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UNIVERSITY



International Logistics Management and Engineering

Graduate Program

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1 Introduction to the Graduate Program

1.1 Concept

The graduate program "International Logistics: Management and Engineering" (ILME) addresses:

- students with at least a Bachelor's degree in science, engineering, and/or management who are fascinated by the challenges and opportunities of the modern logistics industry, the backbone of global trade, production, and distribution.
- professionals with a suitable degree, who are interested in both gaining expertise in cutting edge logistics research, and improving their professional skills in order to master the next step in their career.

The program aims at educating and training leaders of tomorrow to deal with complex problems using engineering and management skills. It is designed to complement the Bachelor's program in International Logistics Management and Engineering which mainly focuses on *logistics processes*. The graduate program concentrates on describing, analyzing, and designing *logistics systems* and their interplay.

Current logistics systems face highly dynamic environmental conditions in a globalized and heavily networked world. One of the pre-conditions of efficiently running global logistics systems is robustness. Thus, the program especially addresses the design and management of robust logistics systems.

A logistics system can be a highly aggregated production network, a warehouse, a production plant, a transportation system, or a combination and network of all of them. The design of material flow, for instance, a factory layout, the planning or dimensioning of a warehouse or the conception of a distribution system will be among the subjects of the graduate study program *International Logistics: Management and Engineering*. By aligning the systems' structures and the required functions, value creation by the layout of the logistics processes is addressed. The approaches, the barriers, and the facilitators of the Change Management in a logistics system are treated. The concepts and the importance of leadership that reflect the technological and intellectual capital within a global logistics network are emphasized.

Successfully graduating students will be qualified to cope with the complex challenges of analyzing, designing, and leading global value networks. They will acquire knowledge in the field's appropriate terminology, theoretical concepts, and analytical frameworks. Understanding approaches for improving efficiency and robustness of large logistics systems and developing the capability to sustainably solve problems via rational and responsible management decision making contribute to the targeted competence profile. Moreover, students will gain an integrative perspective on the analysis, design, and control of complex and adaptive but nevertheless robust logistics systems. Training of soft skills and socio-cultural competencies will complete the education.

A unique feature of the study program is the integration of the engineering perspective, information and communication technologies (ICT), and the management perspective to an equal extent. Engineering aspects will be combined with ICT and intertwined with management skills in order to provide the students with a sustainable and holistic portfolio of competencies. This is based on the fact that clearly a product must be developed and produced before it can be sold and eventually delivered.

Another outstanding feature offered by this program is the carefully balanced integration of learning, researching, and applying. The study program comprises several components which provide knowledge by guided learning in lectures, literature reviews, and case studies. Additionally, it includes training of the student's capabilities of exploration, examination, and explanation by autonomously working on research projects. The results of project work will be presented in seminars, and eventually in the Master's thesis. Finally, the program will provide the students with a practical understanding of logistics systems and deep insights into the real world of logistics via guided industrial projects, industrial visits, guest lectures, and empirical research.

Studying at Jacobs University Bremen offers students a unique opportunity to develop, shape, and optimize their individual profile. Jacobs hosts students from more than 100 nations, and students experience an international community, which fosters considerable intercultural training. Moreover, by integrating theoretical lectures with practical expertise, professional career counseling, an international alumni network, and being embedded in Jacobs' international Campus community, a comprehensive education and a thorough preparation of students for their future careers is guaranteed.

1.2 Degrees

The program *International Logistics: Management and Engineering* offers two degrees, namely the "Master of Science" (MSc) and an "Executive Master of Science" (MSc).

1.2.1 The Master of Science (MSc)

Obtaining a Master of Science degree takes two years of study equivalent to 4 semesters. The first three semesters consist of course work, predominantly during the first two semesters, and will be followed by scientific project work, starting after the second semester. During semester breaks, practical experience in companies is performed. The fourth semester will be devoted to undertake and complete the Master's thesis. Upon graduation, students will be awarded the "Master of Science in International Logistics: Management and Engineering".

1.2.2 The Executive Master (MSc)

Students with a professional background entering the graduate program can apply the Executive Master of Science (MSc) program.

The program consists of course work and projects, including the Master's thesis, *with a total workload that is equivalent* to two study years. The coursework during the first study year is equivalent to the one offered at the MSc program. As a rule, students are required to study on campus during this period.

