COM-407 **TCP/IP networking**

Le Boudec Jean-Yves

Cursus	Sem.	Type
Communication systems minor	H	Opt.
Computer science	MA1, MA3	Obl.
Cyber security minor	H	Opt.
Cybersecurity	MA1, MA3	Obl.
Electrical and Electronical Engineering	MA1, MA3	Opt.
SC master EPFL	MA1, MA3	Obl.

Language of teaching	English
Credits	6
Session	Winter
Semester	Fall
Exam	Written
Workload	180h
Weeks	14
Hours	**6 weekly**
Courses	2 weekly
Exercises	2 weekly
TP	2 weekly
Number of positions	

Summary

In the lectures you will learn and understand the main ideas that underlie and the way communication networks are built and run. In the labs you will exercise practical configurations.

Content

LECTURES: 1. The TCP/IP architecture 2. Layer 2 networking; Bridging. 3. The Internet protocol versions 4 and 6 4. The transport layer, TCP, UDP, sockets, QUIC. 5. Link state routing, OSPF, Distance Vector routing. Interdomain routing, BGP. 6. Congestion control principles. Application to the Internet. The fairness of TCP.
LABS: 1. Configuration of a network, virtual machines and mininet, packet captures 2. MAC; NATs and troubleshooting 3. Socket programming 4. OSPF routing 5. Congestion control and flow management 6. BGP

Keywords

TCP/IP
Computer Networks

Learning Prerequisites

Required courses

A first programming course

Learning Outcomes

By the end of the course, the student must be able to:

- Run and configure networks
- Understand the main ideas that underlie the Internet
- Write simple communicating programs
- Use communication primitives for internet and industrial applications.

Transversal skills

- Access and evaluate appropriate sources of information.
- Continue to work through difficulties or initial failure to find optimal solutions.

Teaching methods

Lectures with questionnaires.
Labs on student's computer and in the Internet Engineering Workshop

Expected student activities

Participate in lectures
Participate in graded test every other week
Make one lab assignment every other week, including handing in a written report
Optional: research exercise: gather information about a specific topic and explain it to class

Assessment methods

Theory grade = max(40% tests + 60% final exam, final exam)
Practice grade = average of labs
Final grade = harmonic mean of theory grade and practice grade.
The research exercice may give a bonus of at most 0.5 points in 1-6 scale.
When computing the test grade, the best 5 out of 7 tests are taken.

Supervision

Office hours	Yes
Assistants	Yes
Forum	Yes

Resources

Bibliography

"Computer Networking : Principles, Protocols and Practice", O. Bonaventure, open source textbook, http://inl.info.ucl.ac.be/CNP3

Ressources en bibliothèque

- Computer Networking / Bonaventure

Notes/Handbook

Slides are on moodle

Websites

- http://moodle.epfl.ch/course/view.php?id=523

Moodle Link

- http://moodle.epfl.ch/course/view.php?id=523

Videos

- http://moodle.epfl.ch/course/view.php?id=523