Final year of the Professional Bachelor 's Degree

in Computer Networks and Telecommunications

specializing in Computer Networks, Mobility, Security

Licence Professionnelle (Troisième année)

Métiers des Réseaux et Télécommunications

Parcours : Réseaux informatiques, Mobilité, Sécurité

International class

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COURSES	420 hours + projects	ECTS
General courses		**6**
M11: Communication skills	25	2
M13: Language skills (English / Français Langue Étrangère…)	30	2
M14: Project management	30	2
Fundamental scientific and technological courses		**9**
M21: Computer Networks	30	2
M23: System administration	30	2
M24: Digital communications and trans. medium	40	3
M25: Network Security	30	2
Specialized Scientific and technological courses		**10**
M31: VOIP – real time flows	15	1
M32: Mobile Transmission systems	40	3
M33: Security of networking infrastructures	30	2
M34: Advanced Computing Networks	30	2
M35: Wireless Networks	30	2
4PT1: Academic project		**5**
M12: Introduction to Internet Legislation	20	2
M22: Database management systems	40	2
4PT2: Academic project audit		1
4ST: Industrial placement in a company or research laboratory		**25**

- 1st semester: **360 hours tuition (25 ECTS)**
  + academic project or thesis (5 ECTS),
- 2nd semester (for students staying for 2 semesters):
  60 hours tuition (4 ECTS)
  + 2nd part of Academic project (1 ECTS)
  +work placement in a company/ research laboratory (25 ECTS)

30 ECTS per semester

Reference	M11	Hours	25	ECTS	2
Name of the module (English)			**Communication skills**		
Name of the module (French)			Communication		
Pre-requisites	No pre-requisites				
Content of the module (English)	**Program** This course aims at learning how to use communications tools, for oral presentation, written report, and also some considerations on how to prepare an application for a job in an international context. It also aims to use communication skills to debate about cultural and technological issues, in oral presentation, or to resolve conflicts in different situations (using theatrical skills).				
Keywords	Oral presentation, written report, conflicts resolution, debates				

Reference	M13	Hours	30	ECTS	2
Name of the module (English)			**French as a foreign language**		
Name of the module (French)			Français Langue Etrangère		
Pre-requisites	No pre-requisites				
Content of the module (English)	**Objectives** This is a basic course in French language (Français Langue Etrangère/French as a foreign language). The objective of this module is: - to enable students to function in French in everyday situations - to encourage students to further their knowledge of France and its culture **Program** The course will be adapted to the students' standard in spoken French. 1°Survival French - Basic communication skills in everyday French including introductions/ description techniques etc. 2° Talks (in English) on the French/European economic environment. **Competences** basic communication skills				
Keywords	Basic French for everyday situations				

Reference	M13	Hours	30	ECTS	2
Name of the module (English)			**Language skills: English**		
Name of the module (French)			Anglais		
Pre-requisites	No pre-requisites				
Content of the module (English)	**Program** This course aims at learning how to use communications tools, for oral presentation, written report, and also some considerations on how to prepare an application for a job in an international context.				
Keywords					

Reference	M14	Hours	30	ECTS	2
Name of the module (English)			**Project management**		
Name of the module (French)			Gestion de projet		
Pre-requisites	No pre-requisites				
Content of the module (English)	**Objectives** The purpose is to initiate students with the project management. **Program** This course is also practically implemented in the academic project which should be resolved by students.				
Keywords	Project management, Gantt chart, practical experiment				

Reference	M21	Hours	30	ECTS	2
Name of the module (English)			**Computer networks**		
Name of the module (French)			Réseaux informatiques		
Pre-requisites	Binary encoding Basic computing knowledges about computers				
Content of the module (English)	**Objectives** Knowing the bases of computer networks technologies **Program** This course deals with computer networks. Topology: bus, ring, start, meshed networks Circuit and packet switching: Connection and connectionless networks Elements of theory: Bandwidth and throughput Encapsulation: OSI model Layer 1: supports Layer 2: Ethernet and IEEE standards, MAC layer – Medium access - LLC TCP/IP: Addressing – routing – elements of dynamic routing - associated services: ICMP ARP Services: DNS, Web, mail. **Competences / labs**: The underlying Operating System is mainly Linux. TCP/IP configuration – Elements of OS management (accounts – rights…) Domain Name Service (Bind) Web services (Apache)				
Keywords	TCP/IP, LAN, Network administration				