In the 2nd year, students will start working on a project. It can be performed from distance, in parallel with their job. During this period, workshops and seminars will be held occasionally on campus, where the students can meet each other and their supervisors accordingly. The Master's thesis can be also completed off campus. Upon graduation, students will be awarded the "Master of Science in International Logistics: Management and Engineering".

1.3 Career Perspectives

The program prepares students - on the levels of the Master of Science, the Executive Master of Science and the PhD level - either for an executive career in the logistics industry or a scientific career at a university or a research institute. The major aim is to enable them to successfully transfer their accumulated profound scientific knowledge to a professional life in an economic environment. Concerning the scientific perspective, the program offers training in a wide range of innovative logistics areas.

Students will be prepared for different management functions, such as those in marketing and personnel departments, category management, and the management of shipping departments. They will be qualified for a wide range of positions in engineering such as those in process management, corporate sourcing, or production planning.

The Career Service Center of Jacobs University (<http://www.jacobs-university.de/csc>) offers assistance by supporting students with advice and tools for pursuing rewarding careers after graduation.

Jacobs University's Alumni Association is a worldwide network of graduates with additional expertise. This institution opens further job options (<http://www.jacobs-university.de/alumni/>).

1.4 Target Audience and Requirements

For detailed information please refer to Jacobs University's Graduate Policies (<http://www.jacobs-university.de/policies-graduate>) and Graduate Admission (<http://www.jacobs-university.de/graduate-admission>).

1.4.1 Master of Science (MSc)

The Master of Science program addresses:

- students with BA/BSc degrees in Logistics, Engineering and/or Management.
- students with BA/BSc degrees in other disciplines, with a strong interest in logistics who have demonstrated a sufficient understanding of the logistics business environment or have completed relevant work experience within the industry.
- graduate students with MSc/MA in a field related to the program.

Candidates for the Master of Science in International Logistics should fulfill the following requirements:

- practical experience - at least one year - (recommended),
- a strong record of academic and/or professional achievements,
- sufficient command of English language,
- profound knowledge of formal methods.

1.4.2 Executive Master (MME)

The Executive Master program addresses professionals from companies:

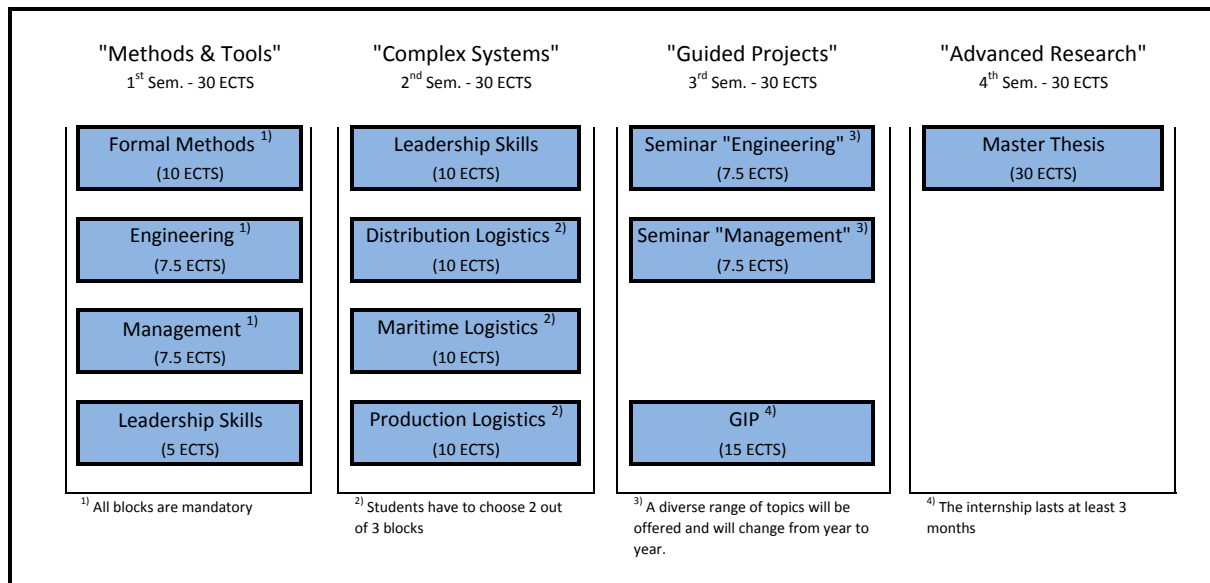
- who want to prepare for the next step in their carriers

- who have at least a Bachelor degree in Engineering and/or Management
- or who have a Bachelor or Master degree in another related discipline.

