



JÖNKÖPING UNIVERSITY  
*School of Engineering*

PROGRAMME SYLLABUS  
**Supply Chain Operations Management (master), 120 credits**

Programmestart: Autumn 2024



## PROGRAMME SYLLABUS

# Supply Chain Operations Management (master), 120 credits

*Supply Chain Operations Management (master), 120 högskolepoäng*

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Programme code: TASC1

Programmestart: Autumn 2024

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Education Cycle: Second-cycle level

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### Title of qualification

Degree of Master of Science (120 credits) with a major in Production Systems, specialisation in Supply Chain Operations Management

### Programme overview

#### Background

The operations function and its role in supply chain networks is of vital importance for organizations, be it in the manufacturing or service industry, to remain competitive in today's rapidly changing and expanding global markets.

Supply chain operations management is a field that has grown rapidly over the recent decades, both in research and practice. The strategic role operations play for businesses to remain competitive has been further demanded through forward technological leaps and contemporary solutions of connecting sites and parties, both internally and externally, around the world. As consumption continue to increase and products are often transported over lengthy distances, sustainable solutions are key in supply chain operations. This program is designed to provide competencies in supply chain operations management by integrating supply chain management, operations management, industrial engineering and work organization. The interdisciplinary approach of this program offers unique opportunities to learn, practice, and gain appropriate knowledge and skills to manage integrated systems in directing, designing and developing sustainable operations for network-based delivery of products and services. Throughout the education, extensive experience is gained in problem-based learning where real-life issues are incorporated, while practicing constant application of communication and presentation skills in various decision-making constellations.

#### Objectives

The program aims to prepare students for managerial work in changing, dynamic supply chain operations environments and provide competences to identify and manage the balance between efficiency requirements on daily operations, the need for innovative aspects of renewal and the demands for lasting sustainability. Further, there is an emphasis on the understanding of the implications of digitalization and connectivity for supply chain operations management. Moreover, the program also prepares students for postgraduate studies, and careers within various areas demanding knowledge and skills in research.

#### Post-graduation employment areas

Graduates will be highly skilled engineers with extensive knowledge on supply chains and operations of the future markets, with the ability to maneuver within a sustainable, complex, digitalized, global system as operations managers, industrial engineers, or supply chain

managers. Further, graduates will be equipped with academic know-how in conducting research, managing projects, and collaborating effectively in interdisciplinary settings. This shall create suitability to be employed by research institutes, universities and within research and development functions.

### **Programme Supportive Research**

The program is designed to include courses related to a number of research areas of the department of Supply Chain and Operations Management at the School of Engineering. All course owners in the program are researchers engaged in a variety of research projects. Therefore, all courses contain insights and examples of cases from ongoing or completed research projects. This implies that the program offers relevant knowledge, providing students with insights into cutting-edge research development. In particular, the program significantly overlaps with two thematic areas of the research environment SPARK: Knowledge intensive product realization, namely “Renewal and organizing for sustainable innovation” and “Responsive and efficient operations and supply chains”. Supply Chain and Operations Management researchers also contribute in terms of their extensive international network creating opportunities for guest lectures, case analyses, and information exchange.

### **Objectives**

After the completion of the programme, students must meet the intended learning outcomes, as described in The Higher Education Ordinance by Degree of Master (1-9), and also the intended learning outcome, as described by JTH:

### **Common learning outcomes**

#### **Knowledge and Understanding**

1. demonstrate knowledge and understanding in the main field of study, including both broad knowledge of the field and a considerable degree of specialised knowledge in certain areas of the field as well as insight into current research and development work
2. demonstrate specialised methodological knowledge in the main field of study

#### **Competence and skills**

3. demonstrate the ability to critically and systematically integrate knowledge and analyse, assess and deal with complex phenomena, issues and situations even with limited information
4. demonstrate the ability to identify and formulate issues critically, autonomously and creatively as well as to plan and, using appropriate methods, undertake advanced tasks within predetermined time frames and so contribute to the formation of knowledge as well as the ability to evaluate this work
5. demonstrate the ability in speech and writing both nationally and internationally to clearly report and discuss his or her conclusions and the knowledge and arguments on which they are based in dialogue with different audiences
6. demonstrate the skills required for participation in research and development work or autonomous employment in some other qualified capacity

#### **Judgement and Approach**

7. demonstrate the ability to make assessments in the main field of study informed by relevant disciplinary, social and ethical issues and also to demonstrate awareness of ethical aspects of research and development work
  8. demonstrate insight into the possibilities and limitations of research, its role in society and the responsibility of the individual for how it is used
  9. demonstrate the ability to identify the personal need for further knowledge and take responsibility for his or her ongoing learning
- JTH. demonstrate the ability to embrace interdisciplinary approaches

