

Industrial Engineering and Management

at Linköping University, Sweden

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Member of Programme board of Industrial Engineering and Logistics



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On the board of the 5-year **Industrial Engineering MSc program** since 2008 being responsible for the part of Mechanical Engineering. Research and teaching areas:

**Design for
remanufacturing**

Product Service Systems

Product Development

Remanufacturing

EcoDesign

Design for Manufacturing

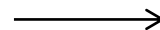
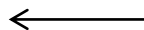
Recycling

**Cleaner
Production**

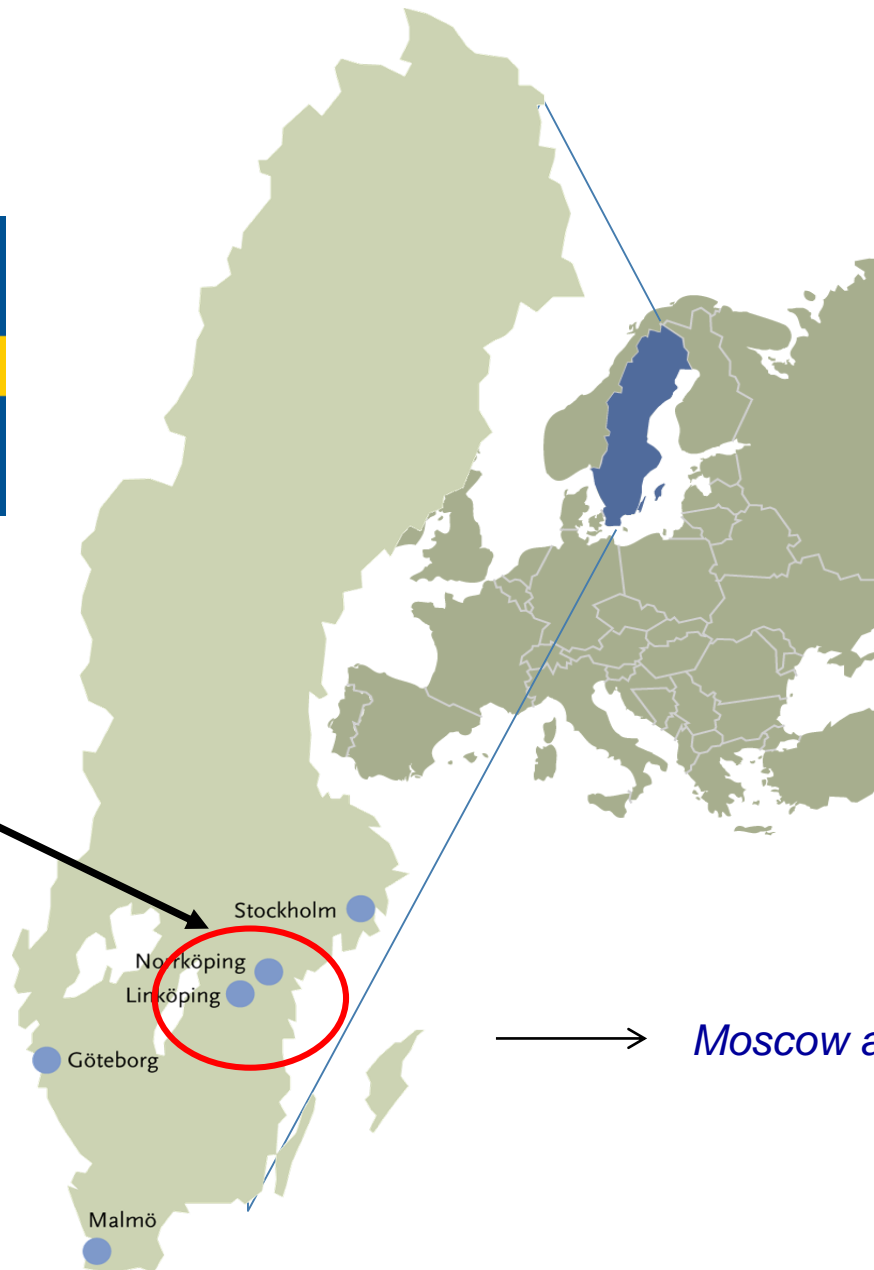


***Linköping
University
cities***

Edmonton (CAN)



Moscow and Magadan (Russia)



Linköping Institute of Technology (LiTH)

