivation and the detailed research question,

	<ul style="list-style-type: none"> • a detailed analysis of the research question with appropriate scientific methods (e.g. observations, surveys and interviews, literature research and others), • development of appropriate solutions approaches under consideration of scientific methods and instruments, • evaluation and selection of optimal solution alternatives with suitable criteria, • design of a project plan for the implementation/ realisation of an optimal solution and if applicable performance of the research (project) plan, • critical evaluation and discussion of the solutions and outlook for further research possibilities and questions as well as further call for actions, • illustration and evaluation in written form of all elements and steps of the research project according to academic principles as well as • oral presentation (and defence) of the task, the essential foundations and assumptions, the chosen procedure and the achieved results in front of an expert audience (in German: Kolloquium).
Teaching and learning methods:	Independent scientific and applied handling of the research question/ task according to the content of the study programme under the guidance of the respective supervisor.
Assessment method:	Written academic work (Master's thesis, oral presentation and defence of the research question, research approach/ methodology and the main foundation as well as the results of the Master's thesis in the thesis defence (Kolloquium).
Workload (25 - 30 h $\hat{=}$ 1 ECTS credit):	900 h
Process and documentation:	780 h
Preparation and implementation of the thesis defence:	120 h
Recommended prerequisites:	—
Required prerequisites:	in accordance with the examination rules
Recommended reading:	The literature recommendations are in accordance with the respective research task/ question of the master thesis.
Use of the module in other degree programs:	—
Particularities:	—
Last update:	02/2022

Impressum:

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