# 2020-2021 Master Cycle Program -

| BD - S1 | | Software Development, Big Data and Cloud Computing (BD) | |
|---|---|---|---|
| Nomenclature | N° | Course | Hourly volume |
| S7-UE1 Computer science | 1E1 | Basic BDD | 24 |
| | 1E2 | Operating Systems / Linux shell | 24 |
| | 1E3 | Introduction à IA | 24 |
| S7-UE3 - Système software & Hardware | 1E4 | Prog. System | 24 |
| | 1E5 | Intermediate Network | 24 |
| | 1E6 | Information System Architure & UML | 24 |
| S7-UE2- Plateforme développement | 1E7 | Angular JS - Niv 1. | 24 |
| | 1E8 | Angular JS - Niv. 2 | 24 |
| | 1E9 | Intermediate Python | 24 |
| S7-UE4 Cloud deployment | 1E10 | Parallel computing | 24 |
| | 1E11 | SEO + GDPR (8h) | 24 |
| | 1E12 | Micro service déploiement cloud | 24 |
| S7-UE5 - Technical Project | 1P1 | BDD Technical project | 64 |
| | | ANSSI/CNIL Conference | 8 |
| S7-UE6 - SHES | 1A | Intermediate/ Advanced English | 30 |
| S7-UE7 - Language | 1H | Human, economic and social sciences | 42 |

| EMB - S1 | | Embedded Sytem | |
|---|---|---|---|
| Nomenclature | N° | Course | Hourly volume |
| S7-UE1 Computer science | 1E1 | Basic BDD | 24 |
| | 1E2 | Operating Systems / Linux shell | 24 |
| | 1E3 | Introduction to IA | 24 |
| S7-UE3 - Système software & Hardware | 1S4 | Physical components | 24 |
| | 1S5 | Labview Théorique | 24 |
| | 1S6 | Modelization composants | 24 |
| S7- UE2 Plateforme développement | 1S7 | FPGA1 | 24 |
| | 1S8 | FPGA 2 | 24 |
| | 1E9 | Intermediate Python | 24 |
| S7-UE4 Architecture | 1S10 | Hardware architecture and functional analysis | 24 |
| | 1S11 | Hardware & IoT | 24 |
| | 1S12 | Real Time OS - RTOS | 24 |
| S7-UE5 | 1P1 | Technical project + Projet FPGA Labview | 66 |
| | | ANSSI/CNIL Conference | 6 |
| S7-UE6 | 1A | Intermediate/ Advanced English | 30 |
| S7-UE7 | 1H | Human, economic and social sciences | 42 |

| CYB - S1 | | Cyber Security | |
|---|---|---|---|
| Nomenclature | N° | Course | Hourly volume |
| S7-UE1 Computer science | 1E1 | Basic BDD | 24 |
| | 1E2 | Operating Systems / Linux shell | 24 |
| | 1E3 | Introduction to IA | 24 |
| S7-UE3 - Système software & Hardware | 1E4 | Prog. System | 24 |
| | 1E5 | Intermediate Network | 24 |
| S7-UE2- Plateforme développement | 1E7 | Angular JS - Niv 1. | 24 |
| | 1E8 | Angular JS - Niv. 2 | 24 |
| | 1C9 | Security introduction | 24 |
| S7-UE4 Sécurité | 1E10 | Parallel computing | 24 |
| | 1C11 | Cybersecurity introduction - level2 | 24 |
| | 1C12 | Sécurité des langages | 24 |
| S7-UE5 - Technical Project | 1P1 | Technical project | 72 |
| S7-UE6 - SHES | 1A | Intermediate/ Advanced English | 30 |
| S7-UE7 - Language | 1H | Human, economic and social sciences | 42 |

| IOT-S1 | | IOT | |
|---|---|---|---|
| Nomenclature | N° | Course | Hourly volume |
| S7-UE1 Computer science | 1E1 | Basic BDD | 24 |
| | 1E2 | Operating Systems / Linux shell | 24 |
| | 1E3 | Introduction to IA | 24 |
| S7-UE3 - Système software & Hardware | 1E4 | Prog. System | 24 |
| | 1E5 | Intermediate Network | 24 |
| | 1E6 | Information System Architure & UML | 24 |
| S7-UE2- Plateforme développemen t | 1E7 | Angular JS - Niv 1. | 24 |
| | 1E8 | Angular JS - Niv. 2 | 24 |
| | 1E9 | Intermediate Python | 24 |
| S7-UE4 - Architecture | 1S10 | Hardware architecture and functional analysis | 24 |
| | 1S11 | Hardware & IoT | 24 |
| | 1S12 | Real Time OS - RTOS | 24 |
| S7-UE5 - Technical Project | 1P1 | Technical project | 72 |
| S7-UE6 - SHES | 1A | Intermediate/ Advanced English | 30 |
| S7-UE7 - Language | 1H | Human, economic and social sciences | 42 |

| SMA - S1 | | Smart energy | |
|---|---|---|---|
| Nomenclature | N° | Course | Hourly volume |
| S7-UE1 Computer science | 1E1 | Basic BDD | 24 |
| | 1E2 | Operating Systems / Linux shell | 24 |
| | 1E3 | Introduction to IA | 24 |
| S7-UE3 - Système software & Hardware | 1E4 | Prog. System | 24 |
| | 1E5 | Intermediate Network | 24 |
| | 1E6 | Information System Architure & UML | 24 |
| S7-UE2- Plateforme développeme nt | 1E7 | Angular JS - Niv 1. | 24 |
| | 1E8 | Angular JS - Niv. 2 | 24 |
| | 1E9 | Intermediate Python | 24 |
| S7-UE4 - Architecture | 1M10 | Energy Challenge + Solar | 24 |
| | 1S11 | Hardware & IoT | 24 |
| | 1S12 | Real Time OS - RTOS | 24 |
| S7-UE5 - Technical Project | 1P1 | Technical project | 72 |
| S7-UE6 - SHES | 1A | Intermediate/ Advanced English | 30 |
| S7-UE7 - Language | 1H | Human, economic and social sciences | 42 |

| IA - S1 | | Business Engineering | |
|---|---|---|---|
| Nomenclature | N° | Course | Hourly volume |
| S7-UE1 Computer science | 1E1 | Basic BDD | 24 |
| | 1E2 | Operating Systems / Linux shell | 24 |
| | 1E3 | Introduction to IA | 24 |
| S7-UE3 - Système software & Hardware | 1E4 | Prog. System | 24 |
| | 1A5 | Certification PMI | 24 |
| | 1E6 | Information System Architure & UML | 24 |
| S7-UE2- Plateforme développement | 1E7 | Angular JS - Niv 1. | 24 |
| | 1E8 | Angular JS - Niv. 2 | 24 |
| | 1E9 | Intermediate Python | 24 |
| S7-UE3 - Digital Product design | 1A10 | Marketing Digital | 24 |
| | 1E11 | SEO + GDPR (8h) | 24 |
| | 1A12 | Qualitive survey | 24 |
| S7-UE5 - Technical Project | 1P1 | Technical project | 72 |
| S7-UE6 - SHES | 1A | Intermediate/ Advanced English | 30 |
| S7-UE7 - Language | 1H | Human, economic and social sciences | 42 |

