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. This is the translation of the version “PO2”.]

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Technology
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1 Study objectives

The aim of the Master of Science in Supply Chain and Operations Management is to provide students with additional, more in-depth and scientifically sound strategies, processes, methods and systems of supply chain and operations management after completing a first profession qualifying degree. In line with the current interpretation of logistics as the holistic management of the flow of objects (goods, people, information, etc.) in networks, a special focus is placed on the internal and cross-company logistics and logistics-related activities and processes of companies.

Students are well-prepared to manage challenges and to actively shape the sustainable economy in terms of ecologically, socially and economic viable sustainable as well as resilient and crisis-proof value networks.

The master’s program begins in the summer semester. The study program lasts three semesters, with two semesters dedicated to courses and one semester to the master's thesis and colloquium.

The study program is a research-oriented Master's program enabling students to fully explore scientific theories, approaches and methods in a problem-oriented manner and to deepen these independently in their own virtual research projects as well as in the master's thesis.

Existing knowledge of logistics, production, operations and supply chain management, which has already been acquired in a bachelor’s degree program in economics or engineering with a minimum degree of "Bachelor of Engineering", "Bachelor of Arts" or "Bachelor of Science" comprising relevant logistics or supply chain management reference, is systematically and scientifically substantiated and deepened in a practice-oriented manner.

A comprehensive and interdisciplinary approach is necessary to understand supply chain and operations management as a cross-sectional function in companies and within their supply chains or company networks. Hence, the individual elements from strategy to concrete implementation are considered from both a business management and an engineering perspective.

The interdisciplinary approach of the study program leads to more than the sum of the partial aspects learned from the disciplines involved - rather, the purposeful adoption of different perspectives enables students to achieve a new level of perceiving supply chains: in this way, they learn very specifically how to adopt the necessary different perspectives and which aspects are of particular importance during their studies. As a result, students gain a new perspective on the tasks and challenges they will face later in their careers. Moreover, they are capable to successfully master the tasks described above as an integrating element of the flow of goods and information within and between companies.

In this master's degree program, students train their function and system-oriented, interdisciplinary thinking. They acquire skills enabling them to recognize and evaluate complex issues and tasks in supply chain and operations management, develop both engineering and business solutions and ultimately combine them into holistic and sustainable solutions. Furthermore, they learn to use scientific methods to solve tasks, apply them to practical problems and further develop them in a problem-specific manner in order to drive technical and scientific progress in research and development.

As "creative problem solvers" for innovation activities in companies as well as for scientific research in partially or completely unknown territory, graduates will be able to work on challenging supply chain and operations management tasks in research and in the development of new products along with processes in a targeted, problem-oriented and independent manner. Graduates will be able to transfer those products and processes in socially and economically responsible management actions.

In recent years, the scope of tasks in supply chain and operations management has grown continuously, which means that scientists and managers are confronted with ever-increasing challenges. The reduction of vertical integration and the dislocation of production and service resources along with processes in complex global supply chains with corresponding opportunities and risks, modern information and communication technologies to Industry 4.0 or Logistics 4.0 along with the formation of complex networks are currently causing that both the linking of companies in supply chain management as well as operations management, meaning the management of processes and resources in production systems for the manufacture of goods and services, are facing fundamental changes. The focus is on the development of sustainable and resilient supply chains that take into account the social, ecological and economic dimensions of sustainability and at the same time continuously adapt to the changing environment in order to ensure the continuity and ability to act of the supply networks (even in the event of disruptions). The Supply Chain and Operations Management degree program addresses these developments thematically and underpins them methodically.

Supply Chain and Operations Managers act as "highly specialized generalists" in a highly exciting and attractive professional field comprising:

- various players in company networks, such as suppliers, manufacturers, retailers and (logistics) service providers;
- different functions/departments, such as procurement, production and sales, as well as
- different disciplines: economics and engineering

This opens up career opportunities for graduates both in logistics and supply chain and operations (management) research at universities and institutes as well as supply chain and operations managers at logistics service providers or in supply chain and operations departments in industry and trade as well as in the higher civil service at public authorities with logistics or comparable areas of responsibility. Furthermore, the master's degree program provides the basis for further academic qualification as part of a doctorate program.

2 Graduate profile

The research-oriented master's degree program educate managers and experts with specific supply chain and operations management knowledge and an interdisciplinary perspective who connect various actors, professional disciplines and functions in their integrative role while being able to develop scientifically sound practical solutions to complex problems.

As "creative problem solvers" in partially or completely unknown territory, graduates address challenges of society, the economy as a whole and the individual economy. In doing so, they transfer current economic, social and technical developments to supply chain and operations management and vice versa in order to realize goal-oriented innovative products and processes to solve these problems. In their role as "highly specialized generalists" for integrating functions (e.g. procurement or distribution), players (manufacturers and suppliers, (logistics) service providers to the consumer) and various professional disciplines (in particular computer science, economics and engineering), they understand the interaction and the diverse cause-and-effect relationships within the company network or in the supply chains. By purposefully taking different perspectives of the supply chain, the future supply chain and operations managers recognize the need for and opportunities for action in the interaction of the various elements. They develop holistic solutions (approaches) and are capable to accompany these until implementation.

During their studies, students address a wide range of topics from a logistics perspective, encompassing digitalization and automation technologies, ecological potentials in the supply chain to urban mobility solutions, which broadens their understanding of the various problems of our time. With this "generalist" understanding, graduates are able to penetrate specific problems in a holistic context. With increasing experience in the professional world, they continuously develop their understanding of problems and their individual problem-solving skills.

As future managers and experts, they will actively shape the transformation processes in logistics, supply chain and operations management with regard to meeting the changing requirements of the respective stakeholders.

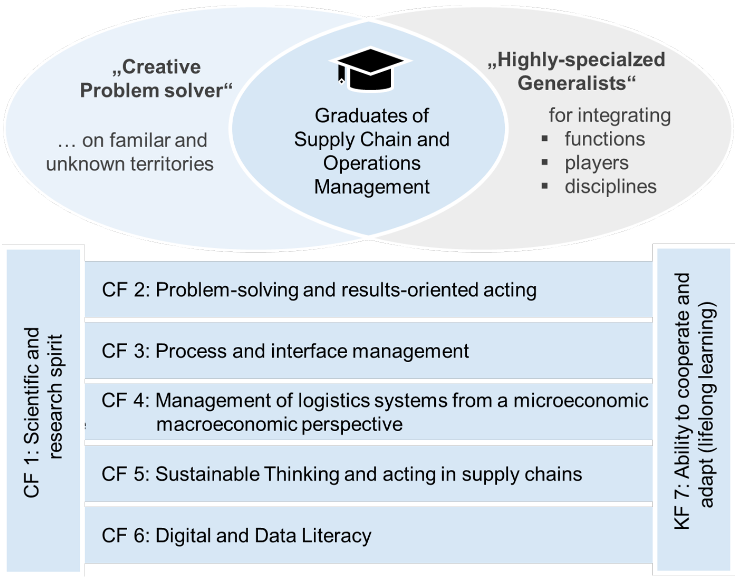

Fig. 1: Graduate profile: fields of competences (CF) of graduates in Supply Chain and Operations Management (source: own illustration).

This results in seven fields of expertise for graduates in Supply Chain and Operations Management (see Fig. 1)

Field of competence 1: Scientific and research spirit

Graduates are able to design specific research projects in and for the field of logistics, supply chain and operations management

by

- identifying and evaluating existing research gaps and deriving key lines of research,
- selecting suitable research methods, especially for novel and unstructured problems,
- addressing the relevant social, ecological and economic challenges for the areas of logistics, supply chain and operations management,
- creating transdisciplinary links and anticipating the benefits of potentials for the aforementioned areas in solving societal challenges,
- consciously training their "out-of-the-box thinking" and also considering unusual ways,

in order to

- carry out research projects for the benefit of companies, the economy and society,
- critically interpret and discuss research findings and transfer them to their own professional environment,
- drive innovation in logistics, supply chain and operations management in manufacture industry, trade and services industry as well as technical and scientific progress in research and development,
- develop and disseminate new knowledge.

Field of competence 2: Problem-solving and results-oriented acting

Graduates are able to prioritize challenges and problems in strategic and operational logistics and supply chain management. They can evaluate and select methods, models and theories of supply chain and operations management according to their suitability for solving these problems. Based on this, they are able to develop innovative, holistic solutions as well as recommendations for action for supply chain and operations management problems and operationalize these for implementation in projects

by

- deepening their knowledge and methodological skills from sustainable strategic planning of logistical networks to the implementation by situational project management,
- transferring familiar methods, models and knowledge to new and unfamiliar situations, further developing them in a problem-specific manner and thus analyzing (new) problems in a structured way,
- understanding the complex cause-and-effect relationships while recognizing strategic options,
- anticipating the requirements of various stakeholders and incorporate them into the solution development,

in order to

- make rational decisions after weighing up possible alternative courses of action,
- evaluate strategic and operational challenges and successfully solve complex supply chain and operations management problems.

Field of competence 3: Process and interface management

Graduates are able to plan, manage and control the flow of goods and information in the network. They can develop measures to optimize these transfer processes and to strengthen collaboration between different players in the value creation network and derive as well as evaluate recommendations for action

by

- developing their systemic understanding/thinking of complex interrelationships in the supply chain and identifying the influencing factors and variables,
- conceptualizing and further developing the theories, models and methods of process management, operations research, relationship management and strategic supply chain management in a problem-specific manner,
- anticipating the requirements of the various stakeholders (e.g. customers and suppliers) and involving them in the development of measures,
- bringing together interdisciplinary solution approaches from an engineering and economic perspective in a holistic manner,

in order to

evaluate and integrate the strategies, processes and systems of different players in the company and in the supply chain:

... across hierarchical levels and often still traditionally oriented functions in the company (e.g. procurement, production, sales),
... across company boundaries in the supply chain (e.g. supplier, manufacturer, retailer, consumer or logistics service provider),
... across various supply chains to create sustainable partnerships in value chains.

Field of competence 4: Management of logistics systems from a microeconomic and macroeconomic perspective

Based on a holistic understanding of supply chain and operations management from a company's perspective (micro-economic) as well as higher-level perspective (macro-economic), graduates are able to correctly contextualize and evaluate unpredictable events in complex (global) value networks. They derive possible countermeasures and optimization measures (recommendations for action) through an appropriate evaluation of the situation

by

- expanding and deepening their specialist knowledge in the management and operation of logistics systems and their elements - with a particular focus on (logistics) service providers,
- evaluating the current status quo and possible applications of modern information and communication systems along with new technologies, for example their potential in terms of sustainability and resilience, digitalization or process optimization and automation in supply chain and operations management,
- developing their understanding of logistical cause-and-effect relationships in companies and their supply chains and identifying the right design variables/influencing factors,

in order to

- create and maintain the ability to act in the complex and dynamic environment of supply chain and operations management including regular and irregular problems with unknown variables, incomplete information and even unpredictable events (so-called "black swan events"),

- make the rational and situation-specific optimal decision after weighing up possible courses of action.

