

Industrial Engineering and Management

/Industriell ekonomi/

The research area Industrial Engineering and Management includes the following specialisations:

- **Industrial Engineering and Management with specialisation in Economic Information Systems**
/Industriell ekonomi med inriktning mot ekonomiska informationssystem/
/SCB code 10202/
- **Industrial Engineering and Management with specialisation in Industrial Marketing**
/Industriell ekonomi med inriktning mot industriell marknadsföring/
/SCB code 21199/
- **Industrial Engineering and Management with specialisation in Industrial Management**
/Industriell ekonomi med inriktning mot industriell organisation/
/SCB code 21199/
- **Industrial Engineering and Management with specialisation in Quality Technology and Management**
/Industriell ekonomi med inriktning mot kvalitetsteknik/
/SCB code 20305/
- **Industrial Engineering and Management with specialisation in Logistics Management**
/Industriell ekonomi med inriktning mot logistik/
/SCB code 20399/
- **Industrial Engineering and Management with specialisation in Operations Management**
/Industriell ekonomi med inriktning mot produktionsekonomi/
/SCB code 21199/

General description of the research area

The research area Industrial Engineering and Management focuses on theoretical and practical knowledge creation central to the management of innovation, production, logistics, quality management, information systems and marketing in established and emerging industries and organizations. The main focus is on business development, organizational development and the development of effective and efficient processes in various types of settings. The research can also focus on how conditions can be created for the development of goods and services, technology, sustainable growth and profitability in industrial companies but also in trade, public and non-profit sectors.

The research is characterized by a variety of approaches and different levels of analysis. One starting point is the organizational level (firm / business area / department / project) and the activities on this level, but the area also includes studies on industry structures, business networks and change processes that cut across several organizations in time and space, and studies from an employee perspective and other stakeholders' perspectives.

The research area Industrial Engineering and Management includes the areas mentioned above which these are described in more detail at the end of this document.

Eligibility requirements and selection

The basic eligibility requirements as well as the general principles for selection are specified in the faculty's *Study Handbook for PhD Studies*.

Specific eligibility requirements

Admission to PhD Studies in the research area of Industrial Engineering and Management requires fulfilling the master's degree requirements with completion of at least 60 ECTS at the master level in a field relevant to the specialisation in PhD studies. These 60 ECTS should include an independent project of at least 30 ECTS in a field relevant to the subject of PhD studies.

Degree

PhD studies in Industrial Engineering and Management lead to a Degree of Doctor or a Degree of Licentiate. The latter degree can also serve as an intermediate stage in the PhD studies. The Degree of Licentiate comprises 120 ECTS, of which courses correspond to 40-60 ECTS and the licentiate thesis corresponds to 60-80 ECTS. The Degree of Doctor comprises 240 ECTS, of which courses correspond to 60-90 ECTS and the doctoral thesis corresponds to 150-180 ECTS. The distribution of courses and thesis credits will be determined in the first individual study plan.

Goals and implementation of the PhD studies

The general goals and objectives of PhD studies are specified in the introduction to the faculty's *Study Handbook for PhD Studies*, as well as in the Higher Education Ordinance (reprinted in the *Study Handbook's* appendix A).

PhD studies in the research area of Industrial Engineering and Management will provide the PhD student with the knowledge and skills to fulfill all the degree outcomes. The studies consist of thesis work, courses, participation in seminars, attendance at national and international conferences, and networking with industry.

The PhD studies will endow the PhD student with a broad knowledge and understanding of Industrial Engineering and Management through participation in different types of seminars, participation in broadening courses from the research area's various specialisations, as well as helping to teach undergraduate courses in Industrial Engineering and Management. PhD students who are involved in undergraduate teaching their own courses must take a mandatory basic course in university pedagogy.

The PhD student will acquire deep knowledge and understanding of Industrial Engineering and Management and, in particular, his/her research specialisation by actively participating in in-depth courses within his/her field of specialisation, by carrying out independent research work in one or several research projects, and by participating in discussions at seminars and conferences, etc.