| ROB - S1 | | Robotics | |
|---|---|---|---|
| Nomenclature | N° | Course | Hourly volume |
| S7-UE1 Computer science | 1E1 | Basic BDD | 24 |
| | 1E2 | Operating Systems / Linux shell | 24 |
| | 1E3 | Introduction to IA | 24 |
| S7-UE3 - Système software & Hardware | 1S4 | Physical components | 24 |
| | 1S5 | Labview Théorique | 24 |
| | 1S6 | Modelization composants | 24 |
| S7- UE2 Plateforme développement | 1S7 | FPGA1 | 24 |
| | 1S8 | FPGA 2 | 24 |
| | 1E9 | Intermediate Python | 24 |
| S7-UE4 Architecture | 1S10 | Hardware architecture and functional analysis | 24 |
| | 1S11 | Hardware & IoT | 24 |
| | 1S12 | Real Time OS - RTOS | 24 |
| S7-UE5 | 1P1 | Technical project | 72 |
| S7-UE6 | 1A | Intermediate/ Advanced English | 30 |
| S7-UE7 | 1H | Human, economic and social sciences | 42 |

| EHE - S1 | | E Health | |
|---|---|---|---|
| Nomenclature | N° | Course | Hourly volume |
| S7-UE1 Computer science | 1E1 | Basic BDD | 24 |
| | 1E2 | Operating Systems / Linux shell | 24 |
| | 1E3 | Introduction to IA | 24 |
| S7-UE3 - Système software & Hardware | 1E4 | Prog. System | 24 |
| | 1E5 | Intermediate Network | 24 |
| | 1E6 | Information System Architure & UML | 24 |
| S7-UE2- Plateforme développement | 1E7 | Angular JS - Niv 1. | 24 |
| | 1E8 | Angular JS - Niv. 2 | 24 |
| | 1E9 | Intermediate Python | 24 |
| S7-UE4 Cloud deployment | 1E10 | Parallel computing | 24 |
| | 1E11 | SEO + GDPR (8h) | 24 |
| | 1E12 | Micro service déploiement cloud | 24 |
| S7-UE5 - Technical Project | 1P1 | Technical project | 72 |
| S7-UE6 - SHES | 1A | Intermediate/ Advanced English | 30 |
| S7-UE7 - Language | 1H | Human, economic and social sciences | 42 |

| BD - S2 | | Software Development, Big Data and Cloud Computing (BD) | |
|---|---|---|---|
| Nomenclature | N° | Course | Hourly volume |
| S8-UE1 plateforme mobile | 2E1 | Mobile application development | 40 |
| | 2E2 | Cross-platform mobile development | 32 |
| S8-UE2 Security | 2E4 | Introduction to security | 32 |
| | 2E5 | Dev Sec Ops | 24 |
| | 2E6 | Python & IA (Data science) | 16 |
| S8-UE3 - Technical Project | 2P1 | Technical Project & IA ToolBox | 72 |
| S8-UE4 Environnement | 2E7 | Java & Advanced Java | 24 |
| | 2E8 | Intermediate BDD (Oracle DBMS) | 24 |
| | 2E9 | C++ | 24 |
| S8-UE5 - Technical Project | 2P2 | Technical project + Conference Geostrategy | 72 |
| S8-UE6 - SHES | 1A | Intermediate/ Advanced English | 30 |
| S8 - UE7 - Language | 1H | Human, economic and social sciences | 42 |

| EMB - S2 | | Embedded Sytem (EMB) | |
|---|---|---|---|
| Nomenclature | N° | Course | Hourly volume |
| S8-UE1 plateforme mobile | 2S1 | Microcontroler & Sensor | 24 |
| | 2S2 | Microcontroler & Communication | 24 |
| | 2S3 | I/O - Analog Design & Signal conditioning | 24 |
| S8-UE2 Security | 2S4 | Security & IC | 24 |
| | 2S5 | Security & Architecture | 24 |
| | 2S6 | Security & Hardware | 24 |
| S8-UE3 - Technical Project | 2P1 | Technical Project | 72 |
| S8-UE4 Intergrated circuit | 2S7 | IC Design | 24 |
| | 2S8 | Mask Layout | 24 |
| | 2S9 | IC Application design | 24 |
| S8-UE5 | 2P2 | Technical project + Certification Labview | 72 |
| S8-UE6 | 1A | Intermediate/ Advanced English | 30 |
| S8-UE7 | 1H | Human, economic and social sciences | 42 |

| CYB - S2 | | Cyber Security | |
|---|---|---|---|
| Nomenclature | N° | Course | Hourly volume |
| S8-UE1 plateforme mobile | 2E1 | Mobile application development | 40 |
| | 2C2 | Mobile security | 32 |
| S8-UE2 Cryptographie | 2C4 | Cryptography | 40 |
| | 2S6 | Security & Hardware | 32 |
| S8-UE3 - Technical Project | 2P1 | Technical Project- 32h IoT Security - 40h | |
| S8-UE4 Infrastructure | 2C7 | Linux Security | 40 |
| | 2C8 | Supply chain - 32h | 32 |
| S8-UE5 - Technical Project | 2P2 | Technical project - 16h Network Security - 56h | 72 |
| S8-UE6 | 1A | Intermediate/ Advanced English | 30 |
| S8-UE7 | 1H | Human, economic and social sciences | 42 |

| IOT-S2 | | IOT | |
|---|---|---|---|
| Nomenclature | N° | Course | Hourly volume |
| S8-UE1 plateforme mobile | 2E1 | Mobile application development | 40 |
| | 2O2 | Apple software - Swift | 24 |
| | 2S3 | I/O - Analog Design & Signal conditioning | 24 |
| S8-UE2 Security | 2E4 | Introduction to security | 32 |
| | 2S5 | Security & Architecture | 24 |
| | 2S6 | Security & Hardware | 24 |
| S8-UE3 - Technical Project | 2P1 | Technical Project | 72 |
| S8-UE4 Environnement | 2E7 | Java & Advanced Java | 24 |
| | 2O8 | Prototypage | 24 |
| | 2E9 | C++ | 24 |
| S8-UE5 - Technical Project | 2P2 | Technical project | 72 |
| S8-UE6 | 1A | Intermediate/ Advanced English | 30 |
| S8-UE7 | 1H | Human, economic and social sciences | 42 |

