

# Smart Cities

Programme course

6 credits

Smarta städer

TNK115

Valid from: 2017 Spring semester

**Determined by**  
Board of Studies for Industrial  
Engineering and Logistics

**Date determined**  
2017-01-25

## Main field of study

Electrical Engineering, Transportation Systems Engineering

## Course level

Second cycle

## Advancement level

A1X

## Course offered for

- Intelligent Transport Systems and Logistics, Master's programme
- Communication and Transportation Engineering, 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

The course labs and project will deal with Android programming hence programming skills (preferably in Java) are highly recommended. The following, or similar courses, are also required: Mobile Communication and Networks, Computer Networking

## Intended learning outcomes

This course aims to present a diverse set of topics covering key technological enablers alongside with social aspects of smart cities having in mind the direct application for the benefit of the citizen. Therefore the course will give a broad viewpoint of applications in smart cities spanning from social inclusion and sustainability to smart buildings and intelligent urban fleet management. Thus upon completion of the course the student should be able to have a working knowledge on:

- Social implications of the technological requirements of infusing intelligence in the urban environment
- Identifying resource requirements for smart city solutions ranging from small-scale indoor to city-scale outdoor applications
- Basic functional and networking aspects of sensors and their role within the concept of the “Internet of Things”
- Handling large amounts of diverse data, focusing on gathering and manipulation, meeting anonymity, privacy and security constraints
- Overall scalability issues of solutions in terms of computational and networking resource management
- Programming (Android-based) mobile devices for building up basic components of applications in a smart city context, focusing on solutions for 1) smart buildings, 2) smart transportation

## Course content

Smart Cities use information and communication technologies (ICT) to be more intelligent and efficient in the use of resources, resulting in cost and energy savings, improved service delivery and quality of life, and reduced environmental footprint – all supporting innovation and a low-carbon economy. Leveraging recent Information and Communications technology advances, we can infuse existing urban infrastructures with new intelligence. By this, we mean digitizing and connecting existing urban resources and systems, so they can sense, analyze and integrate data, and respond intelligently to the needs of their jurisdictions. In short, we can revitalize them so they can become smarter and more efficient. This process can also enable the emergence of novel applications. Thus cities can grow and sustain a high level of quality of life for their inhabitants. The course covers:

- Smart cities, definitions, domains of application citizen Inclusion and working examples
- Intelligent Buildings; Green Building in a Smart City
- Smart Urban Transportation & Logistics
- The Internet of Things as a smart city technological platform
- M2M communication: fundamentals, scalability and protocols
- Sensor Networking and Actuation: towards Cyber-Physical Systems
- Big Data: Crowdsourcing, Security and Data management
- Android programming basics for Lab assignments and Project

## Teaching and working methods

The course comprises lectures, programming labs, and an implementation project.

## Examination

PRA1	Project	2 credits	U, G
LAB1	Laboratory work	2 credits	U, G
KTR1	Written test	2 credits	U, 3, 4, 5

## Grades

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

## Department

Institutionen för teknik och naturvetenskap

## Director of Studies or equivalent

Erik Bergfeldt

## Examiner

Vangelis Angelakis

## Education components

Preliminary scheduled hours: 0 h

Recommended self-study hours: 160 h

## Course literature

Kursen har ingen bok men en litteraturlista, huvudsakligen bestående av forskningsartiklar, rapporter och lämpliga handböcker kommer att distribueras i god tid innan kursstart.

## 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://stydokument.liu.se/Regelsamling/Innehall/Utbildning\\_pa\\_grund-\\_och\\_avancerad\\_niva](http://stydokument.liu.se/Regelsamling/Innehall/Utbildning_pa_grund-_och_avancerad_niva).