Field of competence 5: Sustainable thinking and acting supply chains

Graduates understand the contribution of logistics and supply chain management to achieving sustainability goals. They are able to design logistics project tasks aiming at realizing sustainable systems - in particular measures for transfer processes within and between companies - develop alternatives and make recommendations for action, taking into account sustainability objectives

by

- identifying the right levers/influencing factors for designing sustainable supply chains,
- anticipating the consequences of micro-economic and macro-economic decisions/actions,
- assessing the usefulness of technical innovations regarding the achievement of sustainability goals on a situation-specific basis,
- reconceptualizing areas of logistics systems as models,

in order to

- critically reflect on their own professional and private actions in relation to social, ecological and economic requirements and consequences,
- make a relevant contribution to creating sustainable and responsible supply chains that meet social, ecological and economic objectives in a way that is appropriate to the situation.

Field of competence 6: Digital and data Literacy

Graduates are able to create relevant information and knowledge from data, contextualize it according to the situation and derive recommendations. To implement innovations and process changes, they can conceptualize IT projects for logistics and supply chain management processes, taking into account the various interdependencies

by

- expanding their knowledge of current technologies and the state-of-the-art of the "system landscape" or "software map" for supply chain and operations management applications,
- selecting and evaluating the methods, procedures and instruments for collecting, creating and analyzing data according to the situation,
- critically interpreting and communicating the extracted information,
- designing detailed process models and algorithms for specific planning and optimization tasks,

in order to

- make a relevant contribution towards digital transformation of supply chains,
- actively participate in and shape the digital world of life and work.

Field of competence 7: Ability to adapt and cooperate (lifelong learning)

Graduates can flexibly familiarize themselves with different subject areas and transfer the knowledge they have acquired to their personal and professional environment. They understand the current challenges in society and the associated effects on their own living and working environment. They are able to communicate effectively and work together with different groups of people in order to jointly solve given problems

by

- critically reflecting on current challenges of society, politics, business and science and addressing these in their research and project work,
- working in teams to complete research and project work on a wide range of topics within a given timeframe,
- training their ability to systematically familiarize themselves with unfamiliar topics and to solve problems creatively using specific supply chain and operations management use cases,
- organizing themselves independently (student project teams), communicating their requirements effectively and harmonizing the different thoughts and expectations of the team members when working on these use cases

in order to

- deal with changes in an increasingly changing environment in personal and work life and to continuously develop themselves both professionally and personally,
- communicate effectively across companies, hierarchies and disciplines and collaborate with partners from different backgrounds,
- systematically explore and understand complex, unfamiliar situations with unknown variables in the professional and social environment,
- actively shape transformation processes as a manager or specialist in the field of supply chain and operations management,
- to actively help shape a free and open society that is networked across national borders in the long term.

3 Fields of action

The need to meet sustainability goals, new technologies, modern information and communication systems, the formation of cooperative and productive networks, new risks or shocks due to political and economic instability, cybercrime, resource scarcity, etc. are causing scientists and managers to face constantly growing, new and sometimes unpredictable challenges. As a result, supply chain and operations management faces fundamental (and sometimes disruptive) changes. This also means changing requirements for and in value chain networks, making it inevitable to continuously adapt and in some cases even “rethink” transfer processes (flows of goods, people and information).

Taking on these diverse challenges from society, science and business requires "creative problem solvers" with specific supply chain and operations management knowledge as well as "highly specialized generalists" for a holistic view of the transfer processes and for the integration of functions, players and specialist disciplines in the value creation network.

Four fields of action for Supply Chain and Operations Management graduates can be derived from this mission statement (see Fig. 2).

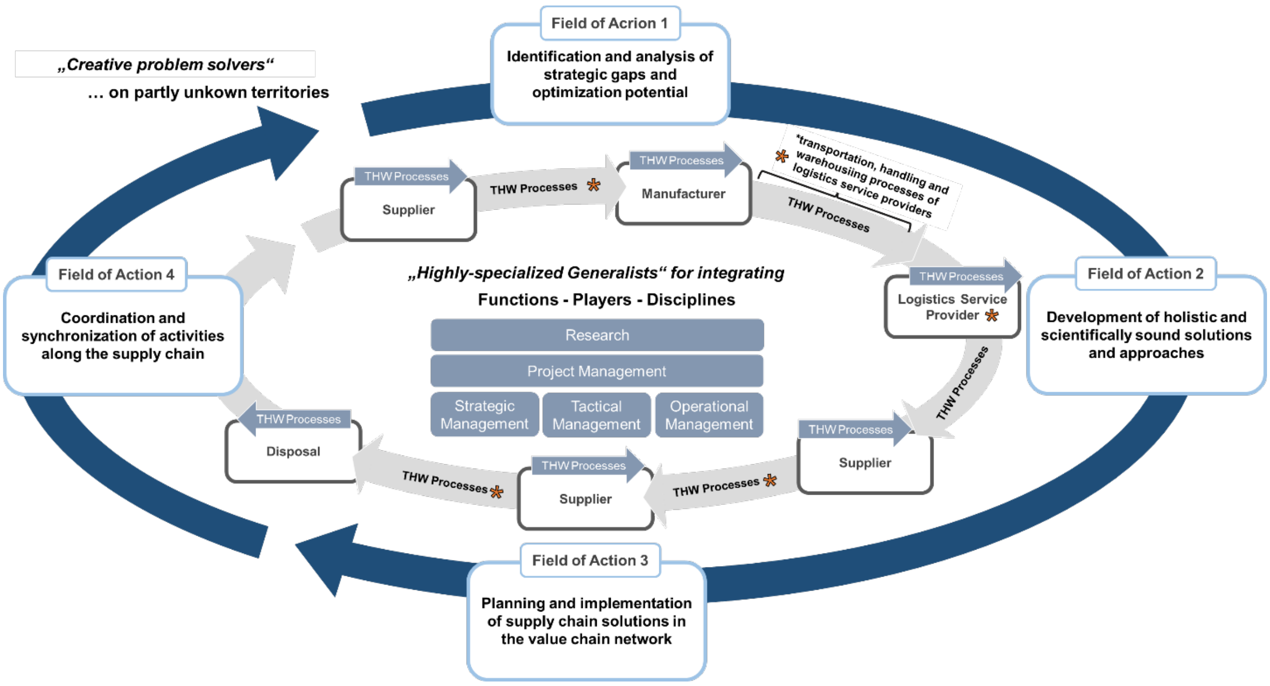

Fig. 2: Fields of activity of SCOM graduates (source: own illustration).

Fields of action 1 to 3 address the future role of graduates as "creative problem solvers" in partly unknown territory, irrespective of industries, functions and (management) hierarchies. Field of action 4 represents the integration function of supply chain and operations management in terms of coordination and synchronization of logistics and logistics-related activities/processes in the company’s network. However, the fields of action should not be considered separately from each other. Figure 2 illustrates this relationship: The outer area represents the fields of action or the typical processes of Supply Chain and Operations Management, while the inner cycle – also the circular supply chain - depicts the possibilities regarding the content of work fields or the orientation (of the fields of action). At the same time, there are different cascades depending on the level of consideration (strategic, tactical, operational).

The master's degree program in SCOM focuses in particular on the design, planning, management and control of internal and inter-company transfer processes - meaning the transport, handling and storage processes associated with the flow of goods and information between the various players (industry, trade and service providers) and functions (purchasing/procurement, production, distribution, marketing/sales, research and development, finance and management). These transfer processes are considered as internal or external services from the raw material supplier to the consumer(s) up to recycling companies within the value network.

As "highly specialized generalists", graduates can work at any (intersection) point in the supply chain and carry out the four fields of activity or focus on specific fields of activity. For example, graduates can work in procurement or distribution for manufacturing companies, in retail or logistics services, in project management or in operations.

Field of action 1: Identification and analysis of strategic gaps and optimization potential in the area of supply chain and operations management

As "creative problem solvers" on familiar and unfamiliar terrain ...

- graduates identify research gaps for and in the field of supply chain and operations management. They recognize strategic gaps and optimization potentials in internal and cross-company logistics and logistics-related activities and processes of companies (networks),
- they use scientific methods to analyze the identified research gaps, strategic gaps and optimization potential in the value chain network. They reasonably select methods, models and theories and further develop these in a problem-specific manner,
- graduates decompose the problems and issues, explore and understand the complex cause-and-effect relationships,
- they explore possible influencing factors and design variables for solving the problem or answer the research questions.

Field of action 2: Development of holistic and scientifically sound solutions and approaches in supply chain and operations management

As "creative problem solvers" on familiar and unfamiliar terrain ...

- graduates develop methodologically sound and data-supported solution alternatives and approaches to close the research gaps and strategic gaps as well as to realize the optimization potential in the value network,
- they integrate the requirements of supply chain partners and the expectations of civil society, business and politics in the solution development process,
- graduates evaluate and prioritize the solution alternatives developed suitable to the situation and select the optimal solution for implementation,
- graduates define further questions and problems based on the knowledge they have gained which may also exceed their own discipline.

Field of action 3: Planning and implementation of supply chain solutions in the value chain network to realize strategic and operational optimization potentials

As "creative problem solvers" on familiar and unfamiliar terrain ...

- graduates plan and initiate the implementation of the selected solution to close the strategic gap as well as to realize the optimization potential in the supply chain,
- they coordinate and monitor the activities associated with implementation in the value network.

Field of action 4: Coordination and synchronization of activities along the supply chain to develop resilient supply chains (integrative management)

As "highly specialized generalists" with an integration function ...

- graduates plan, manage, coordinate and control the internal logistics and logistics-related activities and processes of companies (networks) across functions, hierarchies, companies and supply chains,
- they harmonize the different requirements of the supply chain partners and other stakeholders,
- they strengthen collaboration between the various players in the value network and thus improve transaction relationships,
- graduates optimize transfer processes and process chains (flow of goods, information and people).
- they design long-term competitive and resilient supply chains that meet social, ecological and economic objectives.

4 Study plan and module matrix

The master's program Supply Chain and Operations Management is a study program with attendance at university on site focusing on research-based learning.

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

Students' learning is at the heart of the program, and the structure of the modules enables the implementation of research-based learning. In line with this concept, students go through the research cycle from finding and describing the problem to selecting suitable methods and developing a solution. The share of lectures in English on the master's degree course is 25% to 50%.

In terms of content, the concept of a consecutive master's degree enables the development of a holistic approach from top down, starting with the development of a sustainable strategy to the "toolset" of processes and methods for the management of systems and resources. In the second semester, students can choose between different specializations including “industry-specific specialization subjects”, “mobility and logistics in urban areas” or “insurance in logistics and customs and foreign trade law”.

