

SYLLABUS

Advanced wireless networks 7.5 credits D7030E

Avancerade trådlösa nätverk

Course syllabus admitted: Autumn 2024 Sp 1 - Present

**DECISION DATE
2024-02-15**

Advanced wireless networks 7.5 credits D7030E

Avancerade trådlösa nätverk

Second cycle, D7030E

| Education level | Grade scale | Subject | Subject group (SCB) |
|-----------------|-------------|--------------------|---------------------|
| Second cycle | G U 3 4 5 | Datorkommunikation | Computer Technology |

Main field of study

Computer Science and Engineering

Entry requirements

You are expected to have an understanding of basic computer networking concepts such as the layered architecture and protocol functionality at each layer including the TCP/IP suite, routing, and multiple access techniques at the level of D0002E Computer Communications or an equivalent course (with examiners approval). You should also have programming skills at the level of the course D0009E Introduction to programming.

Good knowledge in English, equivalent to English 6.

Alternative:

Alternative to completed courses can be corresponding knowledge acquired through work within the IT or Electronic sector.

Selection

The selection is based on 30-285 credits

Course Aim

The student shall be able to:

- Describe the details of current radio transmission technologies on the physical layer.
- Compute the parameters of the radio transmission zone.
- Describe the problem of hidden/exposed terminal problem and explain the difference between the existing MAC protocols for wireless and wired networks.
- Explain the channel "capture" effect on MAC and Transport layers - On a sample graph compute routes using major routing algorithms (Bellman-Ford, Dijkstra, etc.) and identify problems with routing in wireless networks.
- Describe the concept of proactive and reactive routing protocols.
- Describe the concept of geographical and content based routing.
- Describe problems of transport layer protocol over multihop wireless networks and present the existing solutions.
- Describe a simulation scenario and plan the simulation experiments.
- Simulate TCP, UDP protocols over different types of ad hoc routing protocols in a network simulator and measure throughput, packet loss rate performance characteristics.
- Explain the functionality of the LTE, WiMax, Zigbee and Bluetooth network architectures.

Contents

Wireless communication fundamentals; Personal area networks (IEEE802.15.x protocols, e.g., Bluetooth, ZigBee); Local area networks (IEEE 802.11x protocols); Metropolitan area networks (LTE, WiMax) Mobile network architectures (Mobile IP, mobile ad-hoc networks, delay-tolerant networks); Hot research issues in the area of wireless networks; Network simulation.

Realization

Each course occasion's language and form is stated and appear on the course page on Luleå University of Technology's website.

The education consists of lectures, laboratory work and a seminar assignment. The laboratories are presented orally and may be provided with a deadline for submission. There are no elective course elements. Unapproved students must retake the unsuccessful examination moment next time the course is given.

Examination

If there is a decision on special educational support, in accordance with the Guideline Student's rights and obligations at Luleå University of Technology, an adapted or alternative form of examination can be provided. Continuous examination with assignments, laboratory work and presentations of research publications. At the end of the course, a written quiz is given.

Unauthorized aids during exams and assessments

If a student, by using unauthorized aids, tries to mislead during an exam or when a study performance is to be assessed, disciplinary measures may be taken. The term "unauthorized aids" refers to aids that the teacher has not previously specified as permissible aids and that may assist in solving the examination task. This means that all aids not specified as permissible are prohibited. The Swedish version has interpretative precedence in the event of a conflict.

Course offered by

Department of Computer Science, Electrical and Space Engineering

Modules

| Code | Description | Grade scale | Cr | Status | From period | Title |
|------|--------------|-------------|-----|-----------|-------------|-------|
| 0002 | Lab report | G U 3 4 5 | 2.5 | Mandatory | A13 | |
| 0004 | Assignment | G U 3 4 5 | 1 | Mandatory | A21 | |
| 0005 | Seminar | U G# | 1 | Mandatory | A21 | |
| 0006 | Written exam | G U 3 4 5 | 3 | Mandatory | A24 | |

Study guidance

Study guidance for the course is to be found in our learning platform Canvas before the course starts. Students applying for single subject courses get more information in the Welcome letter. You will find the learning platform via My LTU.

Last revised

by Robert Brännström 2024-02-15

Syllabus established

by Jonny Johansson, HUL SRT 2013-02-13