- a part of Linköping University

- 1260 Employees
 - 140 Professors
 - 410 PhD
 - 583 PhD-students
- Responsible for
 - 32 engineering programmes
 - 5 at bachelor level (in Swedish, 900 students)
 - 15 at bachelor and master level (cohesive given a professional degree, in Swedish, 5000 students)
 - 12 at master level (mainly in english, 300 students)
 - 12 bachelor programmes (in swedish, 700 students)
- In total almost 9000 students in Linköping and Norrköping
- Budget 1132 MSEK per year (45% education)

General educational structure in Sweden

Research level (3rd level)

Licentiate degree (2 years)

PhD degree (4 years)

PhD degrees

Licentiate degrees

Advanced Level (2nd level)

Master's degree (2 years)

*Master
degrees*

Basic level (1st level)

Bachelor's degree (3 years)

*Bachelor
degrees*

*Professional
degrees*

MSc Engineering Programs (five years)

- Applied Physics and Electrical Engineering
- Biomedical Engineering
- Chemical Biology
- Computer Science and Engineering
- Computer Science and Software Engineering
- Communication and Transportation Engineering
- Design and Product Development
- Energy and Environmental Engineering and Management
- Electronics Design Engineering
- Engineering Biology
- **Industrial Engineering and Management**
- Information Technology
- Mechanical Engineering
- Media Technology and Engineering

Industrial Engineering and Management

- 250 students admitted each year
- Almost 5000 graduates (the program started 1969)
- The two first years include compulsory courses
 - Mathematics and Applied mathematics 34 + 20 credits
 - Industrial Management 26 credits
 - Engineering and Engineering specialization 30 + 10 credits
- The third year includes compulsory courses
 - Industrial Management 18 hp
 - Engineering and Engineering specialization 12 + 30 credits
 - Including Bachelor thesis
- Year four and five consists mainly of
 - Engineering Specialization
 - Master profile (in management)
 - Finance, Industrial marketing, Quality, Logistics, Strategy and control, Operations management, Innovation management

Industrial Engineering and Management with an international profile



- Industrial Engineering and Management - International

Common features:

- Language studies are integrated in the curriculum during year one and year two, i.e. in addition to mathematics, engineering, natural science, and management
- Languages: German, French, Spanish, Chinese, and Japanese
- Year three is spent abroad and engineering courses are studied in the chosen language
- Further language studies during year four
- The students have language knowledge when entering the program
 - Japanese and Chinese: One year of studies in the programme Asian studies
 - Includes both language and Asian culture (Japan, China, Korea)
 - Other languages: 3 or more years of studies

International Master's programmes at LiTH

requirement BSc (in English)

- Aeronautical Engineering
- Energy and Environmental Engineering
- Advanced Computer Graphics
- Biomedical Engineering
- Communication Electronics
- Computer Science
- Ecology and the Enviroment
- Intelligent Transport Systems and Logistics
- Industrial Engineering and Management
- Materials Physics and Nanotechnology
- Mechanical Engineering
- Software Engineering and Management

Industrial Engineering and Management

A 5-year MSc Engineering Program



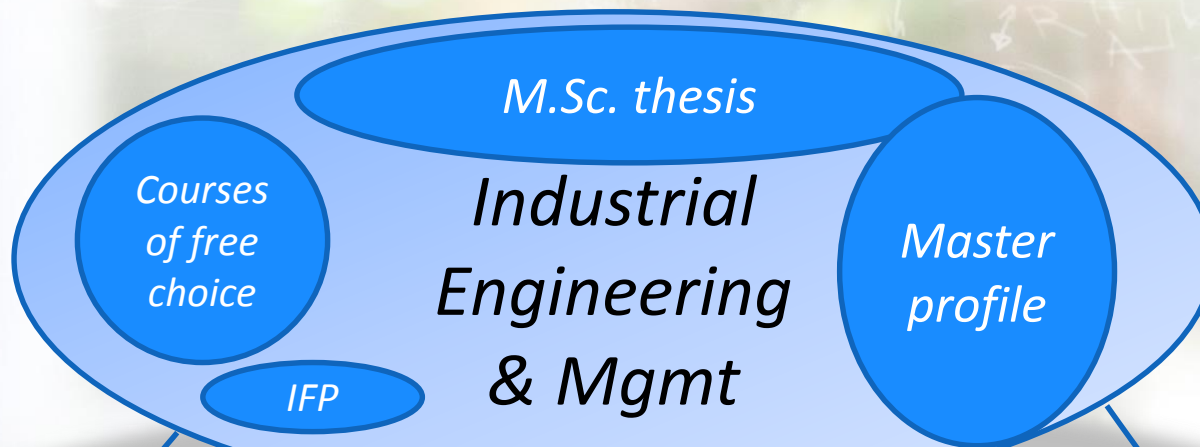
Skvader



A Swedish expression for an unsuccessful combination..

