

# Communication networks : protocols and architectures

## Lecturer

Jean-Michel DRICOT (Coordinator)

## Course mnemonic

ELEC-H417

## ECTS credits

5 credits

## Language(s) of instruction

English

## Course period

First term

## Course content

We will cover the first five chapters of Kurose & Ross book [1] in detail, working our way down the network stack from the application layer to the data-link layer. Concurrent with the lectures, you (in groups) will be building a functional TCP/IP networking architecture and code a client/server application (including the design of the software architecture, data structures, etc.). What you build will be 'real' your code and 'real' networked system, i.e., a system made of routers, switches, wireless access points, network monitors, etc.

After finishing the course, you will be able to do the following:

- > Understand the Internet protocols
- > Build implementations of the Internet protocols
- > Generalize this knowledge to other networking protocols.
- > Be a competent network and systems programmer.
- > Think like a networking practitioner
- > Read and judge articles on networking in trade magazines
- > Begin to read and judge research and technical articles on networking
- > Create simplicity and reliability out of complexity and unreliability
- > Structure and design software systems to achieve that simplicity and reliability

[1] James Kurose and Keith Ross. "Computer Networking: A Top-Down Approach". 6th Edition, Addison Wesley, 2012.

## Objectives (and/or specific learning outcomes)

This course introduces the underlying concepts behind networking using the Internet and its protocols as examples. There are three goals: (1) to give you an understanding of how networks, especially the Internet, work, (2) to give you

experience with large scale systems, and (3) to teach you network programming.

## Pre-requisites and co-requisites

### Courses having this one as pre-requisit

ELEC-H423 | Mobile and wireless networks | 4 crédits, ELEC-H423 | Mobile and wireless networks | 5 crédits and STAG-H502 | Internship (2 months) | 6 crédits

## Teaching method and learning activities

This class places an equal emphasis on practical experience as well as theoretical foundations. You will interact directly with parts of our Internet infrastructure and implement several core components. It will be a lot of work, but it will also be a lot of fun and real-life experience.

## Contribution to the teaching profile

This teaching unit contributes to the following compétences:

- > In-depth knowledge and understanding of integrated structural design methods in the framework of a global design strategy
- > Reformulate complex engineering problems in order to solve them (simplifying assumptions, reducing complexity)
- > Collaborate in a (multidisciplinary) team
- > Work in an industrial environment with attention to safety, quality assurance, communication and reporting
- > Think critically about and evaluate projects, systems and processes, particularly when based on incomplete, contradictory and/or redundant information
- > A creative, problem-solving, result-driven and evidence-based attitude, aiming at innovation and applicability in industry and society
- > A critical attitude towards one's own results and those of others
- > The flexibility and adaptability to work in an international and/or intercultural context
- > An attitude of life-long learning as needed for the future development of his/her career
- > Has an active knowledge of the theory and applications of electronics, information and communication technology, from component up to system level.
- > Has a profound knowledge of either (i) nano- and opto-electronics and embedded systems, (ii) information and communication technology systems or (iii) measuring, modelling and control.
- > Has a broad overview of the role of electronics, informatics and telecommunications in industry, business and society.

- > Is able to analyse, specify, design, implement, test and evaluate individual electronic devices, components and algorithms, for signal-processing, communication and complex systems.
- > Is aware of and critical about the impact of electronics, information and communication technology on society.

### References, bibliography and recommended reading

James Kurose and Keith Ross. "Computer Networking: A Top-Down Approach". 6th Edition, Addison Wesley, 2012.

### Evaluation method(s)

Other

### Evaluation method(s) (additional information)

Written exam + Programming project.

### Main language(s) of evaluation

English

## Programmes

### Programmes proposing this course at the Brussels School of Engineering

MA-IRCB | **Master of science in Biomedical Engineering** | finalité Professional/unit 2, MA-IREL | **Master of science in Electrical Engineering** | finalité electronics and information technologies/unit 1 and MA-IRIF | **Master of science in Computer Science and Engineering** | finalité Professional/unit 1

