WIRELESS TELECOMMUNICATION AND IoT SYSTEMS

OBJECTIVES

The Wireless Telecommunication and IoT Systems specialization presents all the necessary building blocks for the design, planning, deployment, and optimization of mobile wireless communication and connected object networks, as well as digital techniques for transmission and communication.

The Wireless Telecommunication and IoT Systems engineer is an expert that can advise IoT clients on the technologies to choose to inter-connect objects. He/she has the know-how to implement the next generation technologies by operating highly efficient networks.

JOB PROSPECTS

R&D engineer, Integration Engineer, Validation Engineer, Research Engineer, Telecommunication Support Engineer, Technical Sales Engineer, Telecom Project Manager.

COURSE CONTENT

SEMESTER 1

CYBER SECURITY
- Information systems security
- Web application and network security
- Introduction to Cryptography, etc.

ELECTRONICS OF THINGS
- Deepening on Microcontroller
- Battery management, low prower design, Power conversion
- Wireless link, protocoles ans capabilities low power
- Green communication design, System implementation

PROJECT-BASED LEARNING IN ELECTRONIC AND SIGNAL
- Analog electronics: signal conditioning, analog filter, power management
- Digital electronics: Microcontroller based sensor management, bluetooth link
- Fourier series and transform, sampling, digital filtering

NETWORK FUNDAMENTALS
- Network communication, communication channel
- Layer approach, OSI model, TCP/IP model
- Network devices, Network addressing models

DATA SCIENCE FUNDAMENTALS
- Probability theory
- Statistics (descriptive statistics, statistical theory of estimation, hypothesis testing)
- Data science (principal component analysis, linear regression)

ENGLISH, FRENCH AND HUMANITIES COURSES

SEMESTER 2

DATA AQUISITION AND PROCESSING
- Data type: qualitative, quantitative
- Deterministic data processing: Data transforms, filtering, linear prediction
- Random data processing: Distributions, estimation, measure errors, correlation...

CELLULAR TECHNOLOGIES AND IOT
- Architecture and Engineering of cellular mobile communications networks
- Characteristics of the radio propagation (noise, interference, protection against the errors)
- Mobility & Security in cellular communications netwoks
- Multiplexing users

DATABASES AND BIG DATA
- Advanced querying techniques
- Non-relationnal databases

DESIGN OF CONNECTED SYSTEMS
- Introduction to the Internet of Things
- Overview on IoT Networks
- Enabling Technologies, Protocols and Applications
- Low Power Wide Area Networks (LPWAN)

ENGLISH, FRENCH AND HUMANITIES COURSES

CHOOSE ONE COURSE AMONG:

INTRODUCTION TO ARTIFICIAL INTELLIGENCE
- Applications of artificial intelligence to problem solving
- Methods of problem formalization and knowledge representation
- Resolution algorithms associated with these representations

INTERNATIONAL BUSINESS INNOVATION PROJECT
- Build real business model in a multicultural team
- Create innovative idea with marketing & business strategies
- Present final business model to professionals

INTRODUCTION TO RESEARCH
- Definition of research: procedures, organization and purposes
- Targeting information (specialized sites, books, open archives, etc.)
- Bibliographic study: synthesis of the research works
- Modeling a scientific problem
- Writing a scientific publication
- Ethics, integrity and scientific rigor

SEMESTER 3

HIGH-RATE NETWORKS
- Free Space Optics (FSO)
- Optical Networks
- G21, allocation of spectral resources in optical networks
- Wavelength-division multiplexing (WDM)
- Satellite communications

VIRTUALIZED ARCHITECTURES AND CONVERGED SERVICES
- Network orchestration
- Virtualization of network functions (NFV), Open Stack, Opendaylight
- Software Defined Networks (SDN)

- Systems and protocols for converged services
- Quality of service (QoS) and quality of experience (QoE)

PROJECT
The project is composed of an advanced case study. The students will be called upon to use the knowledge, design techniques and tools that they learnt through their courses

ENGLISH, FRENCH AND HUMANITIES COURSES

CHOOSE TWO COURSES AMONG:

SMART CITIES / CONNECTED AND AUTONOMOUS VEHICLES
- Challenges of the smart city
- Instructions for a stronger economic development
- Industry 4.0 market technical
- Smart Transportation
- Aviation market techno-economic analysis

ROUTING AND ADVANCED ARCHITECTURE
- Core network architectures based on protocols such as MPLS
- Implementation of IPv6 networks, and planning for existing network migrations
- Advanced inter-AS routing protocols (autonomous system)

AUDIT AND RISK MANAGEMENT
- Principals of Cybersecurity Governance
- Cybersecurity standards overview
- Security Architecture, Security Audit
- PAM, BCP, Forensic & Incident response, DRP

MACHINE LEARNING
- Linear predictors, convex learning
- Gradient descent, kernel methods

SEMESTER 4

INTERNSHIP
The internship with an international company will enable students to display valuable professional skills and attitudes developed during the three academic semesters.
ISEP will provide you with assistance in your search for an internship. Companies usually give a stipend to the trainees.

Syllabus is subject to minor modifications