JÖNKÖPING UNIVERSITY
School of Engineering

PROGRAMME SYLLABUS

Industrial Engineering and Management: Sustainable Supply Chain Management, 180 credits

Programmestart: Autumn 2024

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PROGRAMME SYLLABUS

Industrial Engineering and Management: Sustainable Supply Chain Management, 180 credits

Industriell organisation och ekonomi: Sustainable Supply Chain Management, 180 högskolepoäng

Programme code:	TGSS6	**Programmestart:**	Autumn 2024
Confirmed by:	Dean 2016-03-30	**Education Cycle:**	First-cycle level
Revised by:	Director of Education 2023-11-01		
Version:	11		

Title of qualification

Degree of Bachelor of Science in Industrial Engineering and Management, specialisation Sustainable Supply Chain Management

Programme overview

Background

Supply chain management has become a central concern for most firms to remain competitive in an ever-intensive dynamic global market. As a field, it has grown rapidly over the recent decades by drawing upon a myriad of fields and areas. Notably, sustainability of supply chains is in the forefront of academic and practice agenda, no matter if the firms are large and global, small and medium sized start-ups, or are involved in strategic, tactical or operational decision-making. This program is designed to provide unique competencies in sustainable supply chain management by integrating the knowledge and skills from Industrial Engineering, and Management. More importantly, since contemporary industrial engineering and management has grown beyond solely focusing on production operations, this program incorporates a variety of actors, functions, operations and industries, including retailing and distribution, services, and purchasing, while having a solid and fair emphasis on production.

Objectives

The program aims to provide students with a deep knowledge of the design, planning and control of supply chain and industrial operations. Specifically, the program aims to provide the students with solid understanding of sustainability issues in the various levels of contemporary supply chains, from purchasing and supply to production, distribution and retailing. The issues include environmental, social and economic aspects as well as planning for successful leadership and management of organizations.

Post-graduation employment areas

Upon graduation, the student is well prepared to work in different positions within various industrial actors involved within supply chains, including production, purchasing, logistics services, distribution and retail firms. Possible future careers could be entry management and/or planning positions within purchasing, supply chain sustainability and social responsibility, production engineering, transport and warehousing, as well as retail logistics. The blend of

theoretical knowledge and practical education prepares the graduates with the expertise relevant for managerial, engineering, as well as consultancy careers within Industrial Engineering and Management.

Educational concept at the School of Engineering

All programmes at the School of Engineering at Jönköping University (JTH) follow an educational concept. The educational concept can be seen as consisting of a number of elements that must be included in the study programmes in order to promote the quality and attractiveness of the education in a way that makes students professionally skilled and sought-after. The concept highlights the connection with industry and internationalisation in particular as two important elements in order to create successful programmes for which there will be a high number of applicants.

In the concept, there are common learning outcomes regarding the areas leadership, project management, economy, entrepreneurship, marketing, sustainable development, scientific methods and communication. There is also an Industrial Placement Course (IPC) included in all programmes, whereby students put their theoretical knowledge into practice. IPC is a 12 credit course (7 weeks practise at a company), and it is also possible to complete the course abroad.

Internationalisation means that, for example, the opportunity is provided to practise languages and intercultural communication through student exchanges with foreign universities. JTH has around 70 partner universities around the world, and takes part in a number of international student exchange programmes. There is the opportunity to spend part of the study period abroad and to accredit studies abroad towards the degree. As a result of this student exchange, a large number of courses at JTH are taught in English.