Competence areas and modules	**1. se.**	**2. se.**	**3. se.**	
	CP	CP	CP	CP
Supply Chain and Operations Management - Strategy	6	6	0	**12**
Strategic supply chain management and logistics 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 for 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**
Compulsory elective modules (one module must be selected)	0	6	0	**6**
Industry-specific supply chain and operations management				
Insurance in logistics and customs and foreign trade law		6		**6**
Mobility and logistics in urban areas				
Master thesis	0	0	30	**30**
Master's thesis			26	**26**
Colloquium			4	**4**
Credit Points (CP)	**30**	**30**	**30**	**90**

Alternative study plan

Competence areas and modules	1. se.	2. se.	3. se.	4. se.	5. se.	
	CP	CP	CP	CP	CP	CP
Supply Chain and Operations Management - Strategy	6	6	0	0	0	**12**
Strategic supply chain management and logistics networks	6					**6**
Sustainable technical solutions in logistics		6				**6**
Supply Chain and Operations Management - Processes and Methods	6	0	6	0	0	**12**
Operations Research	6					**6**
Process management			6			**6**
Supply Chain and Operations Management - Systems	0	0	0	6	0	**6**
IT systems for logistics and supply chain management				6		**6**
Resource management in supply chains	0	0	0	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	**0**	**0**	**12**
Proseminar Research Methods	6					**6**
Supply Chain and Operations in research and practice			6			**6**
Compulsory elective modules (one module must be selected)	0	0	0	6	0	**6**
Industry-specific supply chain and operations management				6		**6**
Insurance in logistics and customs and foreign trade law						
Mobility and logistics in urban areas						
Master thesis	0	0	0	**0**	30	**30**
Master's thesis					26	**26**
Colloquium					4	**4**
Credit Points (CP)	**18**	**12**	**18**	**12**	**30**	**90**

Module matrix

Module / Lehrveranstaltungen				Handlungsfelder / Anzahl Kreditpunkte				Zuordnung Kompetenzen Absolvent*innenprofil							Prüfungen
Semester	Modul	Teilmodul/Lehrveranstaltung (optional)		29	27,5	24	21,5								
				HF 1	HF 2	HF 3	HF 4	KF 1	KF 2	KF 3	KF 4	KF 5	KF 6	KF 7	Anzahl
1	Supply Chain and Operations Management - Strategie	M 1.1	Strategisches Supply Chain Management und logistische Netzwerke	2,5	1,5	0,5	1,5		X	X	X	X			1
2		M 1.2	Nachhaltige technische Lösungen in der Logistik	3	2	1		X	X		X	X		X	2
1	Supply Chain and Operations Management - Prozesse und Methoden	M 2.1	Operations Research	3	3				X	X			X		1
1		M 2.2	Prozessmanagement	1	1	2	2	X	X	X			X	X	1
2	Supply Chain and Operations Management - Systeme	M 3.0	IT Systeme der Logistik und des Supply Chain Managements		1	3	2	X	X	X			X	X	3
1	Ressourcenmanagement in der Supply Chain	M 4.1	Managementbereiche und -(support)funktionen von Logistikdienstleistungsunternehmen	1,5		2	2,5		X	X	X	X		X	4
2		M 4.2	Beziehungsmanagement in Supply Chains	1	2	1	2	X		X	X	X		X	2
1	Forschung	M 5.1	Proseminar Methoden der Forschung	4	2			X			X	X	X	X	2
2		M 5.2	Supply Chain and Operations in Forschung und Praxis	2	3	1		X	X	X	X	X	X	X	1
2	Wahlpflichtmodul	M 6.1	Versicherung in der Logistik und Zoll- und Außenhandelsrecht	0,5	1	2	2,5		X	X	X		X		1
		M 6.2	Mobilität und Logistik in urbanen Räumen	2	2,5	1,5		X	X	X	X	X		X	2
		M 6.3	Branchenspezfisches Supply Chain and Operations Management	1	1	2,5	1,5	X	X	X	X			X	3
3	Masterarbeit	M 7.0	Masterthesis und Kolloquium	7,5	7,5	7,5	7,5	X	X	X	X	X	X	X	2

Fields of action (HF)

HF 1	Identification and analysis of strategic gaps and optimization potential in the area of supply chain and operations management
HF 2	Development of holistic and scientifically sound solutions and approaches in supply chain and operations management
HF 3	Planning and implementation of supply chain solutions in the value creation network to realize strategic and operational optimization potentials
HF 4	Coordination and synchronization of activities along the supply chain to develop resilient supply chains

Fields of competence (KF)

KF 1	Scientific and research spirit
KF 2	Problem-solving and results-oriented action
KF 3	Process and interface management
KF 4	Management of logistics systems from a microeconomic and macroeconomic perspective
KF 5	Thinking and acting sustainably supply chains
KF 6	Digital and data literacy
KF 7	Ability to adapt and cooperate

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: within 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.

By 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 based on 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 for logistics and supply Chain Management
Process management	→	
Management areas and (support) functions of logistics service providers	→	Relationship management in supply chains

In the electives in the 2nd semester ("Branch-specific Supply Chain and Operations Management", "Insurance in Logistics and Customs and Foreign Trade Law" and “Mobility and Logistics in urban areas”) 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.

5 Learning outcomes of the modules/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 BLOOM[1]. The focus is on learning objectives such as thinking, knowledge and problem solving. According to BLOOM[1] , the learning objectives are categorized hierarchically into six taxonomy levels, whereby according to SITTE and WOHLSCHLÄGL[2] each lower category is an element of the higher category. The competence levels can be formulated through the targeted use of verbs in the module descriptions. This makes the learning progress of the students externally visible and empirically comprehensible.

K1	**Knowledge**	Reproduction of knowledge, terms, definitions, procedures, contexts, etc. Typical verbs: *know, describe, depict, report, name*
K2	**Understand**	Transform knowledge in the student’s own words in a meaningful way that perserves its meaning Typical verbs: *interpret, define, formulate, derive*
K3	**Application**	Apply rules, methods or calculation procedures in specific and concrete situations. *Typical verbs: perform, carry out, calculate, plan, design, elaborate*
K4	**Analysis**	Decompose problems into elements in order to work out principles, structures and similarities or contradictions on the basis of a comparison. Typical verbs: *select, categorize, classify, examine, compare, analyze*
K5	**Synthesis**	Combining individual elements into a complete, new whole. Typical verbs: *design, assign, conceive, construct, develop*
K6	**Assess**	Making an evaluative judgment. Typical verbs: *assess, judge, decide, justify, evaluate, classify, give reasons*

In the master's program Supply Chain and Operations Management, the taxonomy levels are passed through or consecutively built on content from the first relevant degree. In the courses of the master's program, students acquire the skills of synthesis and evaluation. This enables students to prioritize new challenges, develop suitable methods and make scientifically sound decisions, even when they are detached from known problems and solution approaches.

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

[1] cf. BLOOM, B. S., Taxonomy of learning objectives in the cognitive domain, Beltz Verlag, Weinheim, 1976.

[2] cf. SITTE, W., Beiträge zur Didaktik des "Geographie und Wirtschaftskunde" Unterrichts. Vienna, 564 pages, WOHLSCHLÄGL, H. (ed.), Materialien zur Didaktik der Geographie und Wirtschaftskunde, vol. 16).

Competence levels of the modules

Semester	Modules	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	Industry-specific supply chain and operations management						
2	IT systems for 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 colloquium						

6 Module examinations

The module examinations of the degree program must to be taken during the course of study after 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 addition to written examinations, term papers and the master's thesis with colloquium the master's degree program in Supply Chain and Operations Management has the following forms of examination, which every student will become familiar with during the course of their studies, see table below.

Other forms of examination
• IT systems for logistics and supply chain management (performance testing) • Management areas and (support) functions of logistics service providers (term paper and presentations) • Relationship management in supply chains (group presentation and research paper) • Proseminar Research Methods (portfolio and term paper) • Supply Chain and Operations in research and practice (Project Portfolio) • Mobility and logistics in urban areas (term paper and presentation) • Industry-specific supply chain and operations management (portfolio and presentation) • Sustainable technical solutions in logistics (term paper and presentation)

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

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

Within the framework of performance tests, typical work scenarios are simulated and students have to cope with professional situations as in a role play. In addition, oral and written examination components can also be combined with the actual performance. Similar to professional settings and practice, students mainly determine on their own on how thoroughly the task is analyzed and which solution is chosen, which methods and instruments are selected and used and how the students design, organize, coordinate and document their own activities and the cooperation with the other group members (project management). This performance is then assessed.

The creation of a portfolio can also be the form of examination. A learning portfolio documents the student's competence development process by means of presentations, essays, excerpts from internship reports, tables of contents of term papers, notes, to-do lists, research reports and other performance presentations and learning productions. It expresses the self-directed and independent learning processes undertaken by 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 using scientific and practical methods within a given period of time and present it independently using verbal communication.

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

As a final thesis, students must complete a written master's thesis and pass the associated colloquium. Details are regulated by the examination regulations of the degree program.

7 Modules

Supply Chain and Operations Management - Strategy

7.1 Strategic supply chain management and logistical networks

Module number:	1110
Module Title:	Strategic supply chain management and logistical networks (German: Strategisches Supply Chain Management und logistische Netzwerke)
Type of Module:	compulsory module
ECTS Credits:	6
Language:	English
Duration of Module:	One semester
Recommended for Semester:	1st semester
Frequency:	once a year in the summer semester
Module Coordinator:	Prof. Dr. Hartmut Reinhard
Lecturers:	Prof. Dr. Nils Finger (associate lecturer), Dr. Kamal Rhaouat (associate lecturer)
Learning Outcome:	The students are able to assess, evaluate and prioritize challenges in Strategic Management as well as analyze and develop the matching Supply Chains and Logistics structures, by developing and evaluating an adequate set of methods covering strategic management and strategic controlling as well as strategic network management in the lectures, to strengthen the students' ability to independently recognize strategic options and to assign the right decisions representing a key competence in their later professional life. As future leaders and experts in Supply Chain and Operations Management they are required to implement strategies and measures for developing resilient supply chain networks. 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.
Trained fields of competence:	This module contributes to the training of the competencies "Problem-solving and Goal-oriented acting", “Managing Processes and Interfaces", "Management of logistic systems from mirco-economic and macro-economic perspectives" and "Sustainable thinking and acting in supply chains".
Module Content:	**Strategic Planning:** • 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 **Strategic Supply Chain Management and Networks:** • Basics 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 in order 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 • Innovative and integrative concepts for Supply Chain Management Systems
Teaching and Learning Methods:	Lecture in form of seminar including discussions, teamwork, independent presentation, case studies and assignments are carried out in student teams 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.
Assessment Method:	written examination (90 minutes The written examination consists of two parts, one for 'Strategic Planning´ and one for 'Strategic Supply Chain Management and Networks'. The points of both module exams are added and result in the grade achieved in the module.
Workload (25 - 30 h≙ 1 ECTS credit):	180 h
Contact hours: 4 SWS	32 h Lecture 16 h Exercise 16 h Project 64 h
Self-study:	10 h Lecture 58 h Exercise 48 h Project 116 h
Recommended Prerequisites:	-
Required Prerequisites:	-
Recommended Reading:	Alter, Roland: Strategisches Controlling, Unterstützung des strategischen Managements, 2nd edition, Munich: Oldenburg Wissenschaftsverlag, 2013 Baum, Heinz-Georg; Coenenberg, Adolf G.; Günther, Thomas: Strategisches Controlling, 5th edition, Stuttgart: Schäffer-Poeschel, 2013. Bowersox, Donald, J./ Closs, David, J./ Cooper, M. Bixby/ Bowersox, John C. (2013); Supply Chain Logistics Management; 4th International ed., Singapore: McGraw Hill Coyle, John J,/ Langley, C. John/ Novack, Robert A./ Gibson, Brian J. (2013): Managing Supply Chains: A Logistics Approach, 9th International ed, Canada: South Western, Cengage Learning Küpper, Hans-Ulrich: Controlling, 6th edition, Stuttgart: Schäffer-Poeschel, 2013. Mangan, John/ Lalwani, Chandra/ Butcher, Tim/ Javadpour, Roya (2012): Global Logistics and Supply Chain Management, 2nd ed, Chichester: John Wiley & Sons Ltd. Müller-Stewens, Günter; Lechner, Christoph: Strategisches Management, 4th edition, Stuttgart: Schäffer-Poeschel, 2011Harrison, A./ van Hoek, R. (2014): Logistics Management & Strategy - Competing Through the Supply Chain, 5th Ed., Harlow: Pearson Education

