

Connected Objects and the Internet of Things

This micro-credential is designed for: students

University: L'X
Prerequisites: The primary prerequisite is to be curious and motivated. Additionally, any "introduction to computer programming" course is strongly recommended.

Description

This micro-credential proposes students an initiation to the technical side of the design, development and implementation of connected objects and systems for the Internet of Things. In particular, students will be exposed to five distinct topics: (i) How the Internet works: the Internet architecture, core protocols and components (ii) How to develop and implement Internet-connected applications and systems (iii) How to design, implement and program smart objects ("things") able to interact with their environment; and how to optimize their performance and their energy efficiency (iv) How to use existing communication tools and technologies, both generic or IOT-specific, to connect objects to each other, and to remote systems in the cloud (servers, datacenters) through the Internet -- thus turning them into "smart connected objects". (v) How to conceive, design and implement complete IOT distributed systems and applications, from the cloud to the edge, able to provide services over IOT systems relying on connected smart objects ("things") communicating over the Internet. These topics will be individually addressed on exercises and tutorials, and then a student project will integrate the different topics into a complete distributed IOT system involving one or several smart objects.

Micro-credential elements

To obtain this micro-credential, you need to successfully complete the following elements:

- Element 1: Computer Networking & Distributed Applications
- Element 2: Connected Objects and the Internet of Things

For detailed information about the elements, please see the following page(s).

General information

Total workload: 64.5 + personal work (in hours for the whole course)

Total ECTS credits: 9

Registration

To register for this micro-credential, follow the registration requirements of the corresponding university as specified here (“How do I sign up”): www.euroteq.eu/microcredentials-registration.

Administration

Number of places: 6

Minimum participants:

Contact: Thomas.Clausen@polytechnique.edu

Information on micro-credential elements

Element 1: Computer Networking & Distributed Applications

Subject area: Computer Science/ICT

Teaching mode: completely online, no specific time (asynchronous)

Instructor(s): Thomas Heide Clausen

Description

This course will introduce students to the architectures, theory, and practice required for implementing communicating, Internet-connected, systems — as well as provide students with the necessary understanding of “how the Internet Works”. The course will be available asynchronously, fully on-line, or on-site, through learning flows with short videos, quizzes, homework, lab exercises.

Full description

<https://synapses.polytechnique.fr/catalogue/2020-2021/ue/50/CSE207-introduction-to-networks?from=D12>

Learning outcomes

principles and architectures”, and will cover topics such as:

How does the Net Work?

Network Programming

Network Configuration

Components of a Computer Network

The Domain Name System

NAT, NAPT, ...

The lab exercises will, additionally, give students practical experiences in computer networking - in particular, but not exclusively, in how to write programs that communicate over the network.

General information

Contact hours per week: 2 hours
Total workload: 24.5 hours + personal work (in hours for the whole course)
ECTS credits: 3

Course start date: 01/09/2022

Course end date: 03/06/2023

Weekly teaching day/time: The course will be available asynchronously, fully on-line, or on-site, 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.

Time zone: CET (Denmark, Germany, France, Netherlands, Switzerland, Czech Republic)

Further information: Individualised starting date, it can be any date, between Sept. 1, 2022 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.

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>.

Activities and methods: Lab work, Online videos, Self-study, Exercises

Presence on campus:

Final examination

Form: written

Date:

Location/format: online

Add. info/requirements: Final exam, weekly quizzes, graded assignments

Administration

Internal course code: CSE207

Element 2: Connected Objects and the Internet of Things

Subject area: Computer Science/ICT

Teaching mode: completely online, no specific time (asynchronous)

Instructor(s): Thomas Heide Clausen

Description

In the 21th century, a company developing a product either: has a strategy for rendering the product somehow connected; or is as disconnected from reality, as was the guy installing the bike-rack on the picture to the right. If you are, or want to be, in the first category, then this course is for you – regardless of your previous experience.

Full description

<https://synapses.polytechnique.fr/catalogue/2021-2022/ue/313/INF471C-modal-connected-objects-and-the-internet-of-things-iot?from=P1277>

Learning outcomes

General information

Contact hours per week: 6

Total workload: 40 + personal work (in hours for the whole course)

ECTS credits: 6

Course start date: 01/09/2022

Course end date: 03/06/2023

Weekly teaching day/time: The course will be available asynchronously, fully on-line, or on-site, 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.

Time zone: CET (Denmark, Germany, France, Netherlands, Switzerland, Czech Republic)

Further information: Individualised starting date, it can be any date, between Sept. 1, 2022 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.

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>.

Activities and methods: Lab work, Online videos, Self-study, Exercises

Presence on campus:

Final examination

Form: continuous assessment

Date:

Location/format: online

Add. info/requirements: An Arduino kit is required to follow this course. We can provide one kit per student considering that the kit will be sent to one of the EuroTeQ partner universities in Europe only. The student should be able to pick it up at the start of the course and return it at the end of the course.

Administration

Internal course code: INF471C

This course is a micro-credential developed by EuroTeQ Engineering University, a collaborative activity of the partner universities DTU, L'X, TU/e, TalTech, CTU and TUM. It is the responsibility of the participant to check if you fulfil the requirements to participate in a specific course, as specified in the description. When the course is completed successfully, participants will be awarded the EuroTeQ micro-credential, evidencing the learning outcomes. For further information about EuroTeQ Engineering University, visit www.euroteq.eu or get in touch with the above-mentioned point of contact.