Intelligent Transport Systems and Logistics, Master's Programme

120 credits

Intelligent Transport Systems and Logistics,

masterprogram

6MTSL

Valid from: 2017 Spring semester

Determined by
Faculty Board of Institute of Technology

Date determined
2017-01-25

Purpose

- An MSc in Intelligent Transport Systems and Logistics from Linköping University works with the design, planning and management of transport and logistics systems and is able to identify, analyse, solve and communicate complex interdisciplinary problems issues in industry and society, with a focus on integrating engineering and management knowledge and skills.
- The master's program in Intelligent Transport Systems and Logistics will become one of the leading international master programs in the field. The courses in the program shall be on a level comparable to similar courses provided within other relevant, excellent international education programs.
- The master's program in Intelligent Transport Systems and Logistics will be the obvious choice for students who have a Bachelor in of Science or Engineering degree and who have the ambition to increase and deepen their knowledge in transportation systems engineering.

Aim

After the completion of the master´s program the student is expected to have acquired the following knowledge and skills:

Technical knowledge and reasoning

An MSc in Intelligent Transport Systems and Logistics from Linköping University will have well-funded theoretical and practical knowledge and excellent technical and managerial skills related to the field transport and logistics systems, and will be able to apply a multidisciplinary system approach to the development of these complex systems. The MSc

- should have a broad knowledge of intelligent transport systems as well as specialized knowledge related to traffic systems and logistics systems.
- is able to effectively use computerised tools for modelling, analysis and visualization of transportation engineering problems
- should have knowledge about the relevant communication technology in the field of transportation

Knowledge of underlying sciences, core engineering fundamental knowledge, and advanced engineering knowledge

Students with Bachelors of Science or Engineering entering the program have already studied in-depth courses within a certain engineering discipline, e.g.systems engineering, electrical engineering, software engineering or industrial engineering, including at least 22 ECTS credits in mathematics and applied mathematics. In the master´s program there is a possibility to deepen the general engineering skills in optimization, geographical information systems, mobile telecommunication and computer networks. Consequently, an MSc in Intelligent Transport Systems and Logistics is able to describe, formulate, and analyse industrial and societal problems by using mathematical tools and technological applications.

In-depth knowledge in one/some applied subject areas

The specialization in the master´s programme focuses on planning and

management of both traffic systems and logistics system, and on mathematical modelling of these systems using optimization and simulation techniques. Specialization also includes traffic safety management and project management.
An MSc in Intelligent Transport Systems and Logistics is able to:

Personal and professional skills and attributes

An MSc in Intelligent Transport Systems and Logistics has the individual and professional capability and attitude to take a leading role in dynamic industrial environments.

Interpersonal skills, teamwork, and communication

An MSc in Intelligent Transport Systems and Logistics is trained to collaboratively work on complex tasks. Interpersonal skills, teamwork and communication are therefore of utmost importance.

Conceiving, designing, implementing and operating systems in the enterprise and societal context

An MSc in Intelligent Transport Systems and Logistics has deep knowledge of systems in an innovation or operations environment, including different external factors in society, the prerequisites of the business context. An MSc in Intelligent Transport Systems and Logistics is able to participate and actively contribute to all phases of the development of these systems, including conceiving, designing, implementing and operating them.

- ◦ analyse complex problems based on relevant theory and practical knowledge
  ◦ relate and synthesize different theoretical perspectives and develop their own models of analysis
  ◦ apply academic principles, models and methodologies in industrial firms
  ◦ critically assess methods, procedures and practices that are applied in technology based firms

Engineering reasoning and problem solving

An MSc in Intelligent Transport Systems and Logistics is able to identify, formulate and examine complex engineering problems in a systematic way.

System thinking

An MSc in Intelligent Transport Systems and Logistics is able to identify, analyse and develop complex systems by defining the system's boundaries and properties, considering the whole system as well as subsystems and describing and examining the interaction between the different parts in the system including its important context variables.

Experimentation and knowledge discovery

An MSc in Intelligent Transport Systems and Logistics is able to adopt new knowledge by using relevant literature and performing quantitative studies.

Personal skills and attitudes

An MSc in Intelligent Transport Systems and Logistics is able to take initiatives, work independently, creatively and to apply critical thinking. Self-knowledge and a will to develop personally throughout life are important. An MSc is also able to plan her/his time and resources in an efficient and effective way.

Professional skills and attitudes

An MSc in Intelligent Transport Systems and Logistics takes responsibility, is reliable and acts professionally. This includes being active in career

planning and keeping up-to-date with the profession's current developments.

Teamwork
An MSc in Intelligent Transport Systems and Logistics is trained to work together with other people in projects and groups. This includes contributing to group effectiveness by actively taking part, creating clear roles and responsibilities, actively sharing knowledge and collaboratively achieving goals. An MSc in Intelligent Transport Systems and Logistics is able to start, plan, manage and lead different types of projects and integrate the work of people from different specializations.