	Russell, R.S./ Taylor, R.W. (2014): Operations and Supply Chain Management, International Student Version, 8th Ed, John Wiley & Sons Singapore Pte. Ltd. Weber, Jürgen; Schäffer, Utz: Einführung in das Controlling - Übungen und Fallstudien mit Lösungen, 12th edition, Stuttgart: Schäffer-Poeschel, 2014. Weber, Jürgen; Schäffer, Utz: Einführung in das Controlling, 14th edition, Stuttgart: Schäffer-Poeschel, 2014. Further course related literature (books, journals or articles) may be indicated at the beginning of the course.
Use of the Module in Other Degree Programs:	-
Particularities:	-
Last update:	02/2025

7.2 Sustainable technical solutions in logistics

Module number:	1120
Module title:	Sustainable technical solutions in logistics (German: Nachhaltige technische Lösungen in der Logistik))
Type of module:	Compulsory module
ECTS credits:	6
Language:	German
Duration of the module:	One semester
Recommended semester of study:	2nd semester
Frequency of the course:	once per academic year in the winter semester
Responsible for the module:	Prof. Dr. Kathrin Hesse
Lecturing:	Prof. Dr. Kathrin Hesse, Dr. Bert Schröer (associate lecturer)
Learning Outcome:	Students are able to independently describe logistical project tasks relevant to sustainability objectives, develop alternatives, make decisions and derive recommendations for action, by independently assessing results on issues relating to current challenges of the progressive use of technology in the area of supply chain and operations management (incl. Industry 4.0, conveyor technology, sustainability and environmental management systems) and thus reconceptualizing key areas of a logistics system as models, to evaluate the developed solutions in terms of their sustainability within the technical concept and to support the transformation of sustainable supply chains..
Trained fields of competence:	The module contributes to the development of the competence field "Scientific and research spirit", "Problem-solving and results-oriented action", "Management of logistics systems from a microeconomic and macroeconomic perspective", "Sustainable thinking and action supply chains" and "Ability to cooperation and adapt".
Module content:	• Requirements, framework conditions and objectives for the planning and use of technical systems in logistics • Current technology trends in logistics, including Industry 4.0 and 5.0 • Basic principles of sustainability and environmental assessment methods (sustainability balance sheet and reporting, life cycle assessment, carbon footprint analyses) to measures for CO2 avoidance of individual modes of transport for holistic mapping of "green logistics", environmental policy regulations and ordinances at various levels (global, European and national)
Teaching and learning methods:	Combination of seminar-based teaching and project-based teaching with workshop elements and coaching by the supervising professor as well as plenary discussions and contributions from industry (including presentations) Development of a research design for sustainable technical solutions through to the preparation and presentation of the research results obtained
Forms of examination:	Lecture (25 %) and term paper (75 %)
Workload (25 - 30 h≙ 1 ECTS credit) :	180 h
Attendance time: 4 SWS	42 h Lecture 21 h Project 63 h
Self-study:	117 h

Recommended prerequisites:	-
Mandatory requirements:	-
Recommended reading:	Bauernhansl, T.; ten Hompel, M.; Vogel-Heuser, B. [Eds.] (2014): Industrie 4.0 in Produktion, Automatisierung und Logistik: Anwendung, Technologien, Migration, Berlin. Jodin, D.; ten Hompel, M. (2012): Sorting and distribution systems: Basics, design, calculation and realization, 2nd ed., Berlin. Martin, H. (2012): Praxiswissen Intralogistikplanung: Reale Projekte mit Ist-Situation, Zielsetzung, Planungen und Wirtschaftlichkeitsbetrachtungen, Wiesbaden. Martin, H. (2014): Transport- und Lagerlogistik: Planung, Struktur, Steuerung und Kosten von Systemen der Intralogistik, 9th ed. Ten Hompel, M.; Büchter, H.; Franzke, U. (2008): Identification systems and automation, Berlin. Ten Hompel, M.; Sadowsky, V.; Beck, M. (2011): Picking: Material Flow Systems 2 - Planning and Calculation of Picking in Logistics, Heidelberg. Eva Geisberger / Manfred Broy, Armin Grunwald, Jürgen Kopfmüller: Integrated Research Agenda Cyber-Physical Systems. Sustainability. Publisher: Campus Verlag; Edition: 2 (March 12, 2012) Kranke, Andre; Schmied, Martin; Schön, Andrea Dorothea- CO2-Calculation in Logistics, Publisher: Vogel, Heinrich; Edition: 1st, Edition 08/2011 Rodt et. Al: CO2 emission reduction in transportation in Germany. Possible measures and their reduction potentials. UBA-Texts 05/2010. 2010 European Council/Council of the European Union (2021): A European Green Deal. Brussels 2021. Available: https://www.consilium.europa.eu/de/policies/green-deal/. European Commission (2021), Directorate-General for Research and Innovation, Breque, M., De Nul, L., Petridis, A.: Industry 5.0: towards a sustainable, human-centric and resilient European industry, Publications Office. https://data.europa.eu/doi/10.2777/308407. Hesse, K. (2019) 'Nachhaltige Rohstoffversorgung - Perspektive Kreislaufwirtschaft und Ressourceneffizienz', in Wellbrock, W. and Ludin, D. (eds) Nachhaltiges Beschaffungsmanagement, Wiesbaden, Springer Fachmedien Wiesbaden, pp. 91-111 Potting, J.; Worrell, E.; Hekkert, M. P. (2017) 'Circular Economy: Measuring innovation in the product chain', ed. V. PBL Netherlands Environmental Assessment Agency. PBL Netherlands Environmental Assessment Agency, The Hague The further literature recommendations announced in the course.
Use of the module in other degree programs:	-
Special features:	-
Last updated:	02/2025

Supply Chain and Operations Management - Processes and Methods

7.3 Operations Research

Module number:	1210
Module title:	Operations Research (German: Operations Research)
Type of module:	Compulsory module
ECTS credits:	6
Language:	German
Duration of the module:	One semester
Recommended semester of study:	1st semester
Frequency of the course:	Once per academic year in the summer semester
Responsible for the module:	Prof. Dr. Marc Kastner
Lecturing:	Prof. Dr. Marc Kastner, Felix Lammerding (M. Sc.)
Learning Outcome:	Students are able to, analyze and solve business decision-making problems by applying decision-theoretical procedures and models to the situation and evaluating their advantageousness for solving the problem to make the best possible decisions as future managers (results competence, strategy competence). Students can model and solve practical decision-making situations using the “DECISIONNAVIGATOR”. Students learn the basic quantitative solution approaches for subject-related planning and decision-making problems in supply chain and operations management. They acquire knowledge of mathematical modelling, optimization procedures and stochastic methods in order to improve the efficiency of resource planning and process control in production and logistics, taking uncertainties into account. Graduates of the module are ideally prepared to take on responsible tasks in the area of planning and optimization in supply chains. They are able to make well-founded, data-based decisions and design innovative and sustainable solutions to increase efficiency and minimize risk in supply chains. Problem-solving, judgment and decision-making skills are trained through case studies and scenario analyses. With their comprehensive problem-solving and decision-making skills, they contribute significantly to the optimization of logistics business processes and thus to the value creation and competitiveness of companies.
Trained fields of competency:	The module contributes to the training of the competence fields "Problem-solving and results-oriented action", "Process and interface management" and "Digital and data literacy".
Module content:	Rational decision-making: 1. What it's all about 2. Structuring the decision-making situation 3. Modeling the consequences 4. Decision with uncertainty and a single goal 5. Decision with multiple goals 6. Problem solving with incomplete information 7. Case studies with the DECISION NAVIGATOR Operations research and supply chain analytics 1. Introduction to quantitative planning and mathematical modeling 2. Basics of linear programming

	3. Introduction to Operations Research and Supply Chain Analytics 4. Application of optimization models and solution methods of operations research in strategic, tactical and operational supply chain management
Teaching and learning methods:	Seminar-based teaching including independent analysis, modeling and evaluation of selected optimization problems
Forms of examination:	Written exam (90 minutes): 95 %, project work (DECISION NAVIGATOR): 5 %
Workload (25 - 30 h≙ 1 ECTS credit) :	180 h
Attendance time: 4 SWS	64 h Lecture
Self-study:	116 h
Recommended prerequisites:	Basics of quantitative modeling
Mandatory requirements:	-
Recommended reading:	*Lecture accompanying literature:* Kastner, M.: Prescriptive Decision Theory, Norderstedt 2024. Günther, H., Tempelmeier, H.: Supply Chain Analytics: Operations Management and Logistics, 13th edition, Norderstedt 2020. *Literature for reference, practice and consolidation:* Clemen, R. T., Reilly, T.: Making Hard Decisions with Decision Tools, 3rd ed., Pacific Grove 2013. Eisenführ, F., Langer, T., Weber, M. (eds.): Fallstudien zu rationalem Entscheiden, Berlin 2001. Eisenführ, F., Weber, M., Langer, T.: Rationales Entscheiden, 5th edition, Berlin 2010. Gigerenzer, G.: Risk. How to make the right decisions, Munich 2013. Hammond, J. S., Keeney, R. L., Raiffa, H.: Smart Choices, Boston 1999. Kahneman, D.: Fast thinking, slow thinking, Munich 2012. Klein, R., Scholl, A.: Planung und Entscheidung, 2nd edition, Munich 2011. Nitzsch, R. von: Entscheidungslehre, 11th edition, Berlin 2021. Nitzsch, R. von, Methling, F.: Reflektiert entscheiden - Kompetent mit Kopf und Bauch, Frankfurt 2021. Ragsdale, C. T.: Spreadsheet Modeling and Decision Analysis, 8th ed., Mason 2018. Spetzler, C., Winter, H., Meyer, J.: Decision Quality. Value Creation from Better Business Decisions, New Jersey 2016. Berens, W., Delfmann, W., Schmitting, W.: Quantitative Planung, 4th edition, Stuttgart (Schäffer-Poeschel) 2004 Domschke, W., Drexl, A., Klein, R., Scholl, A.: Introduction to Operations Research, 9th edition, Berlin (Springer) 2015 Domschke, W., Drexl, A., Klein, R., Scholl, A., Voß, S.: Exercises and Case Studies in Operations Research, 8th edition, Berlin (Springer) 2015 Günther, H., Tempelmeier, H.: Exercise Book Supply Chain Analytics: Operations Management and Logistics, 10th edition, Norderstedt (Books on Demand) 2020 Tempelmeier, H.: Analytics in Supply Chain Management and Production: Exercises and Mini-Case Studies, 7th edition, Norderstedt (Books on Demand) 2020 as well as the further literature announced in the course.
Use of the module in other degree programs:	-

