Optimization in Logistics

Programme course

6 credits

Optimering inom logistik

TNSL17

Valid from: 2017 Spring semester

Determined by
Board of Studies for Industrial Engineering and Logistics

Date determined
2017-01-25

Main field of study
Applied Mathematics, Logistics

Course level
First cycle

Advancement level
G2X

Course offered for
- Air Transportation and Logistics
- Civic Logistics

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
Basics in optimization (especially network and integer programming) and logistics

Intended learning outcomes
The aim of this course is to present a number of application areas within logistics, where quantitative methods are especially suitable.
After the course, the students should:

- Compute cost allocation using quantitative methods
- Model and solve simple time tabling and scheduling problems
- Know of basic methods for transportation planning and vehicle routing
- Understand in which wat more efficient planning in logistics can increase sustainability
- Know of different applications, where vehicle routing is an important partli
- Know methods and considerations necessary when doing Strategic Network Planning
- Know and apply basic methods for localization
- Know of necessary considerations in Multilevel inventory control
- Know and apply basic methods for solving the Traveling Salesman Problem
- Know different types of problems in Machine Scheduling and solve simple problems
- Apply construction-, improvement- and the principles behind Tabu search heuristics

Course content

The course contents include:

- Mathematical modeling of Strategic Network Planning (Supply Chain Design)
- Gravitation models for localization
- Location/routing problems
- Multilevel inventory control
- The Traveling Salesman Problem, and solving it using constraint generation
- Construction heuristics
- Vehicle routing problems, and solving these using heuristics, and by formulating a Set Partitioning Problem
- Scheduling of employees
- Machine sequencing
- Cost allocation using Activity Based Costing and Cooperative Game Theory
- Vehicle routing relating to e-trade
- Principles behind relaxations
- Basic improvement heuristics/local search
- Principles behind Tabu search

Teaching and working methods

The course will consist of lectures, lessons, seminars and laboratory work. The lectures, which primarily are given as recorded sections, downloadable from the course homepage, will discuss the main part of the theoretical content, while the seminars will be dedicated to case works and assignments. The lessons will be used for calculation exercises. The seminars are used to discuss larger areas of theory, as well as discuss cases/assignments, and the laboratory work will mainly consist of computer assisted exercises and assignments.

Examination

LAB1	Laboratory work	1 credits	U, G
UPG1	Case study	2 credits	U, G
TEN1	Written examination	3 credits	U, 3, 4, 5

Good Projects & Labaratory work, with corresponding reports, may lead to higher course grade than grade on the individual assignments

Grades

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

Other information

Supplementary courses:
Larger logistics projects, Thesis work

Department
Institutionen för teknik och naturvetenskap

Director of Studies or equivalent
Erik Bergfeldt

Examiner
Stefan Engevall

Course website and other links
http://www.itn.liu.se/~steen17/

Education components
Preliminary scheduled hours: 48 h
Recommended self-study hours: 112 h

Course literature

Additional literature

Books

Lundgren, Jan, Rönnqvist, Mikael, Värbrand, Peter, (2008) *Optimeringslära*
ISBN: 9789144053141
Lund : Studentlitteratur, 2008

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.