| SMA - S2 | | Smart energy | |
|---|---|---|---|
| Nomenclature | N° | Course | Hourly volume |
| S8-UE1 plateforme mobile | 2S1 | Microcontroler & Sensor | 24 |
| | 2M2 | Linky enedis | 24 |
| | 2M3 | Electrical grid intro - Simulation part 1 | 24 |
| S8-UE2 Security | 2E4 | Introduction to security | 32 |
| | 2S5 | Security & Architecture | 24 |
| | 2E6 | Python & IA (Data science) | 16 |
| S8-UE3 - Technical Project | 2P1 | Technical Project | 72 |
| S8-UE4 Environnemen t | 2E7 | Java & Advanced Java | 24 |
| | 2O8 | Prototypage | 24 |
| | 2M9 | Autoconsomamtion ennedis | 24 |
| S8-UE5 - Technical Project | 2P2 | Technical project | 72 |
| S8-UE6 - SHES | 1A | Intermediate/ Advanced English | 30 |
| S8 - UE7 - Language | 1H | Human, economic and social sciences | 42 |

| IA - S2 | | Business Engineering | |
|---|---|---|---|
| Nomenclature | N° | Course | Hourly volume |
| S8-UE1 plateforme mobile | 2E1 | Mobile application development | 40 |
| | 2E2 | Cross-platform mobile development | 32 |
| S8-UE2 Data Scientist | 2A4 | Certification PMI | 24 |
| | 2E8 | Intermediate BDD (Oracle DBMS) | 24 |
| | 2E6 | Python & IA (Data science) | 16 |
| S8-UE3 - Technical Project | 2P1 | Technical Project | 72 |
| S8 - UE4 - Business Engineer | 2A7 | corporate career : Business Model | 24 |
| | 2A8 | corporate career : Human Ressources | 24 |
| | 2A9 | corporate career : Contrat & Responsibility | 24 |
| S8-UE5 - Technical Project | 2P2 | Technical project | 72 |
| S8-UE6 - SHES | 1A | Intermediate/ Advanced English | 30 |
| S8 - UE7 - Language | 1H | Human, economic and social sciences | 42 |

| ROB - S2 | | Robotics | |
|---|---|---|---|
| Nomenclature | N° | Course | Hourly volume |
| S8-UE1 plateforme mobile | 2S1 | Microcontroler & Sensor | 24 |
| | 2S2 | Microcontroler & Communication | 24 |
| | 2S3 | I/O - Analog Design & Signal conditioning | 24 |
| S8-UE2 Security | 2S4 | Security & IC | 24 |
| | 2S5 | Security & Architecture | 24 |
| | 2S6 | Security & Hardware | 24 |
| S8-UE3 - Technical Project | 2P1 | Technical Project | 72 |
| S8-UE4 Intergrated circuit | 2R7 | Automatic | 24 |
| | 2R8 | Mecanic | 24 |
| | 2E9 | C++ | 24 |
| S8-UE5 - Technical Project | 2P2 | Technical project | 72 |
| S8-UE6 - SHES | 1A | Intermediate/ Advanced English | 30 |
| S8 - UE7 - Language | 1H | Human, economic and social sciences | 42 |

| EHE - S2 | | E Health | |
|---|---|---|---|
| Nomenclature | N° | Course | Hourly volume |
| S8-UE1 plateforme mobile | 2E1 | Mobile application development | 40 |
| | 2E2 | Cross-platform mobile development | 32 |
| S8-UE2 DNB & e health 1 | 2H4 | Image Processing | 24 |
| | 2H5 | Tools for IA | 24 |
| | 2H6 | Python & IA | 24 |
| S8-UE3 - Technical Project | 2P1 | Technical Project | 72 |
| S8-UE4 DNB & e health 2 | 2H7 | Human biomechanics and bio-signals | 24 |
| | 2H8 | Neuroscience and Behavioural Analysis | 24 |
| | 2E9 | C++ | 24 |
| S8-UE5 - Technical Project | 2P2 | Technical project | 72 |
| S8-UE6 - SHES | 1A | Intermediate/ Advanced English | 30 |
| S8 - UE7 - Language | 1H | Human, economic and social sciences | 42 |

| BD -S3 | | Software Development, Big Data and Cloud Computing (BD) | |
|---|---|---|---|
| Nomenclature | N° | Course | Hourly volume |
| S9-UE1 Optimisation | 3E1 | NoSQL databases: Introduction, data modeling & implementation. | 24 |
| | 3E2 | HP Vertica & time-series databases | 24 |
| | 3E3 | Service Web - AWS | 24 |
| S9-UE2 -IA | 3E4 | Security & IA (SOC) | 36 |
| | 3E5 | IA & IBM Bluemix | 24 |
| S9-UE3 - Technical Project | 3P1 | Technical project | 72 |
| S9-UE4 Applied system | 3E7 | Data science, statistics, and analysis tools | 24 |
| | 3E8 | Clustering and Virtualization | 24 |
| | 3E9 | Applied Network | 24 |
| S9-UE5 - Technical Project | 3P2 | Technical project | 72 |
| S9 -UE6 - SHES | 1A | Intermediate/ Advanced English | 30 |
| S9 -UE7 - Language | 1H | Human, economic and social sciences | 42 |

| EMB -S3 | | Embedded Sytem (EMB) | |
|---|---|---|---|
| Nomenclature | N° | Course | Hourly volume |
| S9-UE1 Optimisation | 3S1 | Low Level développement (ST32 Optimisation) | 24 |
| | 3S2 | Embedded system Modelisation methodology | 24 |
| | 3S3 | Labview RT | 24 |
| S9-UE2 IA | 3S4 | Power managent (BMS, IA, Code) | 24 |
| | 3S5 | Design RF | 24 |
| | 3S6 | Embedded IA | 24 |
| S9-UE3 - Technical Project | 3P1 | IA & Technical Project | 72 |
| S9-UE4 Applied system | 3S7 | Engineering & Advanced operating system | 24 |
| | 3S8 | Bus terrain & robotic application | 24 |
| | 3S9 | Embedded Linux | 24 |
| S9-UE5 - Technical Project | 3P2 | Technical project | 72 |
| S9 -UE6 - SHES | 1A | Intermediate/ Advanced English | 30 |
| S9 -UE7 - Language | 1H | Human, economic and social sciences | 42 |

| CYB - S3 | | Cyber Security | |
|---|---|---|---|
| Nomenclature | N° | Course | Hourly volume |
| S9-UE1 Optimisation | 3S1 | Low Level développement | 40 |
| | 3C2 | Digital Investigation | 32 |
| S9-UE2 - Operational security | 3C4 | IA Security operation center (SOC) | 40 |
| | 3C5 | Cloud Security | 32 |
| S9-UE3 - Technical Project | 3P1 | Technical project | 72 |
| S9-UE4 Information system security management | 3C7 | Incidents Management (CSIRT) | 40 |
| | 3C8 | Information security system | 32 |
| S9-UE5 - Technical Project | 3P13 P2 | Technical project | 72 |
| S9 -UE6 - SHES | 1A | Intermediate/ Advanced English | 30 |
| S9 -UE7 - Language | 1H | Human, economic and social sciences | 42 |