Objectives

After the completion of the programme, students must meet the intended learning outcomes, as described in The Higher Education Ordinance by Degree of Bachelor of Science in Engineering (1-11) and also the intended learning outcomes, as described by JTH:

Common learning outcomes

Knowledge and Understanding

1. demonstrate knowledge of the disciplinary foundation of the engineering field chosen and proven experience in this field as well as awareness of current research and development work,
2. demonstrate broad knowledge in the engineering field chosen and relevant knowledge of mathematics and the natural sciences,

JTH. demonstrate knowledge of business (economics, entrepreneurship, business planning, marketing) in relevant activities within the chosen field of engineering,

Competence and Skills

3. demonstrate the ability to identify, formulate and deal with issues autonomously and creatively using a holistic approach and to analyse and evaluate technological solutions,
4. demonstrate the ability to plan and using appropriate methods undertake tasks within predetermined parameters,
5. demonstrate the ability to use knowledge critically and systematically to model, simulate, predict and evaluate series of events on the basis of relevant information,
6. demonstrate the ability to design and manage products, processes and systems while taking into account the circumstances and needs of individuals and the targets for economically, socially and ecologically sustainable development set by the community,
7. demonstrate the capacity for teamwork and collaboration with various constellations,
8. demonstrate the ability to present and discuss information, problems and solutions in speech and writing and in dialogue with different audiences, in both national and international contexts,

JTH. demonstrate ability to apply the acquired knowledge in practical work and demonstrate

insight into the future career,

Judgement and Approach

9. demonstrate the ability to make assessments informed by relevant disciplinary, social and ethical aspects,
10. demonstrate insight into the possibilities and limitations of technology, its role in society and the responsibility of the individual for how it is used, including social and economic aspects as well as environmental and occupational health and safety aspects,
11. demonstrate the ability to identify the need for further knowledge and undertake ongoing development of his or her skills,

Programme-specific learning outcomes

Upon completion of the program, the intended learning outcomes provided for programme must also be met.

Knowledge and Understanding

12. demonstrate knowledge of the design, planning and control of logistics flows in a sustainable fashion
13. demonstrate knowledge of the design, management and development of industrial operations in a sustainable fashion

Competence and Skills

14. demonstrate ability to design, plan and control of logistics flows in a sustainable fashion
15. demonstrate ability to design, manage and develop industrial operations in a sustainable fashion

Judgement and Approach

16. demonstrate ability to propose and compare different options for the design, planning and control of logistics flows and assess their sustainability implications
17. demonstrate ability to propose and compare different options for the design, management and development of industrial operations and assess their sustainability implications

Contents

Programme principles

The education encompasses deep expertise in the design, planning and control of sustainable supply chains. Upon the start, core courses with a clear focus on logistics and sustainability are offered. Additionally, students acquire the basic knowledge and skills for carrying out and communicating scientific research. The program provides an in-depth understanding of leadership and project management principles, followed up by the fundamentals of planning for starting up a business and entrepreneurship. Later, the knowledge and skills on industrial operations are deepened by focusing on quality management and engineering. Moreover, students acquire basic and deeper knowledge in calculus, and mathematical statistics to enrich their engineering profile.

The second year includes courses that deepen the knowledge base within the field of industrial engineering and management with a focus on transportation and warehousing, purchasing, retailing, and industrial marketing and innovation. The knowledge on sustainability in supply chains is deepened in semester 3 by covering the principles of lean and sustainable engineering. Meanwhile, the knowledge base in algebra and optimization is deepened. The year ends with the Industrial Placement Course in which most of the practical course work is carried out at a company. Moreover, the students enrich their knowledge on scientific inquiry upon the start of the Industrial Placement Course.

The final year provides a unique opportunity for the students to take elective courses either at JU or at our partner universities. Students can further specialize in the area of their preference within the framework of industrial engineering and management. Instances for area themes could be production, and services, information systems, and simulation. In the final semester,

students gain further education on the social, well-being, and ergonomic aspects of sustainablility.

During the program, students work on practical cases where they apply their theoretical knowledge in dealing with real-world problems. Laboratory and business games are other tools that are used to facilitate understanding of the contemporary management of supply chains. Group work is very common, e.g., when working with case studies and exercises. In several courses, field trips are organized or guest speakers from the business world are invited to further strengthen the link between education and practice. Students can also deepen their international profile by studying at our partner universities for one or two semesters.

Education in this international program is carried out in English.