- Then 1967-68
 - Industrial Engineering was compared to a "skvader" when the education programme was debated in the Swedish Government.
- Now (according to university website)
 - Linköping is often first (in Sweden) with things like the Industrial Engineering program. The critical people were wondering what should happen to these students who came in between economics and engineering.
 - Today we know where to find them – *at the top of companies and organisations*. Industrial engineering now exists at several universities and is the most popular of all master of science programs.

Industrial Engineering and Management



Year abroad

B.Sc. thesis

Engineering specialization

Statistics

Optimization

Calculus I and II

Linear Algebra

Basic Mathematics

Control Theory

Linear Systems

Mechanics

Physics

Programming

Project Mgmt

Operations Mgmt

Economic Analysis

Marketing

Industrial Organization

Industriell Economy

Mathematics

Engineering

Economy/Management

Engineering specializations

- Many large changes recently conducted in all engineering specializations due to e.g. new demands from students and industry:
- Biology Engineering, restructured for 2014
- Computer Science and Engineering
- Energy and Environmental Engineering, new since 2013
- Mechanical Engineering, restructured since 2013
- Electrical Engineering

Engineering specializations

- compulsory courses during year 3



Computer Science and Engineering

- Switching Theory and Logical Design
- Computer Architecture
- Database Technology
- Bachelor Thesis in Computer Science and Engineering

Electrical Engineering

- Computer Hardware and Architecture
- Signals and Systems
- Programming in Java, Data Structures and Algorithms
- Bachelor Thesis in Electrical Engineering

Biology Engineering

- Cell and microbiological processes
- Principles in Physiology
- Ecology and environment
- Bachelor Thesis in Biology Engineering

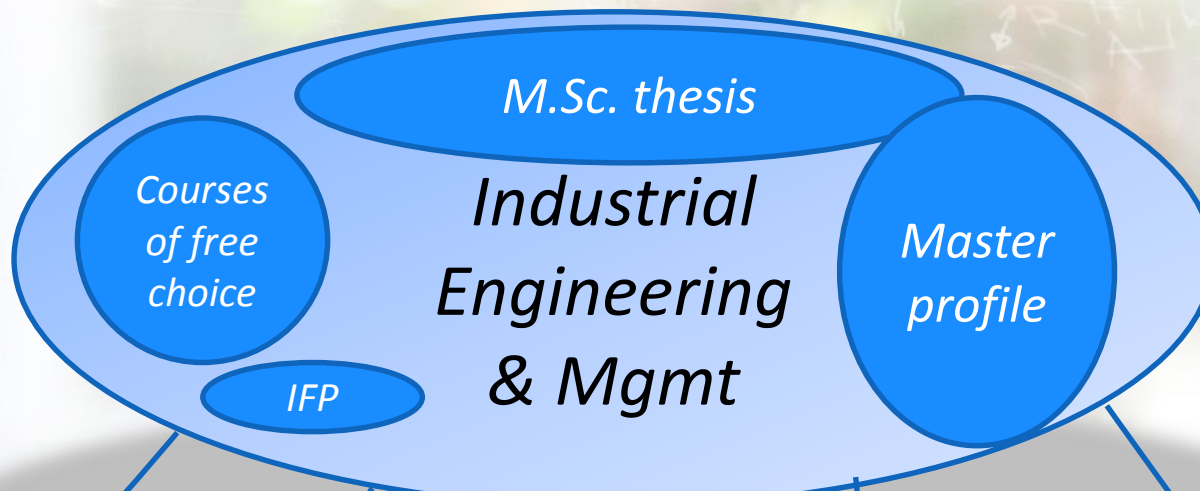
Mechanical Engineering

- Manufacturing Technology
- Engineering Materials
- CAD and Machine Elements
- Bachelor Thesis in Mechanical Engineering

Energy Engineering

- Environmental Engineering
- Energy Systems - Supply and Demand
- Resource Efficient Products and Production
- Bachelor Thesis in Energy Engineering