| IOT-S3 | | IOT | |
|---|---|---|---|
| Nomenclature | N° | Course | Hourly volume |
| S9-UE1 Optimisation | 3E1 | NoSQL databases: Introduction, data modeling & | 24 |
| | 3E2 | HP Vertica & time-series databases | 24 |
| | 3E3 | Service Web - AWS | 24 |
| S9-UE2 IA | 3S4 | Power managent (BMS, IA, Code) | 24 |
| | 3S5 | Design RF | 24 |
| | 3S6 | Embedded IA | 24 |
| S9-UE3 - Technical Project | 3P1 | Technical project | 72 |
| S9-UE4 Applied system | 3O7 | ADS | 24 |
| | 3O8 | Metrology | 24 |
| | 3O9 | Telecom | 24 |
| S9-UE5 - Technical Project | 3P2 | Technical project | 72 |
| S9 -UE6 - SHES | 1A | Intermediate/ Advanced English | 30 |
| S9 -UE7 - Language | 1H | Human, economic and social sciences | 42 |

| SMA - S3 | | Smart energy | |
|---|---|---|---|
| Nomenclature | N° | Course | Hourly volume |
| S9-UE1 Optimisation | 3M1 | Microgrid | 24 |
| | 3M2 | Maintenance prédictive | 24 |
| | 3M3 | V2E Enedis | 24 |
| S9-UE2 IA | 3S4 | Power managent (BMS, IA, Code) | 24 |
| | 2M5 | Electrical grid intro - Simulation part 2 | 24 |
| | 3S6 | Embedded IA | 24 |
| S9-UE3 - Technical Project | 3P1 | Technical project | 72 |
| S9-UE4 Applied system | 3E7 | Data science, statistics, and analysis tools | 24 |
| | 3O8 | Metrology | 24 |
| | 3O9 | Telecom | 24 |
| S9-UE5 - Technical Project | 3P2 | Technical project | 72 |
| S9 -UE6 - SHES | 1A | Intermediate/ Advanced English | 30 |
| S9 -UE7 - Language | 1H | Human, economic and social sciences | 42 |

| IA - S3 | | Business Engineering | |
|---|---|---|---|
| Nomenclature | N° | Course | Hourly volume |
| S9-UE1 Optimisation | 3E1 | NoSQL databases: Introduction, data modeling & | 24 |
| | 3E2 | HP Vertica & time-series databases | 24 |
| | 3E3 | Service Web - AWS | 24 |
| S9-UE2 - Data Scientist Advanced | 3A4 | Management alternatif | 24 |
| | 3A5 | Customer Relation | 24 |
| | 3E6 | IA & IBM Bluemix | 24 |
| S9-UE3 - Technical Project | 3P1 | Technical project | 72 |
| S9-UE4 - Advanced Business Engineer | 3A7 | Lean Start up (8h) Innovation week (16h) | 24 |
| | 3A8 | Innovation week (32h) | 24 |
| | 3A9 | Python - Data science Level 2 | 24 |
| S8-UE5 - Technical Project | 3P2 | Technical project | 72 |
| S8-UE6 - SHES | 1A | Intermediate/ Advanced English | 30 |
| S8 - UE7 - Language | 1H | Human, economic and social sciences | 42 |

| ROB - S3 | | Robotics | |
|---|---|---|---|
| Nomenclature | N° | Course | Hourly volume |
| S9 - UE1 / UE7 | University Program - Double Diploma | | |

| EHE - S3 | | E Health | |
|---|---|---|---|
| Nomenclature | N° | Course | Hourly volume |
| S9-UE1 DNB & e health 3 | 3H1 | Patient protection legislation | 24 |
| | 3H2 | Medical Imaging | 24 |
| | 3H3 | Computer vision and pattern recognition | 24 |
| S9-UE2 -IA | 3E5 | Security & IA (SOC) | 36 |
| | 3E6 | IA & IBM Bluemix | 24 |
| S9-UE3 - Technical Project | 3P1 | Technical project | 72 |
| S9-UE4 DNB & e health 4 | 3H7 | Intelligent medical devices | 24 |
| | 3H8 | Learning Machine for Biomedical | 24 |
| | 3H9 | Deep learning for biomedical | 24 |
| S8-UE5 - Technical Project | 3P2 | Technical project | 72 |
| S8-UE6 - SHES | 1A | Intermediate/ Advanced English | 30 |
| S8 - UE7 - Language | 1H | Human, economic and social sciences | 42 |

# 2020-2021 Master Cycle Program -

Tableau 1

| BD - S1 | BD | EMB | CYB | IOT | SMART | IA | ROB | E-HEA |
|---|---|---|---|---|---|---|---|---|
| Nomenclature | N° | N° | N° | N° | N° | N° | N° | N° |
| S7-UE1 Computer science | 1E1 | 1E1 | 1E1 | 1E1 | 1E1 | 1E1 | 1E1 | 1E1 |
| | 1E2 | 1E2 | 1E2 | 1E2 | 1E2 | 1E2 | 1E2 | 1E2 |
| | 1E3 | 1E3 | 1E3 | 1E3 | 1E3 | 1E3 | 1E3 | 1E3 |
| S7-UE3 - Système software & Hardware | 1E4 | 1S4 | 1E4 | 1E4 | 1E4 | 1E4 | 1S4 | 1E4 |
| | 1E5 | 1S5 | 1E5 | 1E5 | 1E5 | 1A5 | 1S5 | 1E5 |
| | 1E6 | 1S6 | 1E6 | 1E6 | 1E6 | 1E6 | 1S6 | 1E6 |
| S7-UE2- Plateforme développement | 1E7 | 1S7 | 1E7 | 1E7 | 1E7 | 1E7 | 1S7 | 1E7 |
| | 1E8 | 1S8 | 1E8 | 1E8 | 1E8 | 1E8 | 1S8 | 1E8 |
| | 1E9 | 1E9 | 1C9 | 1E9 | 1E9 | 1E9 | 1E9 | 1E9 |
| S7-UE4 Cloud deployment | 1E10 | 1S10 | 1E10 | 1S10 | 1M10 | 1A10 | 1S10 | 1E10 |
| | 1E11 | 1S11 | 1C11 | 1S11 | 1S11 | 1E11 | 1S11 | 1E11 |
| | 1E12 | 1S12 | 1C12 | 1S12 | 1S12 | 1A12 | 1S12 | 1E12 |
| S7-UE5 - Technical Project | 1P1 | 1P1 | 1P1 | 1P1 | 1P1 | 1P1 | 1P1 | 1P1 |
| S7-UE6 - SHES | 1A | 1A | 1A | 1A | 1A | 1A | 1A | 1A |
| S7-UE7 - Language | 1H | 1H | 1H | 1H | 1H | 1H | 1H | 1H |