Communication and communication in English
An MSc in Intelligent Transport Systems and Logistics is able to communicate, orally and in writing, in a correct, inspiring way orientated towards achieving goals. Effective communication is comprised of both task-related and relationship oriented skills. As the program is given in English, an MSc in Intelligent Transport Systems and Logistics is proficient enough in English to take into account the state-of-the art knowledge within the field and, based on this knowledge, understand, analyse, compare, and reflect on complex engineering problems, in written text and orally.

External and societal context
An MSc in Intelligent Transport Systems and Logistics understands the importance of technology in society, including economic, social, and sustainable development.

Conceiving and engineering systems
An MSc in Intelligent Transport Systems and Logistics has the knowledge and skills needed to determine requirements for systems and products and is able to understand and evaluate systems in an industrial context.

Designing
An MSc in Intelligent Transport Systems and Logistics has knowledge about suitable development processes for different kinds of systems.

Implementing
An MSc in Intelligent Transport Systems and Logistics is able to design and manage implementation processes by testing, validating and verifying activities, including an understanding of change processes and the formulation of strategies to overcome resistance to change.

Operating
An MSc in Intelligent Transport Systems and Logistics has the knowledge and skills needed to design, optimize and manage operations and service of technically advanced systems.

Content

The program starts with one semester of compulsory courses. Semesters two and three include specialisation and possibilities for diversification depending on the interest of the student. The programme concludes with a master's thesis of 30hp in semester four.

Entry requirements

- Bachelor's degree with a major in an engineering subject, or equivalent
- 22 ECTS credits in mathematics/applied mathematics and/or application of mathematics relevant for the programme, including courses in linear algebra, calculus and mathematical statistics
- English corresponding to the level of English in Swedish upper secondary education (English 6/B)

Degree thesis

The thesis should be based on the high quality scientific content and carried out in close contact with the research groups involved in the programme. The thesis should be written and presented in English. The main subject of studies for the thesis work should be Transportation Systems Engineering.

To be qualified to conduct a degree project, the student must be admitted to the master's programme and have completed at least 60 credits from courses within the programme, of which 30 credits must be at the advanced (graduate) level within the main subject of studies.

Degree requirements

- All compulsory courses in the program completed
- Optional courses from the curriculum so that 120 ECTS credits is reached
- 90 ECTS courses on advanced level, including master's thesis (30hp), where 60 ECTS (master's thesis and courses) are in the main subject of studies Transportation Systems Engineering
- Master's thesis (30 ECTS) on advanced level, in the main subject of studies Transportation Systems Engineering, examined at Linköping Institute of Technology

Courses with overlapping content are not allowed to be included in the degree. Courses included in the Bachelor's degree can never be included in the Master's degree.

Degree in Swedish

Master of Science (120 credits) with a major in Transportation Systems Engineering

Degree in English

Master of Science (two years) with a major in Transportation Systems Engineering

Common rules

See also common rules

Curriculum

Semester 1 (Autumn 2017)

Course code	Course name	Credits	Level	Timetable module	ECV
Period 1					
TNK055	Geographical Information Systems for Transportation	6*	G1X	4	C
TNK091	Traffic Safety Management	6	A1X	3	C
TNK112	Transport and Logistics Systems	6	A1X	2	C
Period 2					
TNK053	Optimization	6	G2X	1	C
TNK055	Geographical Information Systems for Transportation	6*	G1X	4	C
TNK108	Computer Networking	6	G2X	3	C

Semester 2 (Spring 2018)

Course code	Course name	Credits	Level	Timetable module	ECV
Period 1					
TNK095	Traffic Planning and Simulation	6	A1X	2	C
TNK099	Logistics Networks and Transports	6	A1X	3	C
TNK110	Mobile Communication and Networks	6*	A1X	1	C
TNK087	Data Communication and the Internet	6	A1X	4	E
Period 2					
TNK110	Mobile Communication and Networks	6*	A1X	4	C
TNK080	Wireless Communication Systems	6	A1X	1	E
TNK096	Traffic Demand Modelling	6	A1X	2	E
TNK100	Logistics Resource Planning	6	A1X	3	E

Semester 3 (Autumn 2018)

Course code	Course name	Credits	Level	Timetable module	ECV
Period 1					
TEIO91	Project Management	6*	G2X	-	C
TNK106	Positioning Systems	6	A1X	2	C
TNK101	Traffic Engineering and Control	6	A1X	1	E
TNK104	Applied Optimization I	6	A1X	4	E
Period 2					
TEIO91	Project Management	6*	G2X	-	C
TNK103	Analysis of Communication and Transport Systems	6	A1X	1	C
TNK098	Planning of Public Transportation and Railway Traffic	6	A1X	4	E
TNK105	Applied Optimization II	6	A1X	3	E
TNK114	Logistics in Supply Chains	6	A1X	2	E
TNK115	Smart Cities	6	A1X	4	E

Semester 4 (Spring 2019)

Course code	Course name	Credits	Level	Timetable module	ECV
Period 1					
TQXX30	Degree project - Master's Thesis	30*	A1X	-	C
Period 2					
TQXX30	Degree project - Master's Thesis	30*	A1X	-	C

ECV = Elective / Compulsory /Voluntary
*The course is divided into several semesters and/or periods