Industrial Engineering and Management



Year abroad

Statistics
Optimization
Calculus I and II

Project Mgmt
Operations Mgmt

Economic Analysis Marketing
Industrial Organization
Industriell Economy

Linear Algebra
Basic Mathematics

Control Theory
Linear Systems
Mechanics Physics
Programming

Mathematics

Engineering

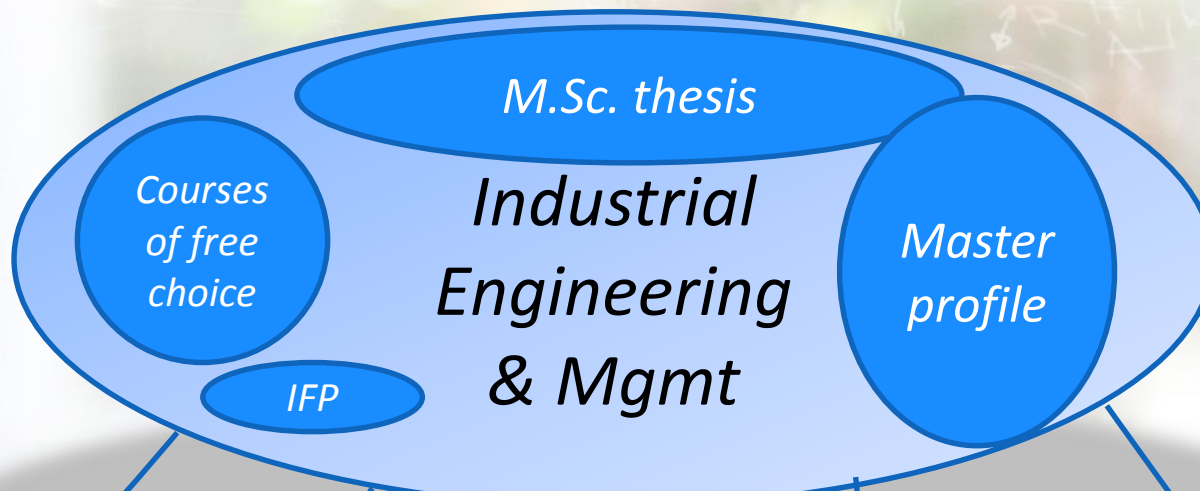
Economy/Management

Studies abroad



- Many students within the Industrial Engineering programme study abroad during one semester or more
 - Often during year 3 but also during year 4 and 5
- International Industrial Engineering students goes to Germany, France, Canada, Argentina, Chile, Uruguay, Japan, China and Taiwan
- Industrial Engineering students goes to Singapore, Europe etc.
- Many goes as "Free movers" to USA and Australia
- New countries where courses are held in English are possible
 - South Korea, China etc.

Industrial Engineering and Management



Year abroad

B.Sc. thesis

Engineering specialization

Statistics

Optimization

Calculus I and II

Linear Algebra

Basic Mathematics

Control Theory

Linear Systems

Mechanics

Physics

Programming

Project Mgmt

Operations Mgmt

Economic Analysis

Marketing

Industrial Organization

Industriell Economy

Mathematics

Engineering

Economy/Management

Master profiles (economic)



Master profiles

- Economic information systems
- Financing
- Industrial marketing
- Quality and organizational development
- Logistics
- Operations management
- Project, Innovations and entrepreneurship
- Strategy and management, new since 2013

Surveys



ISB – International Student Barometer

- the world's largest student survey with over 160,000 students at 193 universities in 14 countries
- 1st globally:
 - Eco-friendly attitude (recycling, energy etc.)
 - Campus environment (the quality of external campus environment)
 - Other friends (making friends from other countries)
- 1st in Sweden in
 - Academics' English (academic staff whose English I can understand)
 - Technology (the learning technology, PCs, networking etc)



94% of our engineering students get a job less than 3 months after graduation

- Best in Sweden, according to a survey from 2010

The engineering alumni are the most satisfied students after graduation

- According to a survey made by the Swedish engineering union 2010

Over 95 % of our alumni would recommend their children to study at LiU

Surveys



UI GreenMetric World University Ranking



Linköping University rankings:

- 2011: **5th** out of 178 universities from 42 countries
- 2012: **12th** out of 215 universities

Source: <http://greenmetric.ui.ac.id/>

Challenges within the Industrial Engineering and Management programme

– a personal view

- How to get the IE-students more interested in engineering
- *the students are more interested in economics*
- How to better integrate the 5-year IE-programme with the 2-year international programme
- *the two student groups have different background*
- How to help the IE-students going abroad in year 3 to find suitable B.Sc. Thesis projects
- *not so easy to find at foreign universities*



Linköpings universitet

expanding reality

Thank you for your attention!

www.liu.se