| BD - S1 | BD | EMB | CYB | IOT | SMART | IA | ROB | E-HEA |
|---|---|---|---|---|---|---|---|---|
| Nomenclature | N° | N° | N° | N° | N° | N° | N° | N° |
| S8-UE1 plateforme mobile | 2E1 | 2S1 | 2E1 | 2E1 | 2S1 | 2E1 | 2S1 | 2E1 |
| | 2E2 | 2S2 | 2C2 | 2O2 | 2M2 | 2E2 | 2S2 | 2E2 |
| | | 2S3 | | 2S3 | 2M3 | | 2S3 | |
| S8-UE2 Security | 2E4 | 2S4 | 2C4 | 2E4 | 2E4 | 2A4 | 2S4 | 2H4 |
| | 2E5 | 2S5 | 2S6 | 2S5 | 2S5 | 2E8 | 2S5 | 2H5 |
| | 2E6 | 2S6 | | 2S6 | 2E6 | 2E6 | 2S6 | 2H6 |
| S8-UE3 - Technical Project | 2P1 | 2P1 | 2P1 | 2P1 | 2P1 | 2P1 | 2P1 | 2P1 |
| S8-UE4 Environnement | 2E7 | 2S7 | 2C7 | 2E7 | 2E7 | 2A7 | 2R7 | 2H7 |
| | 2E8 | 2S8 | 2C8 | 2O8 | 2O8 | 2A8 | 2R8 | 2H8 |
| | 2E9 | 2S9 | | 2E9 | 2M9 | 2A9 | 2E9 | 2E9 |
| S8-UE5 - Technical Project | 2P2 | 2P2 | 2P2 | 2P2 | 2P2 | 2P2 | 2P2 | 2P2 |
| S8-UE6 - SHES | 1A | 1A | 1A | 1A | 1A | 1A | 1A | 1A |
| S8 - UE7 - Language | 1H | 1H | 1H | 1H | 1H | 1H | 1H | 1H |

| BD - S1 | BD | EMB | CYB | IOT | SMART | IA | ROB | E-HEA |
|---|---|---|---|---|---|---|---|---|
| Nomenclature | N° | N° | N° | N° | N° | N° | N° | N° |
| S9-UE1 Optimisation | 3E1 | 3S1 | 3S1 | 3E1 | 3M1 | 3E1 | University Program - Double Diploma | 3H1 |
| | 3E2 | 3S2 | 3C2 | 3E2 | 3M2 | 3E2 | | 3H2 |
| | 3E3 | 3S3 | | 3E3 | 3M3 | 3E3 | | 3H3 |
| S9-UE2 -IA | 3E5 | 3S4 | 3C4 | 3S4 | 3S4 | 3A4 | | 3E5 |
| | | 3S5 | | 3S5 | 2M5 | 3A5 | | |
| | 3E6 | 3S6 | 3C5 | 3S6 | 3S6 | 3E6 | | 3E6 |
| S9-UE3 - Technical Project | 3P1 | 3P1 | 3P1 | 3P1 | 3P1 | 3P1 | | 3P1 |
| S9-UE4 Applied system | 3E7 | 3S7 | 3C7 | 3O7 | 3E7 | 3A7 | | 3H7 |
| | 3E8 | 3S8 | 3C8 | 3O8 | 3O8 | 3A8 | | 3H8 |
| | 3E9 | 3S9 | | 3O9 | 3O9 | 3A9 | | 3H9 |
| S9-UE5 - Technical Project | 3P2 | 3P2 | 3P13 P2 | 3P2 | 3P2 | 3P2 | | 3P2 |
| S9 -UE6 - SHES | 1A | 1A | 1A | 1A | 1A | 1A | | 1A |
| S9 -UE7 - Language | 1H | 1H | 1H | 1H | 1H | 1H | | 1H |