Reference	M23	Hours	30	ECTS	2
Name of the module (English)			**System administration**		
Name of the module (French)			Administration des systèmes		
Pre-requisites	No pre-requisites				
Content of the module (English)	**Objectives** Being able to administrate a local network managed by Windows Active Directory in virtual environments **Competences / labs** Installing and managing a virtual system on a station (Virtual Box) Windows systems administration Active directory and group policies WDS (Windows Deployment System) and MDT (Microsoft Deployment Kit) Supervision with SNMP Administration with PowerShell (application to VMWare server supervision)				
Keywords	Active Directory, GPO, MDT, WDS, SNMP, PowerShell				

Reference	M24	Hours	40	ECTS	3
Name of the module (English)			**Digital communications and trans. medium**		
Name of the module (French)			Communications numériques et support		
Pre-requisites	mathematical functions (log, exp,…), trigonometric functions, complex numbers				
Content of the module (English)	**Objectives** To differentiate the different telecommunication systems To understand the different analog and digital modulations used To understand the transmission protocols To choose and implement a transmission medium To characterize and measure signals in time and frequency domains To use measurement equipment associated to different telecommunication systems **Program** - Introduction and history of the telecommunications - Signal concept - Time to frequency relation - Signal transmission and effect of the channel transmission - Copper cable (Impedance, attenuation, reflection, bandwidth, Reflectometry …) - Fiber optic (Principles, attenuation, bandwidth, splice, connection, Reflectometry…) - Analog amplitude modulation and demodulation - Digital modulations - Signal multiplexing and introduction to protocols (SDH, OWM, FTTx …) **Competences / labs** - Analog Amplitude modulation and demodulation - ASK, FSK, PSK and QAM digital modulations - Optical and electrical reflectometry, electrical and optical cable analysis - base band coding				
Keywords	Telecommunication systems, digital, analog communications				

Reference	M25	Hours	30	ECTS	2
Name of the module (English)			**Network security**		
Name of the module (French)			Sécurité des réseaux		
Pre-requisites	Mainly networking (intermediate or advanced level), operating systems				
Content of the module (English)	**Objectives** Be able to deploy, configure and maintain security software and devices in a network architecture in its environment, contributing to a global security policy. **Program** 1.Error detection 2. Technologies for security 3. Security thanks to ciphering 4. Security Protocols Labs • Firewall: installation and test of a firewall (filtering and address translations) • Cryptography with OpenSSL				
Keywords	Security, Firewalls, cryptography, codes				

Reference	M31	Hours	15	ECTS	1
Name of the module (English)			**VOIP – real time flows**		
Name of the module (French)			VOIP et flux temps réels		
Pre-requisites	No pre-requisites				
Content of the module (English)	**Objectives** Understanding the VOIP and real time transmissions concepts. Set-up a professional IP telephony system and an IPTV infrastructure. - understand the real-time flows constraints - understand the main protocols - know basic QOS concepts (quality of service) - know multicast flow management and routing (IPTV flows) - set-up a professional IPTV setup. **Program** - Corporate telephony concepts - IP adaptation to IPTV - QOS concepts - Multicast streams				
Keywords	IPTV, Multicast, QOS, VOIP				

Reference	M32	Hours	40	ECTS	3
Name of the module (English)			**Mobile Transmission systems**		
Name of the module (French)			Systèmes de transmissions mobiles		
Pre-requisites	No pre-requisites				
Content of the module (English)	**Objectives** Understand and set-up cellular phone networks (GSM/GPRS/EDGE, UMTS, LTE), Understand the network structure and the protocol stack. To be able to operate on the maintenance, installation and management of these networks **Program** Radio transmission concepts (antennas) Cellular communication introduction GSM protocol and physical layer GSM procedures Mobile Internet - GPRS/EDGE CDMA spread spectrum - OFDM 3G – UMTS and 4G – LTE introduction				
Keywords	GSM, GPRS, EDGE, UMTS, CDMA, OFDM, LTE				

Reference	M33	Hours	30	ECTS	2
Name of the module (English)			**Security of network infrastructures**		
Name of the module (French)			Sécurité des infrastructures		
Pre-requisites	Mainly networking (intermediate or advanced level), industrial computing, + Course M25				
Content of the module (English)	**Objectives** Being able to design, maintain and audit a secure network architecture in its environment, contributing in the setting of a security policy **Program** 1. Introduction to dependability, principles of security (physical, exploitation, logical, application, telecommunications…) 2. Strategies of attacks and organisms for security 3. Strategies and policies for security 4. Virus 5. Intrusion detection systems Labs • Metasploit tools for attack • Audit, intrusion detection				
Keywords	Security, Risk analysis				

