



### Keywords

Artificial Intelligence  
 Augmented Reality  
 Cyber Physical Systems  
 Intelligent systems  
 Automation  
 Robotics  
 Virtual Reality

## COMPUTER SCIENCES AND ENGINEERING

### PRESENTING THE UTC DEPARTEMENT OF COMPUTER SCIENCES AND ENGINEERING

The Computer sciences and engineering department of UTC prepares the future engineers to:

- master the fundamental knowledge in computer science,
- favor learning through experimentation,
- acquire a methodology to deepen their knowledge in the concerned fields,
- interact with companies (platform, teaching).

### COURSE DESCRIPTIONS

#### IA03 - MODELING TECHNIQUES, CAPITALIZATION AND KNOWLEDGE MANAGEMENT (6 ECTS)

*Responsible : Marie-Hélène Abel (Fall semester) (Only teaching material in English)*

This course includes an analysis of the problem of knowledge capitalization, as well as a study of technologies and methods of information processing that can be used to meet the expectations of companies.

#### RV01 - VIRTUAL REALITY (6 ECTS)

*Responsible : Indira Thouvenin (Fall semester) (Only teaching material in English)*

This course allows you to acquire the basics of virtual, augmented and mixed reality through numerous examples and a project, carried out with the Unity 3D engine and the Translife platform (CAVE, VR headsets).

#### SR04 - COMPUTER NETWORKS (6 ECTS)

*Responsible : Abdelmajid Bouabdallah (Fall semester) (Only teaching material in English)*

In this course, we present network architectures and technologies as well as communication protocols. We will then study the technologies of the different information transport infrastructures allowing to build large architectures of enterprise information systems (local networks, wireless networks, long-distance networks, network interconnection) with a focus on Internet protocols (IPv4, IPv6).

#### SR08 - Cloud and Advanced Networks (6 ECTS)

*Responsible : Abdelmajid Bouabdallah (Fall semester) (Only teaching material in English)*

This course presents advanced architectures integrating the complete chain of data collection from various sources such as IoT, their transport, as well as their storage and sharing for processing on cloud. We will study the different cloud approaches (public, private, hybrid) by highlighting the advantages and disadvantages of one over the other depending on the deployment environment.



**SY19 - MACHINE LEARNING (6 ECTS)**

*Responsible : Thierry Denoeux (Fall semester) (teaching material and tutorials in English)*  
Presentation of the basics of machine learning, a field at the interface of artificial intelligence and data science, aiming at giving computers the ability to learn without being explicitly programmed. Practical application of the techniques studied in class using R software.

**SY27 - INTELLIGENT MACHINES (6 ECTS)**

*Responsible : Philippe Bonnifait (Fall semester)*  
The objective of this course is to apply and deepen knowledge in the field of real time and embedded computing for intelligent robotic machines. The course is organized around a case study that is different every year. Students work in teams to perform demonstrations in real conditions.

**SY28 - CYBER PHYSICAL SYSTEMS - (6 ECTS)**

*Responsible : Lounis Adouane (Fall semester) (Only teaching material is in English)*  
This course deals with autonomous mobile cyber-physical systems (CPS), subject to several sources of uncertainty and strong dynamic of interaction. Even if the methods and concepts developed in this course can be applied to a wide variety of PCS (such as air traffic control or "smart grids"), multi-robot mobile, constitute the main focus of the UV. The optimal performance of such systems requires the mastery of several components related to cooperative localization, planning, task allocation, real-time communication and control of these complex CPS. All these components and their interactions will be studied in this course.

**SY15 - AUTOMATION FOR ROBOTICS (6 ECTS)**

*Responsible : Philippe Bonnifait (Spring semester)*  
This course focuses on advanced automatic methods for autonomous robotic systems (mobile robots, drones, intelligent vehicles, humanoids, etc.) that use real-time computer systems to implement controllers. The course focuses on observer-based execution control with an opening towards autonomous decision making and planning.

**SY31 - SENSORS FOR INTELLIGENT SYSTEMS**

*Responsible : Philippe Xu (Spring semester)*  
This course provides the fundamental background for understanding smart sensors, covering the measurement, the processing and the analysis of sensor data. The concepts are illustrated through robotic applications with several sensors (cameras, telemeters, IMU, GNSS, etc.).

**GENERAL LAB AND PROJECT COURSES****PR00 – MULTIDISCIPLINARY PROJECT (5 ECTS)***Responsible: Bruno Ramond (Fall and Spring semesters)*

The goal of this course is to have students participating to the achievement of a project. The project should be under the supervision of one adviser.

**TX00 - LAB PROJECT (5 ECTS)***Responsible: Claude-Olivier Sarde (Fall and Spring semesters)*

The TX Unit is a technical Unit belonging to the category "Techniques and Methods" (TM). It allows the students to realize a concrete technical project operating an approach of engineering.

**HUMANITIES AND LANGUAGES****EI02 : INTERNATIONAL PROJECT MANAGEMENT (4 ECTS)***Responsible: Frederic Huet (Fall and Spring semesters)*

Managing international projects presents unique challenges: implementing standard project management methods and tools while accommodating cultural differences and distance in the project team. This course addresses the knowledge, skills, and behaviors required to successfully manage projects across the world.

**EI05 : EUROPEAN UNION, SOCIETY AND SCIENCE POLICY (4 ECTS)***Responsible: Martin Morgeneyer (Fall and Spring semesters)*

Introduction to Europe: Countries, figures, languages - and you! - EU's history and EU's news - From an economic to a political Europe: The treaties and the constitution project, Introduction to Lisbon - The European Institutions - Europeans about Europe - The European citizenship - Key figures - Intro to ERA and REACh - Intro to Bologna - Decision making - European law - Research, EIT, REACh and Sustainable development in Europe - Horizon 2020 - Public consultations - Europe and me.

**SO07 : DIGITAL POLICIES AND INTERNET REGULATION (4 ECTS)***Responsible: Anne Bellon (Fall and Spring semesters)*

Can we govern technology and how? By bringing together different disciplines (political science, law, and economics). This course explores the technical and social arrangements that shape the organization and transformation of content and practices on the web. It adopts a thematic and historical perspective, which aims to discuss specific issues, but above all to grasp the evolution and ruptures that mark the regulation of the Internet.

**LA91 - FRENCH AS A FOREIGN LANGUAGE - level 1 (4 ECTS)***Responsible: Anna Wiacek-Le Verger (Fall and Spring semesters)***LA92 - FRENCH AS A FOREIGN LANGUAGE - level 2 (4 ECTS)***Responsible: Anna Wiacek-Le Verger (Fall and Spring semesters)***LA93 - FRENCH AS A FOREIGN LANGUAGE - level 3 (4 ECTS)***Responsible: Carole Lefrancois-Yasuda (Fall and Spring semesters)***LA94 - FRENCH AS A FOREIGN LANGUAGE - level 4 (4 ECTS)***Responsible: Carole Lefrancois-Yasuda (Fall and Spring semesters)***Contact**

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