Special features:	-
Last updated:	02/2025

7.4 Process management

Module number:	1220
Module title:	Process management (German; Prozessmanagement)
Type of module:	Compulsory module
ECTS credits:	6
Language:	German
Duration of the module:	One semester
Recommended semester of study:	1st semester
Frequency of the course:	Once per academic year in the summer semester
Responsible for the module:	Prof. Dr.-Ing. Zoller
Lecturing:	Prof. Dr.-Ing. Zoller
Learning Outcome:	Students are able to develop optimization measures for direct and indirect business processes, by selecting and evaluating the appropriate process management methods and project management methods for the respective area, to optimize and control processes in a sustainable manner later on in everyday working life and to provide suitable questions and methods for in-depth study in the 2nd semester, in particular the course "IT Systems in Logistics and Supply Chain Management".
Trained fields of competence:	The module contributes to the development of the competence fields "scientific and research spirit", "problem-solving and results-oriented action", "process and interface management", "digital and data literacy" and "cooperation and adaptability".
Module content:	• 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 objectives (Hoshin Kanri) • Agile methods for process control and management (Kanban, Scrum) • Implementing process improvements (improvement kata, office floor management)
Teaching and learning methods:	Lecture, business games, working in groups, student presentations
Forms of examination:	The group work is assessed by a combination of oral and written examinations. Presentation and written elaboration. The overall grade for a group project is made up as follows: • 30% of the grade is based on the quality of the presentation. • 70% of the grade is based on the quality of the written work. A total of five group projects are carried out as part of this module. Each group assignment contributes an equal share of 20% to the overall grade.
Workload (25 - 30 h≙ 1 ECTS credit) :	180 h
Attendance time: 4 SWS	32 h Lecture 32 h Exercise 64 h

Self-study:	76 h
Exam preparation	40 h
Recommended prerequisites:	-
Mandatory requirements:	-
Recommended reading:	Lecture notes Wildemann, H. Lean Management, Munich (TCW), 3rd edition 2009. Vahrenkamp, R. Produktionsmanagement, Munich (Oldenbourg), 6th edition 2006. The further literature recommendations announced in the course.
Use of the module in other degree programs:	-
Special features:	-
Last updated:	02/2025

Supply Chain and Operations Management - Systems

7.5 IT systems for logistics and supply chain management

Module number:	1320
Module title:	IT systems for logistics and supply chain management (German:IT-Systeme der Logistik und des Supply Chain Managements)
Type of module:	Compulsory module
ECTS credits:	6
Language:	German
Duration of the module:	One semester
Recommended semester of study:	2nd semester
Frequency of the course:	Once per academic year in the winter semester
Responsible for the module:	Prof. Dr. Franz-Josef Weiper
Lecturing:	Prof. Dr. Franz-Josef Weiper
Learning Outcome:	Students will be able to design IT projects for logistics and SCM processes with regard to relevant interdependencies, by • constructing detailed process models and diagrams (BPMN) and designing integration scenarios for relevant Re systems, • creating algorithms for specific resource planning and optimization tasks, • assessing the impact of potential disruptions in operations and designing suitable support functions for damage limitation (re-scheduling), to assess the various possibilities and decisions in the implementation of IT projects and thus support the implementation of innovations and process changes in day-to-day logistics. In particular, the questions and learning outcomes of the courses "Operations Research" and "Process Management" are further developed and deepened in a solution-oriented manner.
Trained fields of Competence:	The module contributes to the development of the competence fields "scientific and research spirit", "problem-solving and results-oriented action", "process and interface management", "digital and data literacy" and "ability to cooperate and adapt".
Module content:	For various supply chain operations management problems • "best practice strategies" for problem solving and implementation of IT projects of concrete case studies on real IT projects are analyzed • relevant business software solutions and functions are designed • model drafts/outlines for IT projects according to procedural models of ITIL (IT infrastructure and library) are derived and applied Among others, the following technologies/platforms are covered: • Process Mining • Cloud Business Intelligence • Cloud Enterprise Resource Planning • Automated Machine Learning • Supply Chain Design • Supply Chain Planning
Teaching and learning methods:	Seminar-based teaching with group work

Forms of examination:	Performance test (100 %): In order to prepare research-based learning with regard to the Master's thesis, assignments (term papers) from various areas are assessed during the semester, in which students independently develop the question, solution concept, and the selection or implementation of methods and procedures for set topics.
Workload (25 - 30 h≙ 1 ECTS credit) :	180 h
Attendance time: 4 SWS	32 h Lecture 32 h Exercise 64 h
Self-study:	116 h
Recommended prerequisites:	Basic knowledge of logistics IT and ERP systems
Mandatory requirements:	-
Recommended reading:	M. Beims, M. Ziegenbein: IT Service Management in Practice with ITIL, Carl Hanser Verlag GmbH & Co. KG (2015) N. Ebel: Basiswissen ITIL 2011, Fundamentals and know-how for IT service management, dpunkt.verlag (2014) M. ten Hompel et al: Cloud Computing for Logistics, Springer Verlag (2015) M. ten Hompel et al.: IT in Logistics 2013/2014, Fraunhofer Verlag (2013) H. Stadtler et al.: Supply Chain Management and Advanced Planning: Concepts, Models and Software, Springer Verlag (2010) H. Tempelmeier, H. Günther: Production and Logistics: Supply Chain and Operations Management, Books on Demand (2014) H. Tempelmeier, H. Günther: Exercise Book Production and Logistics, Books on Demand (2013) Wölfle, R. and Schubert, P.: Integrated Business Processes with Business Software: Practical Solutions in Detail, Carl Hanser Verlag GmbH & Co. KG (2005) Wölfle, R. and Schubert, P.: Process Excellence with Business Software: Practical Solutions in Detail, Carl Hanser Verlag GmbH & Co. KG (2006) Wölfle, R. and Schubert, P.: Business Collaboration: Cross-location processes with business software: practical solutions in detail (2007) The further literature recommendations announced in the course.
Use of the module in other degree programs:	-
Special features:	-
Last updated:	02/2025

Resource management in the supply chain

7.6 Management areas and (support) functions of logistics service providers

Module number:	1410
Module title:	Management areas and (support) functions of logistics service providers (German: Managementbereiche und –(support)funktionen von Logistikdienstleistern)
Type of module:	Compulsory module
ECTS credits:	6
Language:	German
Duration of the module:	One semester
Recommended semester of study:	1st semester
Frequency of the course:	Once per academic year in the summer semester
Responsible for the module:	Prof. Dr. Thomas Krupp
Lecturing:	Prof. Dr. Stephan Freichel, Prof. Dr. Thomas Krupp, Uwe Veres-Homm (associate lecturer), Dr. Kamal Rhaouat (associate lecturer)
Learning Outcome:	Students will be able to assess logistics service sub-sectors and companies with regard to strengths and weaknesses as well as opportunities and risks, develop starting points for improvements and design guidelines with regard to the management tasks of the companies, by • classifying logistics service providers (LSPs) in the concept of business logistics and name the specific service characteristics and the properties of LSPs derived from them, • describing logistics functions as services offered by LSPs and explain why industry and retail companies as customers of LPSs outsource certain tasks and what trends there are in this regard, • knowing the basic procedures and critical success factors of tendering and awarding processes, • describing and analyzin various mode-specific and cross-modal institutions and their tasks as well as challenges for the management of LSPs, • discussing the institution-specific business support functions and management tasks of individual LPSs and assessing companies with regard to strategic product-market positions, to • evaluate the attractiveness of the LSP’s sub-segments in everyday professional life (e.g. as a project manager at LSP, industry or trade, or as a management consultant) and evaluate and justify recommendations for action, e.g. for acquisitions or market entry, • in management positions, e.g. in LSP companies, to master and further develop the industry and company-specific characteristics of business management functions such as operations, scheduling and tender management, or financial planning, personnel management or logistics software and to integrate the interdisciplinary relationships.
Trained fields of Competence:	The module contributes to the training of the competence fields "Problem-solving and results-oriented action", "Process and interface management", "Management of logistics systems from a microeconomic and macroeconomic perspective", "Sustainable thinking and acting in supply chains" and "Ability to cooperate and adapt".

Module content:	Concept and functions of LSP: Classification of LSP in the logistics concept and functions of LSP. Workshop on the role of LSP 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 modes of transport, freight forwarders, Courier, Express and Parcel services; Trends, strategies and management functions: Market trends, requirements, basic business and management functions (operations, business development, HR, IT, finance/planning and control, organization); Human resources management in logistics: personnel and corporate strategy, development and implementation of personnel strategies, "war for talent", recruitment in tight markets, motivation and retention of know-how carriers, employee development; Real estate in logistics: types, life cycle, provision and financing of logistics real estate; Block courses with compulsory attendance are held to assess discussion and presentation performance. Teams are required to write and present short minutes of the meetings. As part of two extensive self-study case studies, two team presentations with written papers are completed as examinations. Case Study A) Analysis of company types / LSP sub-sectors (e.g. freight forwarders, railroad companies, road transport companies, heavy goods, textile, refrigerated goods specialists, CEPs, etc. Case Study B) Company analyses with regard to the functions of the LSP and the management task of the company management. For the topics of real estate management in logistics and human resources management in logistics, two presentations with written papers are prepared and delivered, also in teams. Case Study C) Selection of a logistics location from the user's point of view, weighing up relevant location factors at macro, meso and micro level, specification of structural criteria, argumentation of the logistics center to the municipality. Case Study D) Analysis of the personnel strategy of a logistics service provider and identification of motivational factors for its long-term personnel retention
Teaching and learning methods:	Classroom teaching and seminar-style teaching. Small group work. Independent research and case study preparation
Forms of examination:	Elaboration of the case studies. The grade for the case studies is made up in equal parts of the **presentation** and the **written elaboration (term paper).** The four case studies make up the overall grade in equal proportions (25% each).
Workload (25 - 30 h≙ 1 ECTS credit) :	180 h
Attendance time: 4 SWS	32 h Lecture 32 h Exercise 64 h
Self-study:	76 h
Exam preparation:	40 h
Recommended prerequisites:	Logistics basics
Mandatory requirements:	-