Reference	M34	Hours	30	ECTS	2
Name of the module (English)			**Advanced Computing Networks**		
Name of the module (French)			Réseaux informatiques avancés		
Pre-requisites	No pre-requisites				
Content of the module (English)	**Objectives** Knowing how to configure some advances technologies in Computer networks **Program** Dynamic routing: RIP / OSPF /BGP IPv6 Networks Filtering: Access-lists Cisco Networking Academy (CCNA 1-4) **Competences / Labs** IPv6 networks Dynamic routing and filtering				
Keywords	Dynamic routing, ACL, RIP, OSPF, IPv6, Multicast				

Reference	M35	Hours	30	ECTS	2
Name of the module (English)			**Wireless Networks**		
Name of the module (French)			Réseaux sans fil		
Pre-requisites	No pre-requisites				
Content of the module (English)	**Objectives** Being able to design and deploy a Wireless System and to design the proper security infrastructure **Program** Physical Layer: Modulations Mac Layer: CSMA/CA Site Survey and deployment Security: Wep – 802.11i – WPA/WAP2 Elements on Mobile IP QoS **Competences / labs** Hotspot (Access Point + Radius + DBMS) 802.11i – WPA enterprise + Radius + EAP Wireless controllers				
Keywords	WiFi, EAP, 802.1x, Hotspot, WiFI controllers, access-points, 802.11				

Reference	M12	Hours	20	ECTS	2
Name of the module (English)			**Introduction to Internet Legislation**		
Name of the module (French)			Introduction à la législation des réseaux		
Pre-requisites	No pre-requisites				
Content of the module (English)	**Objectives** Take into account law when designing and maintaining an information system **Program** Civil and criminal liability: - Communication freedom - Confidentiality - Property - Copyrights - Freeware, counterfeit, hacking Data security - criminal liability Electronic business Digital signature Contracts				
Keywords	Internet law, Intellectual property,criminal liability				

Reference	M22	Hours	40	ECTS	2
Name of the module (English)			**Database management systems**		
Name of the module (French)			Systèmes de Gestion de Base de données		
Pre-requisites	Basic knowledge in development and/or databases				
Content of the module (English)	**Objectives** Databases modelling DBMS administration and use Being able to - Build a model in a DBMS - Create a data BASE on a DBMS - Query and manage the DBMS - Create a simple WEB system to interact with the database. **Program** - Modelling and building a database (EA diagrams, integrity constraints) - SQL querying - Installing and managing the database - User access management - Web development bases (HTML) - Database access with PHP - Data security				
Keywords	DBMS, SQL, PHP, Databases				

Reference	4PT1	Hours	20	ECTS	2
Name of the module (English)			**Academic project**		
Name of the module (French)			Projet tutoré		
Pre-requisites	Computer Networking and Project management skills				
Content of the module (English)	**Objectives** Being able to design a middle-size network according to requirements. **Program** The students will have to design a network with security aspects and a wireless extension, to implement it, and be audited by another group of students. This work is achieved as teams of 6 to 8 students, the students will have to organize themselves and take opportunity of the course on "project management". Some meetings with the teachers will be organized to validate the advancements of works.				
Keywords					

Reference	4PT2	Hours		ECTS	1
Name of the module (English)			**Academic project audit**		
Name of the module (French)			Projet tutoré : audit		
Pre-requisites	Networking, operating systems, wireless networks, security audit				
Content of the module (English)	**Objectives** Being able to identify the main characteristics of a network and to analyze the main security parameters. **Program** This module concerns the security audit of a network designed by another group of students during academic projects, using vulnerabilities tools and analyzing the provided documentation.				
Keywords					

Reference	5ST	Hours		ECTS	1
Name of the module (English)			**Industrial placement in a company or research laboratory**		
Name of the module (French)			Stage		
Pre-requisites	Network administration				
Content of the module (English)	**Objectives** The purpose is to get a professional experience, and an opportunity to apply the knowledge and know-how (competences) acquired during the courses, on a practical situation. In company, the training period could ideally be connected as a part of a project, or several projects. It can also be a participation in the everyday life of the company, if the student can get new competences from this experiment. **Program** A teacher is responsible for the contact with the company (one visit during the training period, or one phone call if the student is very far from Grenoble). Some opportunities are proposed all around Europe, and sometimes outside Europe, for students in the international program.				
Keywords	Professional experience, internship				