Course PM

EEN115 Introduction to communication networks

2021/22

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Abstract

This document describes the course EEN115 Introduction to communication networks. Any changes to the information in this document will be posted on the course web, which is found at Canvas:

https://chalmers.instructure.com/courses/17491

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General information

Schedule

Available in TimeEdit:
https://cloud.timeedit.net/chalmers/web/s1/ri16Q603260067QQ56ZZ556005yYW56676056706Q656.html

Textbook

J. Cowley, *Communications and Networking*, Second edition, Springer, 2013, ISBN 978-1-4471-4356-7. Available through Chalmers Library and online at
https://link.springer.com/book/10.1007/978-1-4471-4357-4

Exam

Registration is mandatory for exams. Students that do not register for the exam in time will not be allowed to take the exam.

Exam date	Location	Results	Grading reviews

Week 11	Campus Johanneberg	To be announced on the course web	To be announced on the course web

Email subject line
Please include the string "[EEN115]" in the subject line of all course-related emails.

Lecturer
Marija Furdek, furdek@chalmers.se

We are planning for in person lectures. We might move to a hybrid or completely online format based on the COVID 19 pandemic situation.

Guest lecturers

- Applications of blockhain in telecommunications: Nima Afraz, University College Dublin, Ireland, nima.afraz@ucd.ie
- Quantum key distribution networks, Rui Lin, Chalmers, ruilin@chalmers.se
- Machine learning for network optimization, Jelena Pesic, Nokia, France, jelena.pesic@nokia.com

Teaching Assistants
Ehsan Etezadi, ehsanet@chalmers.se

Office hours and a link to connect will be provided through Canvas.

E2 Student Administration Office
Christina Lidbeck, Phone 772 4611, christina.lidbeck@chalmers.se

Prerequisites
The course does not require any specific knowledge on communication networks. General mathematical and programming knowledge is welcome.

Aims and learning outcomes

Course aims

The course aims at introducing the fundamental networking and security, concepts, problems, and applications which are typical of modern communication infrastructures. The course will provide a broad horizontal overview of the area, highlighting the main concepts, technologies, and challenges when looking at the design, operation, and trustworthiness of communication networks.

Learning outcomes

- Model different network topologies and assess the performance of a given network configuration
- Solve routing, resource assignment and flow control problems on a network example
- Explain the main network control mechanisms
- Summarize the principles of network service virtualization
- Distinguish between security threats at different network layers and recommend countermeasures

Content

The content of the course is listed below. A detailed week plan is available on the course web.

- Network architectures, modeling and performance evaluation
    - Core, access and datacenter networks
    - Network throughput, latency, availability
- Network switching and routing
    - Flow and congestion control
    - Routing and resource assignment
- Network control and management
    - GMPLS, SDN
- Network service virtualization
- Network security and privacy
    - Attacks at the physical and upper network layers
    - Access control and cryptography
    - Networks and distributed ledger technologies

Lectures

The lectures are designed to highlight the most important parts of the course. Due to lack of time, all relevant parts are not covered in all details; instead, the students should read the relevant materials on own time.

Guest lectures by invited experts will highlight special parts of the course. The presented material is part of the learning outcomes and will therefore be assessed (e.g., at the exam).

Exercises

The exercise sessions will be held online via Zoom, a link will be provided in the Canvas “Week Plan” page.

The purpose of the exercises is to facilitate learning and understanding of the course material, revise the lectures and go deeper into certain aspects of the covered topics.

It is important that you come prepared to the exercises, i.e., that you have read the relevant sections of the course literature, and perhaps also solved some of the suggested exercise problems. It is also important that you are active during the exercises. Always try to understand what aspects of the course the problems are treating. If you cannot see the point with a certain problem, ask the assistant!

A typical exercise will be started with a short review of the theory and a motivation why the theory is of use for a communications engineer. The assistant may solve a problem on the blackboard, and then the students will be asked to solve several problems individually or in groups.

Written exam

The course will be concluded with a written exam. The exam comprises multiple-choice and fill-in questions and six problems.

The multiple-choice and fill-in questions will give between 1 and 5 points. Incorrect answers do not yield negative points. Each of the problems can yield a maximum of 15 points. An erroneous answer,

incomplete or badly motivated solutions give point reductions down to a minimum of 0 points. A minimum score of 45 is needed to pass the course.

As a rule, bad motivation or errors that relate to fundamental principles of the course will lead to large point reductions. Computational errors that do not lead to unreasonable answers generally give smaller reductions.

The purpose of all exam problems is to test to what degree the students have reached the aims and objectives (see Section Aims and Learning Outcomes on page 3). It will therefore not be possible to solve the exam problems by just finding the correct formula on the note sheet or by remembering and imitating the solution of one of the exercise problems. The course is about understanding, not memorizing the course material.

Final grades

To pass the course, the final exam must be passed. The final grade will be decided based on the table below.

Total score	<45	45-65	66-79	≥80
Grade	Fail	3	4	5