### **Programme-specific learning outcomes**

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

### **Knowledge and Understanding**

10. display knowledge of implications of digitalization and connectivity for supply chain operations management
11. demonstrate comprehension of the characteristics of operations management and its role in supply chain contexts
12. demonstrate comprehension of the balance between efficiency requirements on daily operations and the need for innovative aspects of renewal and innovation

### **Competence and skills**

13. demonstrate skills of problem identification, analysis and decision making within supply chain operations management contexts
14. demonstrate skills of operations management in practice
15. demonstrate the ability to apply different methods and tools relevant for supply chain operations management
16. demonstrate the ability to understand interactions among individuals, groups, organizations and technology in supply chains
17. demonstrate the ability to lead, participate and collaborate effectively in teams toward goals

### **Judgement and Approach**

18. demonstrate the ability to critically analyze the impact operations has on economic, social and environmental sustainable development
19. demonstrate the ability to critically reflect on differences and similarities in process and system perspectives on operations management

## **Contents**

### **Programme principles**

The education encompasses deep expertise in directing, designing and developing sustainable supply chain operations for delivery of products and services (based on the so-called 4D-model of operations management). In relation to this, emphasis is put on integrating aspects of sustainability, and digitalisation and connectivity, into every course, along with a problem-based learning approach. Moreover, communication and presentation skills are at the core of every managerial position and therefore a vital part of the educational programme in supply chain operations management.

During the first year all courses are programme specific and follow two paths. The first path focuses on core aspects of supply chain operations management and offers a solid basis for continued post-graduate studies. The courses build on each other based on the 4D-model for operations management; covering issues related to how to direct, design and develop operations, and how to ensure efficient and effective delivery of products and services. The second path runs in parallel with the first and consists of courses on research methodology and on how to lead people, systems, and processes. The combination of these two paths implies that the program provides an in-depth understanding of the knowledge, skills and abilities needed to manage operations in a supply chain context.

The second year provides a unique opportunity for the students to tailor their own specific competence profile by taking elective courses either at JU or at our international campuses or partner universities. Students can further specialize in the area of their preference within the main field of study; production systems. During the final semester the students conduct the master's thesis as a project work, at JU, an industrial company, or one of the international campuses.

During the program, students work on practical cases where they apply their theoretical knowledge in dealing with real-world problems. Case seminars, literature seminars, exercises, laboratory work and business games are educational tools that are used to facilitate

understanding of the contemporary management of supply chain operations. Group work is very common and gives the students an opportunity to practice their skills and abilities in collaborating interdisciplinary. A fundamental principle of the program is for students to have the opportunity to link theory to industrial practice. Therefore, it is particularly important that students apply the knowledge they have acquired during their studies. Thus, a substantial part of the studies is done as projects, in which theories, models, methods and tools about which students have acquired knowledge are applied in projects covering industrial problem issues. The projects are firmly founded in real problem issues in different types of organizations. 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.

Education in this international program is carried out in English and English is the language used for all communication among teachers and students.

### **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 skills and abilities, and (3) judgement 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 master's thesis.

The academic year consists of four study periods and during each period two courses are read in parallel. The program starts with the course *Introduction to Supply Chain Operations Management*. The main purpose of this course is to give students from a variety of backgrounds the opportunity to understand the concepts upon which supply chain operations are built and to initialize their own problem-based learning and abilities to collaborate in interdisciplinary settings. In parallel, the course *Advanced Research Methods in Supply Chain Operations Management* takes place. This course emphasizes skills and abilities needed to conduct studies in supply chain operations, but also focuses on writing skills and the ability to search and analyse information. During the second study period the course *Operations Strategy and Innovation* and the course *Designing Supply Chain Operations* take place. These are continuations of the Introduction course and further adds to the specialized knowledge in how to direct and design supply chain operations.

The second semester of the first year starts with the course *Deliver: Strategy, Planning and Operations*. This course offers deep knowledge of the planning and control of supply chain operations and is a continuation of the courses *Operations Strategy and Innovation* and *Designing Supply Chain Operations*. In parallel, the first course related to leading operations starts; *Leading Sustainable Operations*. In this course emphasis is put on interpersonal communication, diversity and group dynamics, and social sustainability. During the fourth study period this course is followed by *Leading advanced SOCIO-technical systems*. Here, the interplay among man and machine is emphasised by focusing on human-centred management of machine learning and artificial intelligence, contradictions and interdependencies, and leadership in complex situations. In parallel, during the fourth study period, the course *Developing Sustainable Supply Chain Operations* take place. This course focuses on development, as well as continuous improvements, of sustainable operations. It covers a variety of tools and techniques and put great emphasis on total quality management.