| Cursus | Semester | Course code | Course title | Titre FR | Keywords | Hourly volume | ECTS | Course type | Summary | Objectives | Prior knowledge | Assessment | Learning outcomes | Doc. language | Teach. language | Complementary information |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Master 1 - Semestre 1 - FALL | | | | | | | | | | | | | | | | |
| Master 1 | S1 (Fall) | 1E1 | Basis databases BDD | Bases de données relationnelles | database, relational, management system | 24 | 5/3 | Lecture 4h<br>Lab 20h | This lecture pursues the introduction to databases seen in third year. It begins with some recalls on the SQL language, presents new | Learning medium to advanced knowledge on relational databases | Linux shell, databases and SQL language basics, basics on relational model | MCQ each week, and written test at the end | use of database server, SQL operators, embedded programming on a database server | English | English | none |
| Master 1 | S1 (Fall) | 1E2 | Linux shell | Systèmes d'exploitation (Shell) | kernel, shell, bash, scripting | 24 | 5/3 | Lab 24h | This lecture pursues the introduction to Linux shell seen in third year. Practical class is realized under Linux. | Learning medium to advanced knowledge on Linux shell | Fundamentals on Linux. | Written test. | Knowledge on Linux shell and bash scripting | French & English | English | none |
| Master 1 | S1 (Fall) | 1E6 | AI and neural networks | Réseaux de neurones / Intelligence Artificielle | neural networks, AI, automated learning, logical reasoning | 24 | 5/3 | Lecture 10h<br>Lab 14h | This lectures is an introduction to artificial intelligence, neural networks, automated learning, hybrid computation | Learning fundamental knowledge on neural networks and machine learning. | Fundamentals on programming languages and data structures. | Written test. | Knowledge on the most widely use theoretical and practical machine learning structures. | English | English | none |
| Master 1 | S1 (Fall) | 1E4 | System programming | Programmation système | operating system, services, kernel, shell | 24 | 5/3 | Lecture 4h Lab 20h | This lecture pursues the introduction to operating systems seen in third year. Practical class is realized under Linux. | Learning medium to advanced knowledge on operating systems | Fundamentals on operating systems. | Written test. | Knowledge on operating systems | french and english | English | none |
| Master 1 | S1 (Fall) | 1E5 | Intermediate Network | Réseau - Intermédiaire | network | 24 | 5/3 | Lab 24h | This lecture pursues the introduction to networks seen in third year. | Learning medium to advanced knowledge on networks | Fundamentals on networking. | Test on a computer, using Packet Tracer Software. | Network advanced | English | English | none |
| Master 1 | S1 (Fall) | 1E6 | UML | UML | object-oriented programming, UML, modelling, classes, diagrams | 24 | 5/3 | Lab 24h | This lecture presents the use of UML modelling language for object-oriented programming: use cases diagrams, class diagrams, and | Learning fundamentals and medium knowledge on UML formalism. | Fundamentals on object-oriented programming, basics on Java language. | Written test. | Knowledge on UML and object-oriented modelling. | French & English | English | none |
| Master 1 | S1 (Fall) | 1E7 | Advanced HTML5 | HTML5 | HTML5, CSS3, JavaScript | 24 | 5/3 | Lecture 8h<br>Lab 16h | This lecture presents advanced capabilities provided by HTML5 and JavaScript (Websockets, workers API, geolocation | Learning medium to advanced knowledge on HTML5, CSS3 and JavaScript | Fundamentals on HTML5, CSS3, JavaScript. | Lab work. | Knowledge on Web technologies | English | English | none |
| Master 1 | S1 (Fall) | 1E8 | Advanced JavaScript and PHP | Javascript avancée (AngularJS, NodeJS) | AngularJS, NodeJS, jQuery | 24 | 5/3 | Lecture 8h<br>Lab 16h | This lecture presents widely used JavaScript libraries like AngularJS, NodeJS or jQuery. The purpose is to undestand the architecture of Web | Learning medium to advanced knowledge on well-known JavaScript libraries | Fundamentals on HTML5, CSS3, JavaScript. | Lab work. | Knowledge on Web technologies | English | English | none |
| Master 1 | S1 (Fall) | 1E9 | Server-side programming with Python | Programmation dynamique coté serveur (PHP, Python) | python, django | 24 | 5/3 | Lecture 16h<br>Lab 8h | This lecture introduces student to general programming with Python 3. Although most of them know the basics of Python, this | Learnin beginner to medum knowledge with Python | Linux shell, databases, OOP, basic HTML, coding editor or IDE | Written test at the end | Python programming, good practices, Python landscape overview | English | English | none |
| Master 1 | S1 (Fall) | 1E10 | Parallel computing | Techniques de parallélisation | parallelism, threading, hardware, algorithmics | 24 | 5/3 | Lecture 10h<br>Lab 14h | This lecture is a presentation of most of the well-known techniques used for parallelizing algorithms execution, and the | Learning medium to advanced knowledge on multi-threaded programming, vectorization of code, and hardware | Fundamentals on operating systems, C language, oriented-object programming, and computer components like CPU and | Written test. | Knowledge on methods to apply for parallelizing computations. | French & English | English | none |
| Master 1 | S1 (Fall) | 1E11 | Search Engine Optimization | Moteurs de recherche (SEO) | seo, web, crawler, google, page rank, ranking, keywords, web page | 24 | 5/3 | Lecture 8h<br>Lab 16h | This lecture is an introduction to Search Engine Optimization techniques. It presents the methods of the most widely used web | Learning beginner to medum knowledge about SEO. | Web technologies (HTML5, JavaScript). Web clients (browsers) and servers (Apache). | MCQ, team project. | Knowledge on SEO techniques. | French & English | English | none |
| Master 1 | S1 (Fall) | 1E12 | Micro- service deploiement cloud | Micro-service | Micro-service, Cloud, Rest, Docker, Kubernetes | 24 | 5/3 | Lab 24h | This lecture presents the basics and medium principles of micro-service deployment cloud. | Learning fundamentals and medium knowledge on micro-service. | Fundamentals on programming languages and algorithms. | Written test. | Knowledge on the principles of micro-service solution and most widely used tools. | French & English | English | none |
| Master 1 | S1 (Fall) | 1P1 | Technical project | Projet technique | Microcontroler, IC, Analog Design, System & Application | 72 | 5 | Lab 72h | This course consists in a technical project that students must carry on with the help of their tutor. | Problem Solving experience | none | Lab work. | Problem solving, electronics, informatics | French & English | French & English | none |
| Master 1 | S1 (Fall) | 1A | Intermediate English | Anglais (niv. intermédiaire) | English | 32 | 2 | | Acquisition and application of everyday language elements, using the book FCE Practice Test Plus 2 from Pearson. Training in reading various | At the end of this module, the student will have reached level B2 on the Common European Framework of Reference (CEFR) for | Being to sit the Cambridge First Certificate in English. | Written & Speaking | CECR B2 level | English | English | CECR B1 level |
| Master 1 | S1 (Fall) | 1H | Human, economic and social sciences | Sciences humaines économiques et sociales | | 40 | 3 | | | | | | | | | |
| Master 1 - Semestre 2 - SPRING | | | | | | | | | | | | | | | | |
| Master 1 | S2 (Spring) | 2E1 | Native mobile development - 1 | Développement mobile natif sur Android | android, native, application, mobile | 40 | 2,5 | Lecture 8h<br>Lab 24h | Learn the fundamentals and the methods used to develop native mobile application for Android operating system. The lecture will show how an | Learning fundamentals, medium and advanced knowledge on mobile development. | Linux, Java language, algorithmics. | Team project. | Knowledge on how to develop a mobile application. | French & English | French & English | none |
| Master 1 | S2 (Spring) | 2E2 | Native mobile development - 2 | Développement mobile multi-plateforme | Ionic, android, java, mobile phone | 32 | 2,5 | Lecture 8h<br>Lab 32h | Learn the fundamentals and the methods used to develop native mobile application for Android operating system. The lecture will show how an | Learning fundamentals, medium and advanced knowledge on cross-platform mobile development. | Linux shell, algorithmics. | Team project. | Knowledge on how to develop a mobile application. | French & English | French & English | none |
| Master 1 | S1 (Fall) | 2E4 | Introduction to security | Sécurité institutionnelle | security, hacking, threats, authentication, software flaws, prevention and detection systems | 24 | 5/3 | Lecture 4h<br>Lab 20h | This lecture is an introduction to systems security, including the presentation of legal environment, auditing | Learning fundamental to medium knowledge on how to secure an operating system or an application. | Fundamentals on operating systems, Linux shell, programming languages and algorithms, and virtual machines | MCQ test. | Knowledge on the fundamental principles about securing codes and systems. | French & English | English | none |