Recommended reading:	Pfohl, H.-Chr.: Logistics systems. Business management basics. 9th, newly revised and updated edition, Springer Verlag, Berlin and others, 2018. Eßig, M. / Hofmann, E. / Stölzle, W.: Supply Chain Management. 2nd, newly revised and updated edition, Vahlen Verlag, Munich, 2022. Freichel, S.L.K.: Organization of logistics service networks. Series: Logistics and Corporate Management, edited by Prof. Dr. H.-Chr. Pfohl, vol. 4, Berlin, 1993. Aberle, G.: Transportwirtschaft. Einzelwirtschaftliche und gesamtwirtschaftliche Grundlagen, 5th revised and expanded edition, Oldenbourg Wissenschaftsverlag, Munich 2013. Buchholz, J./Clausen, U./Vastag, A. (Eds.): Handbuch der Verkehrslogistik, Springer Verlag, Heidelberg, 1998. Corsten, H. / Gössinger R.: Dienstleistungsmanagement, 6th completely revised and updated edition, De Gruyter, Oldenbourg, 2015. Müller-Daupert, B. (ed.): Logistik-Outsourcing, 2nd revised and updated edition, Vogel, Munich, 2009. Ihde, G. B.: Transport, Traffic, Logistics. Gesamtwirtschaftliche Aspekte und einzelwirtschaftliche Handhabung, 3rd completely revised and expanded edition, Vahlen, Munich, 2001. Pfohl, H.-Chr. (ed.): Personalführung in der Logistik - Innovative Ansätze und praktische Lösungen, 2nd updated and expanded edition, Deutscher Verkehrs-Verlag, Hamburg, 2009. Jacobi, C. / Kruschina, D. / Nehm, A. / Veres-Homm, U.: Klimabilanz - Impulse für die Logistikimmobilien-Wirtschaft, Logix Initiative Logistikimmobilien (ed.), Weiterstadt, 2020. Nehm, A. / Veres-Homm, U.: Standortkompass - Flächen und Beschäftigungspotentiale in den deutschen Logistikregionen, Logix Initiative Logistikimmobilien (ed.), Weiterstadt, 2018. Veres-Homm, U.: Erfolgreiche Logistikstandorte - Rahmenbedingungen und Ansiedlungsdynamik, in: Münchow, M.M (ed.): Kompendium der Logistikimmobilie - Entwicklung, Nutzung und Investment, Wiesbaden, 2017. Rhaouat, M.K.: The impact of motivational factors on employees' turnover intentions, Dissertation, University of Potsdam, Potsdam, 2021. Stölzle, W. et al. (eds.): Güterverkehr kompakt. 2nd edition, De Gruyter Verlag, Oldenbourg, 2024. The further literature recommendations announced in the course.
Use of the module in other degree programs:	-
Special features:	-
Last updated:	02/2025

7.7 Relationship management in supply chains

Module number:	1420
Module Title:	Relationship management in supply chains (German: Beziehungsmanagement in Supply Chains)
Type of Module:	Compulsory module
ECTS Credits:	6
Language:	English
Duration of Module:	One semester
Recommended for Semester:	2nd semester
Frequency:	once a year in the winter semester
Module Coordinator:	Prof. Dr. Zelal Ates
Lecturers:	Prof. Dr. Zelal Ates
Learning Outcome:	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 • 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; to formulate and determine relationship management strategies serving to strengthen collaboration among supply chain partners and to create resilient and sustainable supply chain networks.
Trained fields competence:	This module contributes to the training of the competencies "Scientific and Research spirit", "Managing Processes and Interfaces", "Management of logistic systems from mirco-economic and macro-economic perspectives" and "Abilitiy to cooperate and adapt".

Module Content:	– Inter-Firm Relationships and Networks
	  o Uncertainties in supply chains
	  o Relationship Theories and Variables
	    ▪ Principal-Agent Theory
	    ▪ Transaction Cost Theory
	    ▪ Resource Dependence View
	    ▪ Social Exchange Theory
	    ▪ Interaction Perspective
	  o Network Analysis and Management
	– Strategy as the management of relationships and networks
	  o The Resource-Based View
	  o Supply Chain Collaboration
	  o CSR and Sustainability
	  o Customer Value and Relationship Value
	– Integrating Service Quality and Productivity Strategies
	  o Service Quality
	  o SERVQUAL
	  o Gaps Model

	○ Blueprinting
Teaching and Learning Methods:	Seminar-like classes in blocks with integrated practical cases
Assessment Method:	Group presentation (20 %) and individual research paper (80 %). Both examination parts have to be passed separately.
Workload (25 - 30 h≙ 1 ECTS credit):	180 h
Contact hours: 4 SWS	32 h Lecture 32 h Project 64 h
Self-study:	76 h
Examination preparation:	40 h
Recommended Prerequisites:	Module "Strategic supply chain management and logistics networks"
Required Prerequisites:	-
Recommended Reading:	Brennan, R., Canning, L. and McDowell, R. (2017): Business-To-Business Marketing, 4th ed, London: Sage. Cachon, G. (2003): Supply Chain Coordination with Contracts, in: de KoK, A. G.; Graves, S. C. [eds.] (2003): Handbooks in Operations Research and Management Science, Vol. 11: Supply Chain Management: Design, Coordination and Operation, Amsterdam: Elsevier, pp. 229-340. Cachon, G., Lariviere, M. (2005): Supply Chain Coordination with Revenue Sharing Contracts, in: Management Science 51 (2005), No. 1, pp. 30-44. 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. Cachon, G.; Netessine, S. (2004): Game Theory in Supply Chain Analysis, in: Simchi-Levi, D; Wu, S. D.; Shen, Z.-J. [eds.} (2004): Handbook of Quantitative Supply Chain Analysis: Modeling in the eBusiness Era, New York: Springer Science and Business Media, pp. 13-66. 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. Dwyer, F. R. and Tanner, J. F. (2009): Business Marketing, 4th Ed., McGraw Hill. Harrison, A.; van Hoek, R., Skipworth, H. (2014): Logistics Management & Strategy: Competing Through the Supply Chain, 5th ed., Harlow: Pearson. O'Brien, J. (2014): Supplier Relationship Management: Unlocking the hidden value in your supply base, London: Kogan Page. Swink, M. (2017): Managing Operations Across the Supply Chain, 3rd ed., New York: McGraw-Hill Education. Further course related literature (books, journals or articles) may be indicated at the beginning of the course.
Use of the Module in Other Degree Programs:	-
Particularities:	-
Last update:	02/2025

Research

7.8 Proseminar Research Methods

Module number:	1510
Module title:	Proseminar Research Methods (German: Proseminar Methoden der Forschung)
Type of module:	Compulsory module
ECTS credits:	6
Language:	German
Duration of the module:	One semester
Recommended semester of study:	1st semester
Frequency of the course:	Once per academic year in the summer semester
Responsible for the module:	Prof. Dr.-Ing. Zoller
Lecturing:	Prof. Dr. Thomas Krupp, Prof. Dr.-Ing. Zoller, Dr. Bernhard Albert (associate lecturer)
Learning Outcome:	Students are able to systematically develop and evaluate innovations for the logistics and supply chain in industry and trade as well as in the service sector. Based on what they have learned, students analyze the current state of research, derive key strands of research and identify specific gaps in research. For a specific research topic, the context of current societal/social, technical, political, etc. developments is assessed. Building on this, they anticipate further developments in supply chain and operations management and their impact on companies and society. Students apply the set of methods taught in the lectures in the context of the concepts of corporate foresight, futurology and open innovation while involving customers, employees and experts, to set innovative impulses in their professional life and thus break completely new ground. This enables students to accelerate innovation processes in their later professional life and thus provide impetus for further development. In the lecture/course "Supply Chain and Operations in Research and Practice" in particular, students provide the decisive relevant input for the continuation of the research cycle of research-based learning.
Trained fields of Competence:	This module contributes to the development of the competence fields "Scientific and research spirit", "Management of logistics systems from a microeconomic and macroeconomic perspective", "Sustainable thinking and acting in supply chains", "Digital and data literacy" and "Ability to cooperate and adapt".

Module content:	Basic research:
	• Overview of methods of structured literature analysis
	• Definition of the scope of analysis
	• Procedure for literature research:
	    o Documentation of search queries
	    o Conceptualization of the topics
	    o The "right" databases
	    o Forward and reverse search
	• Analysis and synthesis
	• Creation of research map, research question, plan
	
	Fields of activity of futurology and open innovation in companies

	• Basic approaches to innovation and innovation management in SCOM:
	  ○ "from the inside out"
	  ○ "Out of the box" - creativity and impulses "from outside"
	• Selected methods for creating innovations in supply chains
	• Corporate foresight process
	• Futurology - concepts and approaches
	• Open innovation in logistics - concepts and approaches
	• Methods of qualitative social research in open innovation and futurology
	• Information gathering, e.g. expert interviews or group moderation
	• Basics of information analysis, in particular hermeneutic and qualitative content analysis
	• Creativity techniques, especially group-based methods such as world café, synectics

Teaching and learning methods:	Within the didactic approach of research-based learning, the pro-seminar Research Methods serves as a methodological framework for the courses in the first semester: Based on the contents of this seminar, the following steps are aimed at: • Introduction to a problem from the field of supply chain and operations management • Verbalization of a suitable research question • Development of existing solution approaches • Selection and acquisition of suitable methods This cycle is then deepened in the second semester, in particular in "Supply Chain and Operations in Research and Practice", and finally completed with the Master's thesis. • Applied methods of learning: • Seminar-based teaching (providing an overview of the methods) and coaching. • Independent research and evaluation of data, statistics and literature. Conception, implementation and evaluation of the results of a workshop in small groups with the aim of producing a report (documentation of the results). In line with the ProfiL² philosophy, the workshop will involve other students and lecturers from different departments. • Practicing and practicing the methods on case studies (working groups, business game, etc.) • Individual discussions • Mixed learning
Forms of examination:	Basic research paper (term paper) (50 %) and future research paper (portfolio) (50 %)
Workload (25 - 30 h≙ 1 ECTS credit) :	180h
Attendance time:	32 h Lecture 16 h Exercise 16 h Project 64 h
Self-study:	10 h Lecture 58 h Exercise 48 h Project

	116 h
Exam preparation:	-
Recommended prerequisites:	-
Mandatory requirements:	-
Recommended reading:	Atteslander, P. (2010): Methods of empirical social research. Berlin: Erich Schmidt Verlag GmbH & Co. Chesbrough, H. (2003): The Era of Open Innovation, MIT Sloan Management Review, Spring 2003, p. 35-41. Chesbrough, H. (2006): Open Innovation: The New Imperative for Creating And Profiting from Technology, Harvard Business Review Press. Chesbrough, H. (2011): Open Services Innovation: Rethinking Your Business to Grow and Compete in a New Era, John Wiley & Sons. Cooper, H. M. (1988). Organizing knowledge syntheses: A taxonomy of literature reviews. Knowledge in Society, 1(1), 104-126. https://doi.org/10.1007/BF03177550 Higgins, J. M. / Wiese, G. (1996): Innovation management. Creativity techniques for entrepreneurial success. Berlin: Springer Jungk, R. / Müllert, N. R. (1993): Future workshops. With imagination against routine and resignation. 3rd ed. Munich: Heyne. Mayring, P. / Gläser-Zikuda, M. [eds.] (2005): The practice of qualitative content analysis. Weinheim and Basel: Beltz Verlag. Schnell, R. / Hill, P. / Esser, E. (2005): Methods of empirical social research. 7th ed. Berlin: Oldenbourg Verlag. Strübing, J. (2018): Qualitative social research: A condensed introduction. 2nd edition. Berlin, Boston. De Gruyter Oldenbourg publishing house. Treptow, C. (2012): Methods and techniques for creative solutions and evaluations of ideas. A leaflet from the Hanover Chamber of Industry and Commerce. Ed. by the Hanover Chamber of Industry and Commerce. Vom Brocke et. al. (2009): Reconstructing the Giant: On the Importance of Rigour in Documenting the Literature Search Process. In F. Sudzina & B. Johansson (Eds.), Information Systems in a Globalizing World: ECIS 2009: 17th European Conference on Information Systems. 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) may be indicated at the beginning of the course.
Use of the module in other degree programs:	-
Special features:	-
Last updated:	02/2025

