From Fundamentals to Reality: How The Internet Really Works — And How To Make It Better

Subject area: Computer Science/ICT

University: L'X
Level: MA1, MA2
Teaching mode: completely online, not time-specific
Instructor(s): Thomas Heide Clausen

Short description

For a student, armed with the fundamentals and theory behind modern networking technology, this courses plunges into the reality of how the Internet really works, and how it came to be the resilient, yet in many ways quite fragile, world-wide system it is today.

Full description

While billions of people take the Internet for granted today, the system is still at its infancy and is subject to rapid and significant change. One of the interesting, and perhaps surprising, characteristics of the Internet is, that we as individual engineers still can make a difference: by examining what works and what doesn't, and understanding the science and art of what truly makes for a successful protocol, the Internet remains a ripe field of innovation.

In this course we will come face to face with the reality of what is and is not "broken" on the Internet today, how to examine the success or failure of an Internet protocol of their choice, and examine the economic and technical aspects of the patchwork of protocols and systems that make up the most complex distributed system mankind has ever created.This course will provide students, who have a basic understanding of computer networking, with in-depth knowledge about computer networking protocols and architectures as used on the Internet. This includes aspects such as OSPF, BGP, The Internet Peering Ecosystem, "modern" transport protocols, such as MP-TCP and QUIC — as well as a thorough understanding of how Internet standards are developed and maintained.

The course will be available asynchronously, fully on-line, or on-site, through learning flows with short videos, quizzes, homework, lab exercises.

Learning outcomes

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Recommended in particular for students of the following study programmes

General information

Contact hours per week:	4 hours
Total workload:	40 hours + personal work (in student hours for the whole course)
ECTS credits:	5
Language:	English

Course start date:	03 January 2023
Course end date:	03 June 2023
Add. info about start date:	Individualised, can be any date, between Jan 3 and April 1, 2023. Please note that the intended start-date must be communicated to Ecole Polytechnique at the time of registration. The course end date should be exactly 10 weeks after the start-date.
Weekly teaching day/time:	Available fully asynchronous
Time zone:	CET (Denmark, Germany, France, Netherlands, Switzerland, Czech Republic)
Further information:	Interested EuroTeQ students are welcome to, at any time, to come discuss their course choices in chat, or in visio, with the instructors from Ecole Polytechnique who will be teaching the classes. To this end, a dedicated WebEx space is permanently available here: https://eurl.io/#fCk0f6iWF.

Prerequisites:	Any "introduction to computer programming" course
Activities and methods:	The course will be available asynchronously, fully on-line, or on-side, through learning flows with short videos, quizzes, homework, lab exercises / tutorials — as well as office-hours via Webex with professors and instructors. While being asynchronous, each student is expected to check in with an instructor over Webex, weekly, following the chosen start-date.
Presence on campus:	no

Final examination

Form:	Final exam, weekly quizzes, grade assignments

Date:

Location/format: online

Re-sit possibility: no

Transcript available: end of the semester and generally 8 weeks after the exam.

Add. info/requirements:

Registration

To register for this course, follow the registration requirements of your **home university** as specified here: www.euroteq.eu/courses-registration.

Administration

Number of places: 24-30

Minimum participants:

Internal course code:

Contact: euroteq-mobility@polytechnique.fr

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This course is part of the EuroTeQ Engineering University joint course catalogue 2023. This is a collaborative activity of the partner universities DTU, L'X, TU/e, TalTech, CTU, TUM as well as Technion. Students from these universities can participate in the offered courses. It is the responsibility of the student to check if you fulfil the requirements to participate in a specific course. Students are also advised to check with their home institution how to get recognition of the ECTS credits gained in courses of the EuroTeQ course catalogue. For further information about EuroTeQ Engineering University, visit www.euroteq.eu or get in touch with the above-mentioned point of contact.