2 Study Program

The graduate program consists of a **Qualification Phase** (semesters 1 to 3), and an **Advanced Research Phase** (4th semester).

Figure 1: Structure of the "International Logistics: Management & Engineering graduate program.



The **Qualification Phase** consists of three blocks. They are equivalent to the first three semesters of the program, namely:

- **Methods & Tools,**
- **Complex Systems,**
- **Guided Projects.**

The block *Methods and Tools* provides the students with advanced methods and tools that are necessary for describing, analyzing, and designing logistics systems. The block *Complex Systems* provides instruction in specific logistics topics. In *Guided Projects* the students shall be directed through work on their own projects, a necessary competence for developing new solutions. The students deepen their practical experience during this block.

The **Advanced Research Phase** covers the fourth semester. It includes a self-contained research project (master thesis). In order to receive the MSc degree, a total of 120 ECTS (European Credit Transfer and Accumulation System) credits are required.

2.1 Structure of the Qualification Phase

In order to successfully complete the qualification phase for the MSc a total of 90 ECTS credits have to be earned from:

- **Block Methods and Tools (30 ECTS)**
 - Formal Methods (10 ECTS)
 - Engineering Methods (7.5 ECTS)
 - Management Methods (7.5 ECTS)

- Leadership Skills (5 ECTS)
- **Block Complex Systems (30 ECTS)**
 - Students choose two out of three modules:
 - * Distribution Logistics (10 ECTS)
 - * Maritime Logistics (10 ECTS)
 - * Production Logistics (10 ECTS)
 - Leadership Skills (10 ECTS)
- **Block Guided Projects (30 ECTS)**
 - graduate seminars (15 ECTS)
 - guided projects (15 ECTS)

The qualification phase for Graduate students entering the program with a bachelor's degree takes three semesters during which 90 ECTS credits must be earned. The study plan for the qualification phase is shown above. At least 20 ECTS credits must be earned in every semester of the Qualification Phase with an average grade of 3.0 or better, otherwise the student will be placed on academic probation. A graduate student with a GPA in any given semester worse than 4.33 will be automatically suspended, (Jacobs University operates on a grading scale between 1 and 5, where 1 the best possible grade, and 5 is a fail).

The yearly course offerings will be announced, communicated to, and discussed with the students in May for the Fall semester and in December for the Spring semester. The updated course plan with the valid course descriptions will be provided via the home page of the study program (<https://ses.jacobs-university.de/ses/ilme>).

Also, the topics and types of learning methods used may vary from year to year. The program seeks to assemble combinations of learning forms that simultaneously fulfill the students' need to understand a topic, as well as develop new learning skills.) Students finishing with a MSc degree after two years of studies devote the 4th semester to writing the Master's thesis based on a research proposal (recommendation: to be submitted in the 3rd semester).

2.1.1 Methods and Tools - 1st Semester

The block *Methods and Tools* (1st semester, 30 ECTS) is divided into four modules "Formal Methods", "Engineering", "Management", and "Leadership Skills". All modules are mandatory. The module "Formal Methods" counts for 10 ECTS. The modules "Engineering" and "Management" count for 7.5 ECTS each. The module "Leadership skills" counts for 5 ECTS. In case several courses for a module are offered, students must choose one of them.

"Formal Methods" provides the students with generic knowledge that is vital but not original for logistics. The content of courses (e.g. in mathematics, statistics, etc.) within this module forms a necessary basis for students studying *International Logistics: Management and Engineering*. Students who have already taken the courses being offered may choose other courses from the same field. The knowledge gained is not only used in logistics, but also in many other management areas such as marketing and finance. It provides the students with the necessary skills in higher mathematics for the modeling and simulation of logistics systems respectively with the tools for formally analyzing complex logistics systems.