| Master 1 | S2 (Spring) | 2C1 | JEE | JEE | Java, JEE, application server, beans, Jakarta | 24 | 5/3 | Lecture 10h<br>Lab 30h | This course aims at discovering the Java Enterprise Edition platform (Java EE) and to put into practice its various | Learning beginner to medum knowledge about JavaEE. | Java language, algorithmics, Web technologies. | MCQ each week, lab work and written test at the end. | Knowledge on JEE application development. | French & English | French & English | none |
| Master 1 | S2 (Spring) | 2E8 | Python for data science | Python pour data science | Python, big data, analysis, data sets | 24 | 5/3 | Lecture 8h<br>Lab 16h | The goal of this lecture is to learn how to analize big data sets using Python language : with tools like Jupyter, Numpy, Pandas, scikit and | Learning fundamentals and medium knowledge on data analysis with Python. | Basics of Python language. | Lab work and written test. | Knowledge on how to analyze big data sets using Python. | French & English | French & English | none |
| Master 1 | S2 (Spring) | 2P1 | Technical project | Projet technique | Microcontroler, IC, Analog Design, System & Application | 72 | 5 | Lab 8h | This course consists in a technical project that students must carry on with the help of their tutor. | Problem Solving experience | none | Lab work. | Problem solving, electronics, informatics | French & English | French & English | none |
| Master 1 | S1 (Fall) | 2E7 | Advanced JavaScript and PHP | Javascript avancée (AngularJS, NodeJS) | AngularJS, NodeJS, jQuery | 24 | 5/3 | Lecture/lab | This lecture presents widely used JavaScript libraries like AngularJS, NodeJS or jQuery. The purpose is to undestand the architecture of Web | Learning medium to advanced knowledge on well-known JavaScript libraries | Fundamentals on HTML5, CSS3, JavaScript. | Lab work. | Knowledge on Web technologies | French & English | French & English | none |
| Master 1 | S2 (Spring) | 2E8 | Oracle DBMS | BDD Oracle | database, relational, management system, tuning, client application | 24 | 5/3 | Lecture 8h<br>Lab 16h | This lecture is a presentation of the famous Oracle DBMS, widely used in many companies. In its first part, it presents the architecture of | Learning beginner to medum knowledge about Oracle databases. | Linux shell, fundamentals of SQL. | Written test. | Knowledge on Oracle DBMS architecture and usage. | French & English | French & English | none |
| Master 1 | S2 (Spring) | 2E9 | Advanced programming with C++ | Programmation avancée C++ | C++, programming, design patterns | 24 | 5/3 | Lecture 8h<br>Lab 16h | This course presents to programmers the main differences between JAVA and C ++ and approaches some advanced | Learning medium to advanced knowledge on C++ and design patterns. | C language, procedural programming, bascis of object-oriented programming. | Written test. | Knowledge on how to design an application in C++ following the most well know design patterns. | French & English | French & English | none |
| Master 1 | S2 (Spring) | 2P2 | Technical project | Projet technique | Microcontroler, IC, Analog Design, System & Application | 72 | 5 | Lab 72h | This course consists in a technical project that students must carry on with the help of their tutor. | Problem Solving experience | none | Lab work. | Problem solving, electronics, informatics | French & English | French & English | none |
| Master 1 | S2 (Spring) | 2A | Intermediate English | Anglais (niv. intermédiaire) | English | 32 | 2 | | Acquisition and application of everyday language elements, using the book FCE Practice | At the end of this module, the student will have reached level B2 on the Common | Being to sit the Cambridge First Certificate in English. | Written & Speaking | CECR B2 level | English | English | CECR B1 level |
| Master 1 | S2 (Spring) | 2H | Human, economic and social sciences | SHES | | 40 | 3 | | | | | | | | | |
| Master 2 - Semestre 1 - FALL | | | | | | | | | | | | | | | | |
| Master 3 | S1 (Fall) | 3E1 | NoSQL databases: presentation, data modelling, and implementation. | Présentation générale, Modèles de données et utilisation de BDD NoSQL | NoSQL, NewSQL, document oriented, query languages, graph oriented, peer to peer, client, server, load balancing | 24 | 5/3 | Lecture 8h<br>Lab 16h | This course presents to programmers the NoSQL and NewSQL databases.<br>At the end of this course, the participants will | Learning medium to advanced knowledge on non-relational storage systems. | Fundamentals on relational databases, UNIX shell, and C language. | Team project. | Knowledge on how to set-up and run a non relational database. | French & English | French & English | none |
| Master 3 | S1 (Fall) | 3E2 | HP Vertica and time-series databases | Formations HP Vertica et BDD de séries temporelles | Vertica, Big Data, time-series, analysis | 24 | 5/3 | Lecture 4h<br>Lab 4h | This course presents Vertica storage system from Hewlett-Packard.<br>At the end of this course, the participants will | Learning basic to medium knowledge on HP Vertica. | Fundamentals on relational databases and Big Data. | Team project, MCQ. | Knowledge on the characteristics of HP Vertica, its analytical and administration functions. | French & English | French & English | none |
| Master 3 | S1 (Fall) | 3E3 | Service Web | AWS - Service Web | Web, AWS, Certification | 24 | 5/3 | Lab 24h | This course presents Amazon service, AWS Certification | AWS Certification | Fundamentals on Big Data. | Lab Work & Examination | Certification valorisation | French & English | French & English | none |
| Master 3 | S1 (Fall) | 3E4 | Security on distributed and cloud architectures | Sécurité des systèmes répartis et des architectures cloud | security, auditing, applications, databases, operating systems | 36 | 5/2 | Lecture 4h<br>Lab 20h | This lecture pursues the "Security" module of preceding year, looking at more complex security standards, hardware and | Learning medium to advanced knowledge on security risks, policies, threats and ways of response. | Fundamentals on networking, operating systems, Web technologies and shell. | MCQ, lab work. | Medium to advanced knowledge on how to secure an application (distributed or not), and how to respond to an attack or a potential | French & English | French & English | none |
| Master 3 | S1 (Fall) | 3E5 | IA & IBM Bluemix | Plateforme IBM Bluemix | cloud computing, IBM, Bluemix, watson, AI | 24 | 5/2 | Lecture 4h<br>Lab 12h | This lecture is a discovery of the IBM cloud platform through examples of Web development, using an account on IBM Bluemix | Learning medium to advanced knowledge on IBM Bluemix. | Fundamentals on networking, operating systems, Web technologies and shell. | Lab work, team project. | Knowledge on how to develop an application based on cloud services. | French & English | French & English | none |
| Master 3 | S1 (Fall) | 3P3 | Technical project | Projet technique | Microcontroler, IC, Analog Design, System & Application | 72 | 2,5 | Lab 72h | This course consists in a technical project that students must carry on with the help of their tutor. | Problem Solving experience | none | Lab work. | Problem solving, electronics, informatics | French & English | French & English | none |
| Master 3 | S1 (Fall) | 3E7 | Data science, statistics, and analysis tools | Data science, statistiques, et outils d'analyse (Predicsis, Splunk) | Hadoop, analysis, predictions | 24 | 2/1 | Lecture 8h<br>Lab 16h | This course targets students with experience in any programming language (functional or object-oriented) who want to | Learning medium to advanced knowledge on Big Data analysis tools. | Fundamentals on databases and Big Data. | Team project, MCQ. | Design a Big Data solution, import datasets, know how to do ETL, evaluate the quality of imported data. | French & English | French & English | none |
| Master 3 | S1 (Fall) | 3E8 | Clustering and virtualization | Virtualisation et clustering | virtualization, docker, kubernetes | 24 | 5/3 | Lecture 8h<br>Lab 16h | This lecture presents virtualization and IaaS (hands-on Openstack): students will learn what is virtualization, the various | Learning medium to advanced knowledge on hypervisors. | Fundamentals on networking, operating systems, and shell. | Lab work. | Knowledge on how to set-up and manage an hypervised architecture. | French & English | French & English | none |
| Master 3 | S1 (Fall) | 3E9 | Applied Network | Réseau application | network | 24 | 5/3 | Lab 24h | This lecture pursues the introduction to networks seen in the fourth year. | Learning advanced to applied knowledge on networks | Fundamentals on networking. | Test on a computer, using Packet Tracer Software. | Network advanced | English | English | none |
| Master 3 | S1 (Fall) | 3A | Technical project | Projet technique | Microcontroler, IC, Analog Design, System & Application | 72 | 5 | Lab 72h | This course consists in a technical project that students must carry on with the help of their tutor. | Problem Solving experience | none | Lab work. | Problem solving, electronics, informatics | French & English | French & English | none |
| Master 3 | S1 (Fall) | 3H | Advanced English | Anglais (niv. avancé) | English | 32 | 2 | | Acquisition and application of everyday language elements, using the book FCE Practice Test Plus 2 from Pearson. Training in reading various | At the end of this module, the student will have reached level C1 on the Common European Framework of Reference (CEFR) for | | Written & Speaking | CECR C1 level | English | English | CECR B2 level |
| Master 3 | S1 (Fall) | 3H | Human, economic and social sciences | SHES | | 40 | 3 | | | | | | | | | |

