

# Communication networks : protocols and architectures

## Titulaire

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## Mnémonique du cours

ELEC-H417

## Crédits ECTS

5 crédits

## Langue(s) d'enseignement

Anglais

## Période du cours

Premier quadrimestre

## Contenu du cours

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.

## Objectifs (et/ou acquis d'apprentissages spécifiques)

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.

## Pré-requis et co-requis

### Cours ayant celui-ci comme pré-requis

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

## Méthodes d'enseignement et activités d'apprentissages

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 au profil d'enseignement

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.

## Méthode(s) d'évaluation

Autre

## Méthode(s) d'évaluation (complément)

Written exam and programming project.

## Langue(s) d'évaluation principale(s)

Anglais

## Programmes

### Programmes proposant ce cours à l'école polytechnique de Bruxelles

MA-IRCB | **Master : ingénieur civil biomédical** | finalité Spécialisée/ bloc 2, MA-IREL | **Master : ingénieur civil électricien** | finalité Spécialisée électronique et technologies de l'information/bloc 1 **et** MA-IRIF | **Master : ingénieur civil en informatique** | finalité Spécialisée/ bloc 1