The PhD student will develop familiarity with scientific methodology through his/her own research and by attending the faculty's mandatory course in research methodology, other mandatory courses in research methodology common for the research area, as well as departmental activities for PhD studies. Alternatively, the PhD student may acquire such knowledge through other means.

PhD students in Industrial Engineering and Management acquire skills and competencies by:

- Independently planning and carrying out his/her research work.
- Conducting research in parallel with course work.
- Taking part in the department's research activities and attending seminars, workshops and guest lectures, etc. during his/her period of study.
- Reporting on results achieved and plans for continued thesis work at least once a year at a seminar.
- Participating in international conferences and presenting his/her own research in order to practise his/her ability to make presentations in front of colleagues from his/her own field of research as well as adjacent, related fields, and to critically review his/her own research as well as the other participants' research.

PhD students in Industrial Engineering and Management will develop the ability to value and a critical attitude by completing courses in research ethics, participating in different types of seminars as well as participating in departmental activities for PhD students. PhD students in Industrial Engineering and Management will demonstrate their intellectual independence by writing and defending a licentiate and/or doctoral thesis.

Thesis

The subject of the thesis should be chosen in consultation with the supervisor. To receive a Degree of Licentiate, the student should write a licentiate thesis that will be defended at a public seminar. The thesis should show the student's ability to systematically elucidate a problem using scientific methods.

To receive a Degree of Doctor, the student should write a doctoral thesis that will be defended at a public disputation. The thesis can consist of either a monograph or a compilation thesis. In the latter case, the thesis will consist of a summary of the PhD student's work as well as a number of scientific articles. The number of articles can vary depending on the PhD student's own contributions to the respective work, the scope of the articles and their scientific contributions. Normally a compilation thesis consists of 4-6 articles, of which at least 2 articles have been accepted for publication in international scientific journals and/or books, plus another 2-4 articles that are of such a standard as to be suitable for publication in international journals. In a compilation thesis, it should be clearly indicated what the PhD student has contributed by him-/herself and what the other co-authors have contributed.

Individual study plan

An individual study plan will be formulated for each PhD student. The detailed planning of courses and other components will be conducted in consultation with the supervisor and documented in the individual study plan (see *Study Handbook for PhD Studies*, section 5.3). The study plan should be established within one month after admission to PhD studies, and it should be revised at least once a year.

Courses

Faculty course requirements

Scientific theory, methodology and ethics

All PhD students should complete mandatory courses as decided by the faculty in methodology and ethics, or be deemed to have equivalent competencies, in order to receive a degree.

Pedagogic studies

All PhD students who are involved in teaching should complete a basic course in pedagogy. At least 3 ECTS from this course should be included in the PhD studies, and any remaining credits should be counted as departmental duties (see *Study Handbook for PhD Studies*, section 5.5).

Course requirements common for the research area

The following courses are mandatory for PhD students in the research area of Industrial Engineering and Management:

- Basic course/courses in research methodology, 7,5 ECTS, which includes the faculty's mandatory course in methodology
- In-depth courses in research methodology connected to own research, 7,5 ECTS

Accreditation

Master courses may be counted toward the degree in certain cases. At most a third of the course requirements for the degree, that do not form part of the basic or specific eligibility requirements for the specialisation, and that are relevant to the PhD studies may be accredited the degree. The PhD student should submit an application for accreditation using the appropriate application form to the department's administration for PhD studies; the application is then to be approved or rejected by the main supervisor, and a positive decision on accreditation can be made by the Director of PhD Studies at the relevant department. A decision to reject an application for accreditation may not be made by the Director of PhD Studies at the department, rather, such a decision can only be made by the faculty's Board of PhD Studies.

Specialisations

Industrial Engineering and Management with specialisation in Economic Information Systems

The area's main focus is where management and IT meet. This involves how information is transferred from, between and to people, and the possibilities and consequences of the use of IT. The area includes research on business and organisational development, management control, and the development of knowledge and competence, especially in settings where the use of IT is a major component.