The second year consists of an elective semester (semester three) and the master's thesis

(semester four). The third semester consists of several different tracks to choose from, giving students the opportunity to build a custom-made profile with respect to their own interests. The first track consists of the course *Lean and Six Sigma for Sustainable Operations (15 credits)*. This is an interdisciplinary course offering the opportunity to deepen the knowledge of lean and six sigma, respectively and combined. The course includes a six sigma project. The second track is primarily focused on deepening the students' knowledge on how to conduct research and preparing them for future research carriers. It includes two courses: *Research track: Industrial Placement in Supply Chain Operations Management (7.5 credits)* and *Research track: In-depth Project Work in Supply Chain Operations Management (7.5 credits)*. Both courses are conducted in close collaboration with researchers, primarily from the department of Supply Chain and Operations Management, and industrial partners involved in research projects focusing on co-production. Should more students than there are available projects elect the course, it is up to the examiner to distribute the places. This is done based on a combined assessment of the students' progress during the first year of studies and fit with the specific topic of the project. The third track offers the students a unique opportunity to broaden their knowledge and understanding of supply chain operations management by adding the field of business administration. This is done through two courses that are co-read with students from Jönköping International Business School (JIBS): *Entrepreneuring; Person and Process (7.5 credits)* and *Entrepreneuring: Creating a New Venture (7.5 credits)*. The fourth track focuses on broadening the knowledge related to product development and production engineering. It consists of the course *Integrated Product Realization (7.5 credits)* which is followed by two courses for the students to choose between: *Integrated Product and Production Development (7.5 credits)* and *Automation and Production Technology (7.5 credits)*. The fifth track is a collaborative, interdisciplinary course gathering students from materials and manufacturing, product development, production engineering, and supply chain operations management in a *15 credits project work* focusing on product realization.

The students admitted to the program having 15 credits mathematics must take the 7.5 credits course *Mathematics for Intelligent Systems* (preferably during the third semester) to obtain a Master of Science degree.

For those seeking to add further international experience to their portfolio, there is the opportunity to go abroad during the third elective semester. JU and the School of Engineering COLLABORATE with several partner universities and offer a number of international campuses. Students who go abroad during this semester are required to take courses equivalent to 30 credits within the main field of study. The recommendation is to select courses within the specialisation, but some complementary topics might be relevant, given students' personal preferences and career plans. Students choose the courses in coordination with the School of Engineering faculty, and accreditation of the courses is also conducted by the School of Engineering.

The fourth semester is dedicated to the master's thesis. The thesis provides further scope and depth to knowledge within the main field of study. Further, it allows the students to independently carry out research projects by the support from dedicated supervisors. When writing up the thesis the student uses the knowledge and experience gained during the program to conduct research within supply chain operations management, making assessments where relevant scientific, societal and ethical issues are taken into account and where the students are able to demonstrate awareness of sustainable development.

## Courses

### Mandatory courses

Course Name	Credits	Main field of study	Specialised in	Course Code
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Advanced Research Methods in Supply Chain Operations Management	7.5	Production Systems	A1N	TARR21
Deliver: Strategy, Planning and Operations	7.5	Production Systems	A1F	TDSS22
Designing Supply Chain Operations	7.5	Production Systems	A1F	TSCS21
Developing Sustainable Supply Chain Operations	7.5	Production Systems	A1F	TSSS22
Final Project Work in Production Systems	30	Production Systems	A2E	TEUT23
Introduction to Supply Chain Operations Management	7.5	Production Systems	A1N	TISR21
Leading Advanced Socio-Technical System	7.5	Production Systems	A1F	TATS22
Leading Sustainable Operations	7.5	Production Systems	A1N	TSOR22
Operations Strategy and Innovation	7.5	Production Systems	A1F	TOSS21