The module "Engineering" provides students with methods that are originally used in, and have been developed for logistics issues. This module includes courses that introduce the ideas of

self-cooperating and self-controlling systems, or focus on instruments for sophisticated representation of logistics systems in complex models and simulations. This is done in order to provide logistics management with tools for planning, optimizing, and controlling. This module introduces and discusses a comprehensive spectrum of current approaches in modeling, and outlines future developments.

The "Management" module offers courses that deal with the control of supply chains and organizational designs for supply networks. It includes instruments for value-based management and advanced controlling; it might include also a workshop to introduce students to SAP as a worldwide-used enterprise resource planning software. Moreover, the module will give an introduction to global brand management and an overview of organizational theories. The focus for this module is on measuring performance, creating structures, and understanding the processes used in complex supply networks.

The module "Leadership Skills" in this block focuses only on intercultural competencies and communication. It includes intensive language training in German (or in a different language for German native speakers).

2.1.2 Complex Systems - 2nd Semester

The block **Complex Systems** (2nd semester, 30 ECTS) includes the four modules: "Production Logistics", "Distribution Logistics", "Maritime Logistics", and "Leadership Skills". From the Logistic modules offered, students have to select 2 out of 3 (20 ECTS). Usually, a module will consist of several parts.

The module "Production Logistics" covers topics like *Supply Chain Design* or *Smart Parts in Logistics*. It analyzes the design of infrastructure, processes, and system's features, as well as functions from an engineering perspective. For example, options for designing a production site or a warehouse will be examined. The module also focuses on so-called intelligent technologies (e.g. RFID) and their applicability to logistics tasks as well as advanced engineering related topics in logistics such as logistics-oriented design of technologies or information technologies in logistics.

The module "Distributions Logistics" addresses challenges and solutions of multimodal transportation systems and of sustainable logistics. The focus concentrates on modeling, planning, and controlling complex transportation tasks. Additionally, systems for warehouse management will be addressed. It also covers issues like Green Logistics and Logistics for Renewable Energy Supply.

The module "Maritime Logistics" provides an understanding of maritime transport, the most environmentally friendly mode of transportation. It also covers hinterland transport by other transport modes. The main objective is to provide a profound knowledge of business processes and innovations in maritime transport technologies to increase productivity, reliability, sustainability and better working conditions. Improving business processes requires new innovative solutions based on the potential of information and communication technologies. Students will learn to analyze systems and develop methods and tools for improving aspects of the processes related to economics and technology, and in relation to the carbon footprint of operations.

The module "Leadership Skills" is mandatory for all students. It counts for 10 credit points and comprises two mandatory parts, *Management competencies* (7.5 credit points) and *Inter-*

cultural competencies (2.5 credit points). The former includes courses and workshops that develop the management competencies of the participants for leading positions in industries and sciences. Therefore, the focus concentrates on training in project management, decision making, as well as leading teams and groups. The latter addresses inter-cultural competencies. It offers courses in intercultural communication and an additional language course in German or another language for German native speakers.

2.1.3 Guided Projects - 3rd Semester

The block **Guided Projects** (3rd semester, 30 credit points) encloses the three modules "Seminar Engineering", "Seminar Management", and "Guided Industrial Project". All modules are mandatory.

The module "Seminar on Engineering" focuses on a given research topic which is combined with industry data. This ensures knowledge of current research topics and allows students to develop an understanding of existing logistics problems. The module "Seminar on Management" will focus on empirical research to train the students' ability to think in concepts. The courses offered might be held in cooperation with logistics service providers or a company from a different industry which faces interesting logistics problems.

Both seminars aim at analyzing a practical problem of a company and providing a feasible and intelligent solution, which has to be developed by the students. The problem analysis as well as the development of the solution will be embedded in a theoretically profound framework and intended to apply scientific research results to practical issues. For both seminars the students have to work on such a problem in teams under the supervision of lecturers and company representatives. The students will create presentations, scientific papers, and reports about their work. A kick-off meeting, several workshops, as well as a final presentation and discussion in front of the company's management can be components of this seminar.