Special interest is directed at the roles of strategies and information systems when people interact in organisations (public, private and non-profit), networks and coalitions, and the interplay with the surrounding ecologies. Perspectives management – discerning and paying heed to different stakeholders' perspectives – is an important part in the striving for deeper and more nuanced understanding of the studied phenomena.

Required course:

- Classics in Economic Information Systems, 7,5 credits

Industrial Engineering and Management with specialisation in Industrial Marketing (det som följer översätts av IEI)

Industrial marketing focuses on how companies and other organizations can create value and do business together in a business-to-business context. Value creation can take a starting point in products as well as services, and also combinations in complex systems and solutions. An important

foundation in industrial marketing is that buyers and sellers (and also other actors in extended market channels and networks) have deep, and often long-term, relationships with each other and that these relationships include technical, business as well as social dimensions. Industrial marketing is perceived as a value creating process that can include a wide range of activities including, for example, market analysis, market strategies, product and service development, as well as sales and deployment of various market offers. The process of industrial marketing also includes a societal dimension (e.g. the surrounding environment) and how to create sustainable businesses and market offers.

Research within Industrial marketing is carried out from a strategic and an operational, as well as from a network, perspective. The general aim is to develop new theoretical knowledge as well as to be practically relevant for, and applicable in, industry.

Industrial Engineering and Management with specialisation in Industrial Management

The area's main focus is on industrial management, especially innovation and entrepreneurship. Innovation includes research on innovation processes at the individual, firm, industrial and system level. Entrepreneurship includes research on business development, especially in the early phases. Research is conducted primarily through empirical studies of industrial and / or knowledge-intensive organizations, networks and industries.

The research aims to develop knowledge that contributes to a better understanding of the different types of innovation and entrepreneurship processes and how they are affected by the firm's organization and strategies, the interaction between different actors, political intervention and the institutional framework in general. The research often aims at, based on an understanding of the above aspects, formulating recommendations for managers and policy makers on how innovation and entrepreneurship processes can be managed, organized and stimulated.

Required course includes:

- Classics in Innovation and Entrepreneurship, 7.5 credits

Industrial Engineering and Management with specialisation in Quality Technology and Management

The main focus is research on principles, methods and tools for improving existing and developing new and innovative products and services, and managing processes in order to satisfy the needs and expectations of customers, owners and other stakeholders. The research field Quality Technology and Management is based on a management philosophy guided by the core principles: management engagement, customer focus, continuous improvements, employees' involvement and decisions based on facts. The research includes both quality management and quality engineering e.g. statistical process control and experimental design. The research is conducted in both private and public sectors.

Industrial Engineering and Management with specialisation in Logistics Management

The research field Logistics Management is on how to design and implement more efficient and effective logistics systems and supply chains. The research is on both the physical materials flow, inbound from suppliers, internally through the company and outbound to customers and on the related information flow. It comprises improvement of logistics structures and processes with applications in supply chain management, distribution systems and –channels, including strategic development and development of logistics based business models. From our focus on profitable and sustainable growth, the research provides business benefits for industrial and trading companies as

well as social values by applying logistics principles and models on the public sector, e.g. Health Care Logistics and City Logistics.

Industrial Engineering and Management with specialisation in Operations Management

Operations management is an area studying how company performance can be improved by efficient allocation of production resources such as labor, capital and materials. It encompasses developments in theory and application, wherever engineering and technology meet the managerial and economic environment in which industry operates. While economic performance is the main focus, environmental and social practice can be included in order to sustain the development of industry. Consequently, decisions concerning production and supply chain operations, production planning and control, investment and financing become the central scheme of this area of study. The study also extends from traditional manufacturing industry to service industry, which includes manufacturing services, financial service, logistics services, retailing and public services. The research in Operations Management often adapt quantitative methods such as decision analysis, optimization, simulation, statistics and data analytics for developing new theory and improving industry practice.

Transitional provisions

Changes to the general study syllabus do not apply to those who have already been admitted to PhD studies in the research area. A change to the new general study syllabus may however be approved if both the main supervisor and the PhD student agree. In such a case, this should be documented in the individual study plan.