Programme progression

The program courses, goals and progression are continuously assessed. The program is based on a system-wide perspective, which means that (1) knowledge and understanding, (2) the skill and ability, and (3) judgment and approach are built up continuously during the program. Each course is part of the system and provides all three levels of knowledge and for the whole program, the students have knowledge of the entire system at all three levels. Examination takes place in different forms in different courses continuously during the programme with progressively higher requirements as the courses follow. Final examination takes place in the form of the final thesis.

This program is comprised of courses which focus on various aspects of industrial engineering and management and sustainable supply chain management. The first course offered, *Logistics Engineering*, provides a solid cornerstone to the program. In this course, students become familiar with the primary knowledge and skills in relation to logistics flows, including materials planning and control, production, and distribution. These knowledge and skills are followed up more specifically in several other subsequent courses including *Quality Management and Engineering*, *Lean and Green Engineering*, *Transportation and Warehousing*, *Industrial Finance and Controlling,* and *Retailing* (focusing on retail and distribution operations). An introduction to the basics of supply chain management and the related sustainability implications is provided in *Principles of Sustainable Supply Chain Management*. This course serves as a premise for a number of other courses in the program including *Supply Chains and Social Responsibility, Lean and Green Engineering*, and partially *Purchasing*, and *Sustainable Business Relationships*, among others. The students become familiar with the principles of leadership and change management in organizations and projects in *Leadership and Project Management*, which provides a base for *Leading and Organizing*. The mathematics and optimization courses provided in the program give an essential engineering edge to the knowledge and skills of the students, which is central to several operations-related courses throughout the program, and potentially the elective courses. Specifically, if the program students decide to stay at JU rather than studying abroad, the courses offered in semester 5 build on the various courses and topics studied in several other courses in the program. For instance, *Innovative Production Systems Development* deepens the knowledge and skills on production and operations gained in year 1. *IT in Supply Chains,* and *Simulation in Industrial Engineering* deal with the application of IT is contemporary supply chain management. The course *Intercultural and International Communication* enriches students' international profile, while studying at JU. The *Industrial Placement* and *Final Project Work* courses provide a unique opportunity for students to further practically experience their knowledge during an internship and thesis work. The latter-mentioned practice-oriented courses are supported by the knowledge and skills gained in various courses, especially methodology and presentation courses.

Basic Physics 2

The students who miss Physics 2 should take the 6-Pre-education credits course Basic Physics 2 in addition to the 180 credits required to obtain a Bachelor's of Science degree.

Semester 5

Study abroad or elective courses (within Industrial Engineering and Management)

Courses

Mandatory courses

Course Name	Credits	Main field of study	Specialised in	Course Code
Retailing	7.5	Industrial Engineering and Management	G2F	TDHN11
Final Project Work in Industrial Engineering and Management	15	Industrial Engineering and Management	G2E	TEIP19
Research Methods and Communication	7.5	Industrial Engineering and Management	G1N	TFKG18
Supply Chains and Social Responsibility	7.5	Industrial Engineering and Management	G1F	TSCK12
Principles of Sustainable Supply Chain Management	7.5	Industrial Engineering and Management	G1N	TSSG18
Basic Calculus	7.5		G1N	TGAG19
Basic Physics 2	6		GXX	TG2F07
Sustainable Business Relationships	7.5	Industrial Engineering and Management	G2F	THAN19
Industrial Finance and Controlling	7.5	Industrial Engineering and Management	G1N	TEKG19
Purchasing	7.5	Industrial Engineering and Management	G2F	TIKN10
Quality Management and Engineering	7.5	Industrial Engineering and Management	G1F	TKYK19
Lean and Green Engineering	7.5	Industrial Engineering and Management	G1F	TLGK19
Leadership and Project Management	7.5	Industrial Engineering and Management	G1N	TLPG18
Leading and Organizing	7.5	Industrial Engineering and Management	G1F	TLDK11
Linear Algebra and Optimization	7.5		G1N	TAOG19
Mathematical Statistics	7.5		G1F	TMSK17
Industrial Placement Course in Industrial Engineering and Management	12	Industrial Engineering and Management	G2F	TNON15
Logistics Engineering	7.5	Industrial Engineering and Management	G1N	TTOG18