7.9 Supply Chain and Operations in research and practice

Module number:	1520
Module title:	Supply Chain and Operations in research and practice (German: Supply Chain and Operations in Forschung und Praxis)
Type of module:	Compulsory module
ECTS credits:	6
Language:	German
Duration of the module:	One semester
Recommended semester of study:	2nd semester
Frequency of the course:	Once per academic year in the winter semester
Responsible for the module:	Prof. Dr. Thomas Krupp
Lecturing:	Supervision by all logistics lecturers at the Institute of Automotive Systems and Production (Faculty 08) and the Schmalenbach Institute of Business and Economics (Faculty 04)
Learning Outcome:	Students are able to assess existing gaps in research and to design a concrete research project based on this. by using the instruments from all lectures of the previous course and the proseminar "Proseminar Methods of Research" to explain the benefits of the research project for companies and society, to evaluate the state of research and decide on a suitable research approach and funding opportunities. This enables them to carry out research projects profitably and successfully in their profession, both in science and in practice, from the perspective of both research and operational practice. They can evaluate the benefits and transferability of research results from logistics / supply chain and operations management in their own professional world.
Trained fields of Competence:	This module contributes to the training of all fields of competence of the graduate profile.
Module content:	Fundamentals of scientific theory 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 analysis in logistics Empirical analyses: questionnaire and expert interviews Strategy process in the company Overview of alternative research, analysis and optimization methods Research cycle - development and analysis of specific research questions and transfer to a suitable research design through to evaluation
Teaching and learning methods:	As part of the didactic approach of research-based learning, "Supply Chain and Operations in Research and Practice", together with the "Proseminar on Research Methods", serves as a methodological bracket over the courses of the first semester: Based on the content of these courses, the following steps are taken: Development of a "suitable" research design Carrying out a research activity Preparation and presentation of the results and

	Reflection on the entire process This cycle is then completed in full in the Master's thesis Seminar-based teaching (selection and explanation of the research project) and coaching Research project in small groups with preparation of a report Small group discussions and elements of the group puzzle for the joint development of the research project
Forms of examination:	Project portfolio (100 %), for explanation: e.g. brief descriptions of selected optimization methods, 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≙ 1 ECTS credit) :	180 h
Attendance time:	-
Self-study:	-
Recommended prerequisites:	Attendance of the first semester lectures, in particular "Strategic Supply Chain Management and Logistics Networks" and "Proseminar on Research Methods".
Mandatory requirements:	-
Recommended reading:	Deutsche Verkehrszeitung / LOG..Kompass [ed:] Forschungsagenda Logistik, current edition, DVV Media Group "Logistics Research" (peer-reviewed open access journal), Springer Open, http://www.springer.com/engineering/production+engineering/journal/12159 *Publications and presentations of current logistics research projects at the TH Köln, representative* Krupp, T.; Luu, A. (2022) "Logistik im Kreislauf", published in: Orth, P.; Bruder, J.; Rink, M. (eds.) "Kunststoffe im Kreislauf - Vom Recycling zur Rohstoffwende", Spronger Vieweg. Krupp, T.; Suntrop, C.; Veres-Homm, U.; Wauben, D. (2014) "Chemielogistik im Rheinland - Angebot, Nachfrage und Infrastruktur", study by ChemCologne, Würzburg: Vogel Business Media. Krupp, T.; Suntrop, C.; Veres-Homm (2017): "Leveraging Supply Chain for strategic advantage in the Chemical Industry". Recklinghausen. RDN Publishing House. Krupp, T.; Bernd, U.; Albert, B.; von der Gracht, H. (2013): "Zukunftsreport 2.0 der System Alliance", Niederaula: System Alliance. Reinhard, H.; Krupp, T.; Köhne, C., (2021): "Truck navigation - actors - data flow - field tests", TH Köln. Reinhard, H.; Krupp, T.; Köhler, K.; Köhne, C. (2020): "Baustellenmanagement im Bezirk der IHK Köln", IHK Cologne. The further literature recommendations announced in the course.
Use of the module in other degree programs:	-
Special features:	-
Last updated:	02/2025

Compulsory elective modules

7.10 Industry-specific supply chain and operations management

Module number:	2010
Module Title:	Industry-specific supply chain and operations management (German: Branchenspezifisches Supply Chain and Operations Management)
Type of Module:	compulsory elective module
ECTS Credits:	6
Language:	English
Duration of Module:	One semester
Recommended for Semester:	2nd semester
Frequency:	once a year in the winter semester
Module Coordinator:	Prof. Dr. Thomas Krupp
Lecturers:	Prof. Dr. Stephan Freichel, Prof. Dr. Kathrin Hesse, Prof. Dr. Thomas Krupp,
Learning Outcome:	Students can • apply tailored analytical framework for industry-specific Supply Chain and Operations Management; • evaluate the importance of sector-specific analysis for logistics service providers and the Supply Chain and Operations departments in industry and trade by... • 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 respond flexibly to the after sales requirements of the customers; in order to optimize and evaluate new industry-specific Supply Chain and Operations processes with an interdisciplinary approach. Perspectives are chemical industries and chemical process engineering, production processes and Supply Chain Management in the automotive sector and the specific characteristics of the spare parts logistics and the specific characteristics of the Supply Chain and Operations Management in the automotive aftermarket sector. 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
Trained fields of Competence:	This module contributes to the training of the competencies "Scientific and Research spirit", "Problem-solving and Goal-oriented acting", "Managing Processes and Interfaces", "Management of logistic systems from micro-economic and macro-economic perspectives" and "Ability to cooperate and adapt".

Module Content:	**Supply Chain and Operations Management in Chemical Industries**
	• Importance of branch-specific analysis in logistics
	• Overview - supply chains in the chemical industry
	  o Characteristics of chemical logistics - Specifics and heterogeneity
	  o 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 - 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** • Basics 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 team work studies on selected cases and key issues.
Teaching and Learning Methods:	Case-study examples, selected expert lectures and company visits
Assessment Method:	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≙ 1 ECTS credit):	180 h
Contact hours: 4 SWS	32 h Lecture 16 h Exercise 16 h Project 64 h
Self-study:	10 h Lecture 58 h Exercise

	48 h Project 116 h
Recommended Prerequisites:	-
Required Prerequisites:	-
Recommended Reading:	Amecke, H.: Chemiewirtschaft im Überblick - Produkte, Märkte, Strukturen, VCH Verlagsgesellschaft mbH, Weinheim, 1987. Bretzke, Wolf-Rüdiger: Logistical Networks, 4th edition, Springer, Heidelberg, 2020. 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); Successful with After Sales Services: Business Strategies for Service Management and Spare Parts Logistics, Berlin/ Heidelberg/ New York 2006. Springer, pp. 153-177. Hecker, F. / Hurth, J. / Seeba, H.-G. (Eds.): Aftersales in der Automobilwirtschaft. 3rd edition. Springer Verlag, Munich, 2017. Klug, F.; Logistikmanagement in der Automobilindustrie: Grundlagen der Logistik im Automobilbau, Springer Verlag, Heidelberg, Dordrecht, London, New York, 2010. Krupp, T.; Luu, A. (2022) "Logistik im Kreislauf", published in: Orth, P.; Bruder, J.; Rink, M. (eds.) "Kunststoffe im Kreislauf - Vom Recycling zur Rohstoffwende", Spronger Vieweg. 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. Krupp, T.; Suntrop, C.; Veres-Homm, U.: Chemielogistik im Ruhrgebiet, ChemSite, Herten, 2016. Krupp, T.; Suntrop, C.; Veres-Homm, U.; Wauben, D.: Chemielogistik im Rheinland - Angebot, Nachfrage und Infrastruktur, ChemCologne, Cologne, 2015. Krupp, T.; Suntrop, C.; Kille, Christian; Veres-Homm, U.; Heeg, L.: Chemielogistik - Bedeutung, Strukturen, Dynamik, Deutscher Verkehrsverlag, Hamburg, 2013. Suntrop, C.: Chemical Logistics: Market, Business Models, Processes, Viley VCH, Weinheim, 2011. German Chemical Industry Association (VCI) [ed.] (2022 or current edition): Chemical industry in figures, VCI, Frankfurt, 2022. Further course related literature (books, journals or articles) may be indicated at the beginning of the course.
Use of the Module in Other Degree Programs:	-
Particularities:	-
Last update:	02/2025

7.11 Insurance in logistics and customs and foreign trade law

Module number:	2020
Module title:	Insurance in logistics and customs and foreign trade law (German: Versicherung in der Logistik und Zoll- und Außenhandelsrecht)
Type of module:	Compulsory elective module
ECTS credits:	6
Language:	German
Duration of the module:	One semester
Recommended semester of study:	2nd semester
Frequency of the course:	Once per academic year in the winter semester
Responsible for the module:	Prof. Dr. Thomas Krupp
Lecturing:	Dr. Marcus Kirchhof (associate lecturer), Mr. Reinhard Fischer (associate lecturer)
Learning Outcome:	Students will be able to assign the principles of liability law for logistics companies as well as customs and foreign trade regulations to export and import requirements in companies according to the situation and assess their advantageousness for problem solving, by taking precautions to analyze the required transport insurances as well as the embargo and denied parties, to identify and classify deficits in the secure supply chain and to select and assign measures to eliminate them, to make optimal decisions in and for the company as future managers (especially in logistics), with the aim of efficiently organizing the global flow of goods and information in the company network and ensuring it in the long term.
Trained fields of Competence:	This module contributes to the training of the competence fields "Problem-solving and results-oriented action", "Process and interface management", "Management of logistics systems from a microeconomic and macroeconomic perspective", and "Digital and data literacy".
Module content:	**Insurance in logistics** • Liability principles ○ Liability of carriers for domestic transportation (carriers, forwarders, warehouse keepers) ○ Liability for cross-border transportation (land transportation, rail transportation, air transportation) ○ Liability for sea transportation ○ Liability from contracts for work and services ○ German Freight Forwarders' Standard Terms and Conditions • Insurance basics ○ General information ○ Liability insurance ○ Property insurance ○ Transport insurance ○ Recourse • Traffic liability insurance ○ The VHV insurance ○ AVB Logistics ○ Special clauses Public liability insurance