### Elective courses

Course Name	Credits	Main field of study	Specialised in	Course Code
Automation and Production Technology <sup>4</sup>	7.5	Production Systems	A1F	TAPS22
Entrepreneuring <sup>3</sup>	15	Business Administration	A1N	JEPR23
Integrated Product and Production Development <sup>4</sup>	7.5	Production Systems, Product Development	A1F	TPUS22
Integrated Product Realization <sup>4</sup>	7.5	Production Systems, Product Development	A1N	TIPR22
Intercultural and International Communication <sup>6</sup>	7.5	Industrial Engineering and Management	G1N	TIKG18
Lean and Six Sigma for Sustainable Operations <sup>1</sup>	15	Production Systems	A1F	TLXS22
Mathematics for Intelligent Systems <sup>6</sup>	7.5		A1N	TMAR21
Project Course <sup>5</sup>	15	Production Systems, Product Development	A1N	TPJS22
Research Track: In-depth Project Work in Supply Chain Operations Management <sup>2</sup>	7.5	Production Systems	A1F	TRES22
Research Track: Industrial Placement in Supply Chain Operations Management <sup>2</sup>	7.5	Production Systems	A1F	TRTS22
Transportation and Warehousing <sup>6</sup>	7.5	Industrial Engineering and Management	G2F	TTLN18

<sup>1</sup> Elective block 1

<sup>2</sup> Elective block 2

<sup>3</sup> Elective block 3

<sup>4</sup> Elective block 4

<sup>5</sup> Elective block 5

<sup>6</sup> Elective block 6

### Programme overview

#### Year 1

Semester 1		Semester 2	
Period 1	Period 2	Period 3	Period 4
Advanced Research Methods in Supply Chain Operations Management, 7.5 credits	Designing Supply Chain Operations, 7.5 credits	Deliver: Strategy, Planning and Operations, 7.5 credits	Developing Sustainable Supply Chain Operations, 7.5 credits
Introduction to Supply Chain Operations Management, 7.5 credits	Operations Strategy and Innovation, 7.5 credits	Leading Sustainable Operations, 7.5 credits	Leading Advanced Socio-Technical System, 7.5 credits

#### Year 2

Semester 3		Semester 4	
Period 1	Period 2	Period 3	Period 4
<i>Integrated Product Realization</i> <sup>4</sup> , 7.5 credits	<i>Automation and Production Technology</i> <sup>4</sup> , 7.5 credits	Final Project Work in Production Systems, 30 credits	
<i>Mathematics for Intelligent Systems</i> <sup>6</sup> , 7.5 credits	<i>Integrated Product and Production Development</i> <sup>4</sup> , 7.5 credits		
<i>Research Track: Industrial Placement in Supply Chain Operations Management</i> <sup>2</sup> , 7.5 credits	<i>Intercultural and International Communication</i> <sup>6</sup> , 7.5 credits		
<i>Entrepreneuring</i> <sup>3</sup> , 15 credits			
<i>Lean and Six Sigma for Sustainable Operations</i> <sup>1</sup> , 15 credits			
<i>Project Course</i> <sup>5</sup> , 15 credits			
	<i>Research Track: In-depth Project Work in Supply Chain Operations Management</i> <sup>2</sup> , 7.5 credits		
	<i>Transportation and Warehousing</i> <sup>6</sup> , 7.5 credits		

<sup>1</sup> Elective block 1

<sup>2</sup> Elective block 2

<sup>3</sup> Elective block 3

<sup>4</sup> Elective block 4

<sup>5</sup> Elective block 5

<sup>6</sup> Elective block 6

### 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

The applicant must hold the minimum of a bachelor's degree (i.e the equivalent of 180 ECTS credits at an accredited university) in engineering or technology. The bachelor's degree should comprise a minimum of 15 credits in mathematics. Proof of English proficiency is required.

### Continuation Requirements

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



### **Qualification Requirements**

To obtain a Degree of Master of Science (120 credits) with a major in Production Systems, specialisation in Supply Chain Operations Management, students must complete a minimum of 120 credits in accordance with the current programme syllabus, at least 60 credits of which must be in the main field of study Production Systems and 21 credits in Mathematics.

In addition a Degree of Bachelor of Science in Engineering/Degree of Bachelor of Science or an equivalent Swedish or foreign qualification is required.

### **Quality Development**

Management councils, Head of Programmes, teachers and students work together with the development of the programmes and courses. All students get the opportunity to do a course evaluation after each completed course and before graduation time. The results of the evaluation are presented to the Head of Programmes, Head of Departments, Course Coordinators and to the Director of Education for further development.

Head of Departments, or corresponding, and Head of Programmes raise questions regarding the programme development within the Council of Programmes. Representatives of students and programme managers gather continuously to discuss the recently completed programme courses.

The chairman of students Educational Committee is a regular member in Council of Education.

### **Other Information**

#### **Information regarding eligibility**

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 (JU)"