Transportation and Warehousing	7.5	Industrial Engineering and Management	G2F	TTLN18
Inquiry Methodology in Industrial Engineering and Management	3	Industrial Engineering and Management	G1F	TUMK11

Elective courses

Course Name	**Credits**	**Main field of study**	**Specialised in**	**Course Code**
Intercultural and International Communication[I]	7.5	Industrial Engineering and Management	G1N	TIKG18
IT in Supply Chains[I]	7.5	Industrial Engineering and Management	G2F	TSCN11
Simulation in Industrial Engineering[I]	7.5	Industrial Engineering and Management	G2F	TSEP11
Innovative Production Systems Development[I]	7.5	Industrial Engineering and Management	G2F	TUIN18

Programme overview

Year 1

Semester 1		Semester 2	
Period 1	Period 2	Period 3	Period 4
Logistics Engineering, 7.5 credits	Leadership and Project Management, 7.5 credits	Basic Calculus, 7.5 credits	Linear Algebra and Optimization, 7.5 credits
Research Methods and Communication, 7.5 credits	Principles of Sustainable Supply Chain Management, 7.5 credits	Industrial Finance and Controlling, 7.5 credits	Mathematical Statistics, 7.5 credits

Year 2

Semester 3		Semester 4	
Period 1	Period 2	Period 3	Period 4
Lean and Green Engineering, 7.5 credits	Quality Management and Engineering, 7.5 credits	Retailing, 7.5 credits	Industrial Placement Course in Industrial Engineering and Management, 12 credits
Purchasing, 7.5 credits	Transportation and Warehousing, 7.5 credits	Sustainable Business Relationships, 7.5 credits	Inquiry Methodology in Industrial Engineering and Management, 3 credits

Year 3

Semester 5		Semester 6	
Period 1	Period 2	Period 3	Period 4
IT in Supply Chains [I], 7.5 credits	*Innovative Production Systems Development [I], 7.5 credits*	Leading and Organizing, 7.5 credits	Supply Chains and Social Responsibility, 7.5 credits
Simulation in Industrial Engineering [I], 7.5 credits	*Intercultural and International Communication [I], 7.5 credits*	Final Project Work in Industrial Engineering and Management, 15 credits	

Year 4

Semester 7		Semester 8	
Period 1	Period 2	Period 3	Period 4
Basic Physics 2, 6 credits			

Teaching and examination

Throughout the academic year, typically, two courses are taken in parallel. Examination forms and grades are given by each course module, respectively. The programme overview shows the programme structure for both years and may be changed during the programme. For updated

programme overview visit http://www.ju.se

Prerequisites
General entry requirements and Physics 1, Chemistry 1, Mathematics 3c, English 6 with required grade passed in the Swedish upper secondary school system or international equivalent.

Continuation Requirements
In order to begin the second year, at least 30 credits from the programme's first year must be completed.
In order to begin the third year, at least 90 credits from the programme's first and second year must be completed.

Qualification Requirements
To obtain the Bachelor of Science in Industrial Engineering and Management, specialisation in Sustainable Supply Chain Management the student shall complete the course requirements of at least 180 credits in accordance with the current programme syllabus.

Quality Development
The School of Engineering's quality assurance process involves continuous development and quality assurance of degree programmes and courses. This means, among other things, that great importance is attributed to student feedback and that a proactive approach is taken to the development of degree programmes and courses. The quality assurance process is carried out following applicable steering documents.

Other Information
If formal competence is missing, the applicant's substantial competence is tested if the applicant has acquired equivalent knowledge in some other way. The aim is to assess the collective competence and if the applicant has the opportunity to meet selected training. Substantial competence can be about knowledge and experience from working life, long-term mobility or other courses.

Course included in the programme can be read as a separate course, subject to availability. Prerequisites are stated in the syllabus.

Admission is under "Admission arrangements for first and second level" at Jönköping University.

This syllabus is based on "Regulations and guidelines for education at undergraduate, postgraduate and doctoral studies at Jönköping University"