	Customs and foreign trade law
	• Legal basis for the cross-border movement of goods
	  o Legislation in the European Union
	  o The new provisions of the Union Customs Code and its delegated and implementing acts
	• Clearance procedure
	  o The German customs IT procedure ATLAS
	  o Simplified procedures for customs declarations
	  o Only authorization in the European Union
	• Proof of status in the European Union
	• Transit procedure
	  o Detailed consideration of the NCTS and TIR procedures
	• Duty exemptions
	  o Tariff and non-tariff duty exemptions in cross-border trade in goods
	• Active refinement
	  o Special case constellations from the chemical and automotive industries
	• Passive finishing
	  o Selected examples from the textile industry
	• Temporary use
	  o Special use cases
	• Bonded warehouse
	  o Investigation of bearing types A to E
	  o Deepening the storage and retrieval scenarios
	• Authorized Economic Operator (AEO)
	  o Advantages in the cross-border movement of goods
	  o Authorization procedure
	  o Re-certification
	  o Temporary suspension and withdrawal
	• Customs value
	  o Consolidation of the individual customs valuation methods
	• Relationship between customs and sales tax
	  o VAT in the EU internal market
	  o Selected case studies from eCommerce logistics
	• Prohibitions and restrictions
	  o Specific examples from the area of brand protection and pharmaceuticals in eCommerce logistics
	• Origin of goods and preferences
	  o Deepening of preference calculation with application of multilateral cumulation
	• Foreign trade law
	  o Export procedure
	  o Selected examples of embargo measures
	• Approval procedures, types and certificates

Teaching and learning methods:	Seminar-based teaching; integrated case exercises
Forms of examination:	Written exam (100 %), 90 minutes
Workload (25 - 30 h≙ 1 ECTS credit) :	180 h
Attendance time: 4 SWS	64 h
Self-study:	116 h
Recommended prerequisites:	-

Mandatory requirements:	-
Recommended reading:	Wieske, T.: Transportrecht schnell erfasst, 3rd edition, Heidelberg, Springer, 2012 Legal texts (HGB, BGB, VVG) International conventions (CMR, COTIF/CIM, CMNI, MÜ, HVR) General Terms and Conditions of the Freight Forwarding Industry Fischer, R./Reinhard, H.: One goal - two paths? The comparison between Authorized Economic Operator and Customs-Trade Partnership Against Terrorism. In: AW-Prax, 16th year, 4/2010, pp. 119-156. Drees, F. J. et al: Customs & Export 2011: Everything you need to know now! Federal Gazette, 2011. Witte, P./Wolffgang, H.-M.: Lehrbuch des Europäischen Zollrechts, 6th edition, nwb Verlag, 2009. Witte, P./Henke, R.: Fallstudien Europäisches Zollrechts, 3rd edition, nwb Verlag, 2010. The further literature recommendations announced in the course.
Use of the module in other degree programs:	-
Special features:	-
Last updated:	02/2025

7.12 Mobility and logistics in urban areas

Module number:	2030
Module title:	Mobility and logistics in urban areas (German: Mobilität und Logistik in urbanen Räumen)
Type of module:	Compulsory elective module
ECTS credits:	6
Language:	German
Duration of the module:	One semester
Recommended semester of study:	2nd semester
Frequency of the course:	once per academic year in the winter semester
Person responsible for the module:	Prof. Dr. Thomas Krupp
Lecturers:	Dr. Klaus Esser (associate lecturer), Dr. Hendrik Koch (associate lecturer)
Learning Outcome:	Students are able to assess the challenges of passenger and freight transportation in urban areas and derive recommendations for action, by • applying analysis grids for problem-related logistics considerations, • analyzin the provision of services in urban passenger and freight transport • evaluating current and forward-looking approaches, • anticipating the different requirements of urban stakeholders, • bringing together the various disciplines and perspectives such as urban planning, transportation planning, retail, etc, to develop holistic solutions for optimizing the flow of people and goods in urban areas and thus contribute to the sustainable transformation of urban transport.
Trained fields of competence:	This module contributes to the training of the competence fields "Scientific and research spirit", "Problem-solving and results-oriented action", "Process and interface management", "Management of logistics systems from a microeconomic and macroeconomic perspective", "Sustainable thinking and acting in supply chains" and "Ability to cooperate and adapt".
Module content:	**Freight, commercial transport, logistics** *Basics of urban freight transport* • Actors of commercial transport - consumers, suppliers and stakeholders of urban logistics • Levels of (urban) goods transport: industrial and commercial goods transport (industrial logistics, construction sites and tradesmen); B2B (store deliveries) and B2C (deliveries to private households) consumer goods distribution • Transport infrastructure and control in urban freight transport • Stages of urban freight distribution: (main runs), penultimate and last mile, definition and delimitation of last-mile transportation *Urban distribution systems* • Courier, express and parcel services (CEP) - Special features of the logistics market segment: structure and concept; demand structures and market overview • Megatrend e-commerce and growth in shipment volumes • General cargo transportation, branch deliveries, etc. • (Integrated) city logistics concepts • "New" delivery services such as Flaschenpost, Lieferando, Gorillaz etc.

Selected best and next practices in urban freight transport

- New vehicle and system technologies
- Innovative solutions for last-mile logistics
- Innovative concepts: Pickshare, freight streetcar, etc.

Role of and challenges for local authorities

- Challenges for local authorities (securing supplies for the economy and population, reducing emissions, competition for land, etc.)
- Consequences of the mobility and transportation transition for urban commercial transport
- Sustainable urban logistics as a municipal design task

Trade and logistics

- Interactions between retail and logistics
- Effects of changes in the retail sector on logistics flows
- Logistics as the "backbone" of retail

Passenger transportation

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 corona, 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/municipal authorities, transport associations; instruments of planning & control of services and transport infrastructure in public passenger transport (NVP, SUMP etc.)
- Connection between mobility and spatial and settlement structures: current approaches "15-minute city (Paris)", "Copenhagen Way", "Superblocks (Barcelona)"
- Transport transition for sustainability/climate protection and mobility: transport as a climate change problem and sustainable mobility as a solution

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

- New legal framework for passenger transportation (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 transportation

- Digital mobility platforms as the Amazon of mobility
- Digital pricing as the basis for new, flexible mobility products
- Mobility budgets as the answer to company cars or job tickets in mobility management
- On-demand services, ridehailing and robotaxis

Teaching and learning methods:	Classroom teaching and seminar-based teaching, excursions if necessary. Independent research and case study preparation

Forms of examination:	Elaboration of case studies as term paper (50 %) and presentation (50 %)
Workload (25 - 30 h≙ 1 ECTS credit) :	180 h
Attendance time: 4 SWS	64 h
Self-study:	76 h
Exam preparation	40 h
Recommended prerequisites:	-
Mandatory requirements:	-
Recommended reading:	Aberle, G.: Transportwirtschaft. Einzelwirtschaftliche und gesamtwirtschaftliche Grundlagen, 4th revised and expanded edition, Munich/Vienna 2006. Ackermann, T: Handbuch Marketing im ÖPNV, DVV media 2016 ADL future lab/UITP: The Future of Mobility post-COVID, 4th edition 2020 Agora Verkehrswende: Securing the mobility of tomorrow with the transport transition. 12 theses on the transport transition, Berlin 2017 BMVI / infas: Mobility in Germany, 2018 (www.mobilitaet-in-deutschland.de) Buchholz, J./Clausen, U./Vastag, A. (Eds.): Handbuch der Verkehrslogistik, Heidelberg 1998.Clausen, U.; Geiger, C. (2013): Traffic and transportation logistics, Springer Vieweg Gather, M., Kagermaier, A., Lanzendorf, M. (2008): Geographische Mobilitäts- und Verkehrsforschung, Borntraeger. Henkel, S.; Tomczak, T.; Henkel, S.; Hauner, C. (2015): Mobility from the customer's perspective, Springer Gabler. KE-CONSULT (2021), Möglichmacher in bewegten Zeiten, CEP Study 2021, Analysis of the market in Germany. Study for the German Parcel and Express Logistics Association. KE-CONSULT, Prognos, ILS (2018), Smart Cities - Verkehrlich-städtebauliche Auswirkungen des Online-Handels, study for the Federal Institute for Research on Building, Urban Affairs and Spatial Development, Bonn. KE-CONSULT, Prognos (2020), Market analysis of urban commercial transport in Germany, study for NOW GmbH (National Organization Hydrogen and Fuel Cell Technology). KE-CONSULT (2018), Die Ladezone im Blickpunkt, Anforderungen an die Güterversorgung der Stadt, study for the Cologne Chamber of Commerce and Industry. Pfohl, H.-Chr.: Logistics systems. Business management basics. 9th, newly revised and updated edition, Springer Verlag, Berlin and others, 2018. Lecture notes from the lecturers with current practical examples. The further literature recommendations announced in the course
Use of the module in other degree programs:	-
Special features:	-
Last updated:	02/2025

Master thesis

7.13 Master's thesis and colloquium

Module number:	0950/0960
Module Title:	Master's thesis and colloquium (Master's Thesis and Final Oral Examination ("Colloquium")
Type of Module:	obligatory module
ECTS Credits:	26 ECTS for the Master's Thesis and 4 ECTS for the Final Oral Examination ("Colloquium")
Language:	German or English
Duration of Module:	One semester
Recommended for 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 as thesis supervisors
Learning Outcome:	Students show in their master thesis that they are capable 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 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. Students should be capable • to work independently, diligently as well as subject- and result-oriented; • to apply the subject specific knowledge and methods purposefully and problem oriented in order to give their qualified scientific view/opinion on their topic; • to think in a cross-disciplinary context; • to elaborate a project plan and the respective time management independently; to organize the implementation of their research project (master thesis) self-responsibly and to deliver the results according to the deadline in time; • to document and record the results precisely and completely. Furthermore, the master thesis should be proven and evaluated critically; • to present the task, the approach as well as the results in a thesis defense in front of an expert audience. 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.
Trained fields competence:	This module contributes to the training of all competencies in the graduate profile.
Module Content:	The content of the master thesis depends on the respective economic, business or logistics research question which may be specialized in the various fields of sciences such as logistics, supply chain management or operations management. Typically a master thesis consists of the following elements:

	• the research motivation and the detailed research question; • 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/ realization 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 defense) 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 program under the guidance of the respective supervisor.
Assessment Method:	Written academic work (master thesis, oral presentation and defense of the research question, research approach/ methodology and the main foundation as well as the results of the master thesis in the thesis defense (colloquium).
Workload (25 - 30 h≙ 1 ECTS credit):	900 h
Process and documentation:	780 h
Preperation and implementation of the thesis defense:	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:	02/2025

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Technology
Arts Sciences
TH Köln

Cologne, 10.02.2022

Subject: Plagiarism check for final theses in the Logistics (B. Sc.) and Supply Chain and Operations Management (M. Sc.) degree programs

Dear students,

All final theses for the above-mentioned degree programs must (BPO §30 para. 1, MPO §28 para. 1) be sent to the following e-mail address in addition to the 3-fold, written and digital form:

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