The module "Guided Industrial Project" (GIP) confronts the students with the practical logistics problems of companies. During this internship, students experience practical situations beyond their theoretical studies. They apply academic concepts in practice and have the chance to explore possible future opportunities for employment. Moreover, they work on these problems in dedicated teams. They learn how to split up tasks, how to work together, and how to behave and communicate in a professional context in order to take on the necessary steps. The GIP takes place off campus, normally between the second and the third semesters of study and lasts at least three consecutive months. For more details also see "Guided Industrial Projects" on www.jacobs-university.de/ilme/downloads.

As an exception, and after approval by the program coordinator, students might extend their GIP and work six instead of three months. In this case, students will start working individually on a supervised project (15 ECTS) that combines the learning objectives of the "Seminar Engineering" and the "Seminar Management". Therefore, they do not have to take part in these two modules. The project has to be performed from distance, in parallel with their internships. During this period, mandatory workshops and seminars will be held occasionally on campus, where students can meet each other and their supervisors accordingly.

2.2 Advanced Research Phase

After having finished the Qualification Phase, students enter the Advanced Research Phase. They should now combine all of their acquired competencies, skills and capabilities in writing their Master's thesis in order to deepen and show their qualification in advanced project work.

2.2.1 The Master of Science (MSc)

In the Master of Science Program, students in the Advanced Research Phase must write a Master's thesis. The selected topic of the thesis as well as the approach must be related to a real logistics problem of a company. The thesis should demonstrate the capability of the student to analyze and solve a complex logistics problem. It is an opportunity to demonstrate scientific skills and the knowledge gained as well as the ability to develop new insights. The thesis should demonstrate the comprehensive understanding of the underlying field, and it should be an original contribution to logistics theory and/or practice. Additionally, in the development process the student will be able to prove his/her skills in analyzing and solving a single problem based on a target-oriented application of scientific instruments and a critical reflection on current relevant scientific literature. Thereby, compliance with necessary quality standards as well as with the requirements for scientific research outlined in the corresponding guidelines is mandatory. The Master's thesis must be finished by the end of the 4th semester and is worth 30 ECTS out of 120 ECTS necessary for the MSc degree. Credits are awarded only if the grade is better than 4.0. If the thesis does not fulfill this requirement, the examination committee may agree that the thesis be resubmitted within three months.

2.2.2 The Executive Master of Science (MSc)

The advanced research phase of the Executive Master Program is identical to the final step of the MSc program. The only difference is that the students can write the Master's thesis while with their home companies.

3 The Doctor of Philosophy (PhD)

Students with an excellent record of achievement in their Master's studies and who have demonstrated an aptitude for research may progress to a PhD research phase, upon recommendation of the faculty and subject to approval by the Dean of the School of Engineering and Science. Students who entered with a master's degree by a direct application choose the supervisor during the application/acceptance process.

In order to obtain a PhD degree, up to three years of working on a research project is required. Upon graduation, Jacobs University Bremen awards a PhD in "International Logistics". The three-year PhD phase is devoted to active research within the research group of an academic supervisor, or multiple advisors whenever possible. This is done in order to foster interdisciplinary research within the *International Logistics* graduate program.

As a rule, Jacobs University awards a PhD degree in International Logistics. Alternatively, Doctors of Philosophy may use the German "Dr." in front of their names.

Sem. (PhD)	Phase	Description
1	PhD Proposal	Development of a Thesis Proposal; Public Defense of Thesis Proposal at the end of semester
2	PhD Research	Project Work and Refinement Phase; Written Progress Report for the Thesis Committee at the End of the Semester; Progress Seminar
3	PhD Research	Project Work and Refinement Phase; Written Progress Report for the Thesis Committee at the End of the Semester; Progress Seminar
4	PhD Research	Project Work and Refinement Phase; Written Progress Report for the Thesis Committee at the End of the Semester; Progress Seminar; Publications
5	PhD Research	Project Work; Thesis Preparation; Publications; Progress Seminar
6	Thesis & Defense	PhD Thesis; Publications; Public Defense

During the first semester of the final phase, all PhD students work out a thesis proposal in collaboration with their academic supervisor(s). The proposal must

- demonstrate that the student masters the professional terminology in the research domain and has the requisite background knowledge,
- identify and motivate a relevant, novel, and feasible research question,
- connect the question to the state of the art literature through an illustrative literature overview,
- design experiments, theoretical investigations/implementations, including a time line,
- describe the criteria for evaluating the eventual success of the project.

