Industrial Ecology

Programme course

6 credits

Industriell ekologi

TKMJ10

Valid from: 2017 Spring semester

Determined by
Board of Studies for Mechanical Engineering and Design

Date determined
2017-01-25

Offered for the last time
Spring semester 2022

Replaced by
TKMJ55

Main field of study
Energy and Environmental Engineering, Mechanical Engineering

Course level
Second cycle

Advancement level
A1X

Course offered for
- Chemical Analysis Engineering, B Sc in Engineering
- Industrial Engineering and Management - International, M Sc in Engineering
- Industrial Engineering and Management, M Sc in Engineering
- Mechanical Engineering, M Sc in Engineering
- Applied Physics and Electrical Engineering, M Sc in Engineering
- Industrial Engineering and Management, Master's programme
- Sustainability Engineering and Management, Master's programme
- Applied Physics and Electrical Engineering - International, M Sc in Engineering

Entry requirements
Note: Admission requirements for non-programme students usually also include admission requirements for the programme and threshold requirements for progression within the programme, or corresponding.

Prerequisites
Admittance requirements for master programme at LiTH or at least two years engineering studies at university level. Large Technical Systems and the Environement or a comparable basic course in Environmental Science is compulsory

Intended learning outcomes

The course aims at developing the participants' understanding of a proactive approach to the prevention of environmental impact from products, organisations and technical systems. This will be accomplished since the participant will be able to;

- evaluate environmental impact from material and energy flows in a life cycle perspective based on thermodynamics and suggest improvements with the awareness of the risk for problem shifting
- apply material strategies such as dematerialisation, substitution and waste hierarchies regarding different products
- describe the usability of different tools and strategies for optimising material and energy flows in a life cycle perspective
- on a general level analyse how cooperation between different actors regarding material and energy resources can be developed

Course content

- Material strategies with special emphasis on waste and recycling: Waste management in practice, Waste hierarchy, Reuse, Material and Energy recycling, Land-fills, Urban and Land-fill mining, Resource dissipation, Exergy and entropy, Dematerialisation, Transmaterialisation, Material and substance selection, Service-life, Use of by-products, Producers' responsibility
- Tools and concepts for environmental systems analysis with special emphasis on material flow analyses: Problem shifting – tool selection, Material flow analyses, Total material requirement, Direct material input, Material intensity per service, Ecological rucksacks, Ecological footprint, Substance flow analyses, Life-cycle assessments
- Industrial symbiosis – occurrence and typology, Eco-industrial parks, Development of industrial symbiosis, Socio-economic dimensions of industrial symbiosis
- Business dimensions and insights into the conditions for a company in the recycling business

Teaching and working methods

The course includes lectures, guest lectures and different levels of group assignments.

Examination

UPG1	Approved assignments	2 credits	U, G
TEN2	A written examination	4 credits	U, 3, 4, 5

Active participation in group assignments.

Grades
Four-grade scale, LiU, U, 3, 4, 5

Other information
Supplementary courses: Management systems and sustainability, Resources effcicient products

Department
Institutionen för ekonomisk och industriell utveckling

Director of Studies or equivalent
Niclas Svensson

Examiner
Joakim Krook

Course website and other links

Education components
Preliminary scheduled hours: 54 h
Recommended self-study hours: 106 h

Course literature
Industrial ecology and sustainable engineering, T.E. Graedel, B.R. Allenby, Pearson Education, ISBN: 0138140340

Common rules

Regulations (apply to LiU in its entirety)

The university is a government agency whose operations are regulated by legislation and ordinances, which include the Higher Education Act and the Higher Education Ordinance. In addition to legislation and ordinances, operations are subject to several policy documents. The Linköping University rule book collects currently valid decisions of a regulatory nature taken by the university board, the vice-chancellor and faculty/department boards.

LiU's rule book for education at first-cycle and second-cycle levels is available at http://styrdokument.liu.se/Regelsamling/Innehall/Utbildning_pa_grund-_och_avancerad_niva.