At the end of the 1st semester of the advanced research phase, a doctoral thesis committee is constituted and the proposal is defended in public. After (and if) the thesis proposal is successfully defended, the remaining time is used to carry out the proposed research. If necessary, the originally stated objectives are refined or even re-defined during this process. Progress is monitored by presentations within group-seminars, which are mandatory for the PhD students,

as well as on a day-by-day basis in close interaction with the supervisor.

The final semester is devoted to writing the thesis document. At the end of the program, the results are presented to the graduate program and the university in a public PhD thesis defense. The thesis committee judges the presentation of the thesis defense together with the content and form of the thesis to determine whether it will be accepted or rejected. The PhD thesis is usually not graded within the Jacobs University grading system but may be awarded with the predicate "with distinction".

PhD students are encouraged but not required to participate in courses to broaden and deepen their knowledge in the different related fields.

Teaching experience is part of graduate education. All graduate students are strongly encouraged to work in undergraduate courses as teaching assistants (TAs). This includes, among other activities, giving tutorials, grading exercise sheets, and supervising lab or undergraduate project work. According to their experience, PhD students may also work out exercise sheets or define undergraduate projects and offer seminars.

4 Courses

The following tables show the study plan for Master students graduating in June 2013. The courses actually offered might change due to changing students' requests, available capacities and a quorum of five students per course. The updated course plan with the valid course descriptions will be provided via the website of the study program. Abbreviations are as follows:

- LEC - Lecture
- LAB - Laboratory
- SEM - Seminar
- GIP - Guided Industrial Project
- MT - Master Thesis

Fall 2011

Module	Courses	Form	ECTS	Course No.
Methods & Tools				
	Orientation Course	SEM	0	051 451
Formal Methods (10 ECTS)				
Advanced Mathematics	Mathematical Methods for Logistics & Economy (Intersession 2012)	LEC	5	051 461
Statistics	Econometrics (Spring 2012)	LEC	5	990 222
Engineering Methods (7,5 ECTS)				
Adv. Modeling & Simulation of Logistics Systems	Adv. Modeling & Simulation in Logistics	LEC	2,5	051 421
	Application of Modeling & Simulation	LAB	2,5	051 431
	Application of Modeling & Simulation Methods	LEC	2,5	051 441
Management Methods (7,5 ECTS)				
	Global Franchising	LEC	3,5	052 111
	Global Brand Management	LEC	3,5	052 101
	Introduction to SAP (Spring 2012)	SEM	0,5	050 922
Leadership Skills (5 ECTS)				
Intercultural Competencies	German (any other language course for German Native Speakers)	LAB	2,5	
	Intercultural Competencies for Leaders in Business	LAB	2,5	051 411

Spring 2012

Module	Courses	Form	ECTS	Course No.
Complex Systems				
Production Logistics (10 ECTS)				
	Information Systems in Logistics	LAB	2,5	051 452
	Factory Planning	LEC	2,5	051 402
	Decision Making in Supply Chains	LAB	2,5	051 444
	Adv. Production Monitoring & Control	LAB	2,5	051 462
Distribution Logistics (10 ECTS)				
	Distribution Logistics I: Marketing Logistics - From a Brand Perspective	SEM	5	051 432
	Distribution Logistics II: Value Proposition, Architecture of Value Creation & Income Model of Service Providers	SEM	5	051 414
Maritime Logistics (10 ECTS)				
	Port Management & Operations	SEM	5	051 472
	Terminal Management & Operations	LAB	5	051 434
Leadership Skills (10 ECTS)				
Management Competencies	Project Management	SEM	2,5	051 412
	Decision Making (Fall 2011)	SEM	2,5	051 422
	Leading Teams & Groups (Fall 2011)	LAB	2,5	051 442
Intercultural Competencies	German (or any other language course for German native speakers)	LAB	2,5	

Fall 2012

Module	Courses	Form	ECTS	Course No.
Guided Projects				
Seminar Engineering	Seminar Engineering	SEM	7,5	051 511
Seminar Management	Seminar Engineering	SEM	7,5	051 521
Guided Industrial Project	Internship	GIP	15	051 531

Spring 2013

Module	Courses	Form	ECTS	Course No.
Adv. Research				
Master Thesis	includes Master Thesis Colloquium	MT	30	051 512