| Cursus | Semester | Course code | Course title | Titre FR | Keywords | Hourly volume | ECTS | Course type | Summary | Objectives | Prior knowledge | Assessment | Learning outcomes | Doc. language | Teach. language | Complementary information |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Master 1 - Semestre 1 - FALL | | | | | | | | | | | | | | | | |
| Master 1 | S1 (Fall) | 1E1 | Basis databases BDD | Bases de données relationnelles | database, relational, management system | 24 | 5/3 | Lecture 4h<br>Lab 20h | This lecture pursues the introduction to databases seen in third year. It begins with some recalls on the SQL language, presents new | Learning medium to advanced knowledge on relational databases | Linux shell, databases and SQL language basics, basics on relational model | MCQ each week, and written test at the end | use of database server, SQL operators, embedded programming on a database server | English | English | none |
| Master 1 | S1 (Fall) | 1E2 | Linux shell | Systèmes d'exploitation (Shell) | kernel, shell, bash, scripting | 24 | 5/3 | Lab 24h | This lecture pursues the introduction to Linux shell seen in third year. Practical class is realized under Linux. | Learning medium to advanced knowledge on Linux shell | Fundamentals on Linux. | Written test. | Knowledge on Linux shell and bash scripting | French & English | English | none |
| Master 1 | S1 (Fall) | 1E6 | AI and neural networks | Réseaux de neurones / Intelligence Artificielle | neural networks, AI, automated learning, logical reasoning | 24 | 5/3 | Lecture 10h<br>Lab 14h | This lectures is an introduction to artificial intelligence, neural networks, automated learning, hybrid computation | Learning fundamental knowledge on neural networks and machine learning. | Fundamentals on programming languages and data structures. | Written test. | Knowledge on the most widely use theoretical and practical machine learning structures. | English | English | none |
| Master 1 | S1 (Fall) | 1S4 | Physics of solids, semiconductors & devices | Physique du composant | Atoms, Solids, Band structure, Crystallography, Semiconductors, electrons & holes, space charge layer, PN junction | 24 | 5/3 | Lecture 12h<br>Tutorial 12h | Starting from the electronic structure of atoms and molecules, we study the properties of solids from their electronic band | - Basics in Physics of Solids<br>- Understanding of the interest of semiconductors in the realization of electronic components | Basic quantum physics | Written test. | Understanding of the physics phenomena leading to currents in devices, the way to control them and basic calculations of currents in | English | English | Bibliography<br>[1] Physics of semiconductor devices, S.M.SZE, John Wiley & Sons (1981)<br>[2] D.K. SCHRODER : |
| Master 1 | S1 (Fall) | 1S5 | Labview (Theoretical) | Labview Théorique | LabVIEW, Naional Instrument | 24 | 5/3 | Lecture and Lab | This lectures presents the basics of LabVIEW programming by introducing the way the language works and how it is used by | Learn how LabVIEW works, and get basic knowledge to prepare for CLAD certification | Basics in Informatics | MCQ | Labview programming theory | French & English | English | none |
| Master 1 | S1 (Fall) | 1S6 | Conception of Digital circuits: From semiconductors to Integrated Circuits | Conception de circuits digitaux | Semiconductors, Integrated Resistance, MOS Capacitance, MOSFET, CMOS cells, FDSOI node | 24 | 5/3 | Lecture and tutorial | This courses begins with a thorough review of actual digital circuits with a short history of circuit integration. Its goal is to develop a | - Knowledge of basic elements and components for the design of integrated circuits, focusing on the tradeoff between | Physics of semiconductors, Basics from electrostatics, Family Components, logic operation | Written test. | Know how to use proper modeling based on a degree of accuracy for a digital MOS circuit design application | English | English | Information for visiting students:<br>Calculate the basic parameters for resistance, capacitance and p-channel |
| Master 1 | S1 (Fall) | 1S7 | FPGA1 | FPGA1 | FPGA | 24 | 5/3 | Tutorial | - To Understand the design process for implementing a digital design onto a FPGA<br>- VHDL Programmation - Step I | Getting started with the FPGA and realization of different functional structures in VHDL language | VHDL | Written test | FPGA level 1 and VHDL coding | English | English | Download Vivado (required for using BASYS 3 board)<br><br>Bibliography<br>FPGA Design: Best Practices |
| Master 1 | S1 (Fall) | 1S8 | FPGA 2 | FPGA 2 | FPGA, VHDL, Cryptography | 24 | 5/3 | Tutorial | Introduction of cryptography solutions (AES, DES, ….)<br>Cryptographic Applications using FPGA Technology<br>FPGA Implementation of AES | Using FPGA, on an cryptographic application | FPGA1 | Written test | FPGA level 2 and cryptographie application (AES) | English | English | Download Vivado (required for using BASYS 3 board)<br><br>Bibliography<br>FPGA Design: Best Practices |
| Master 1 | S1 (Fall) | 1E9 | Server-side programming with Python | Programmation dynamique coté serveur (PHP, Python) | python, django | 24 | 5/3 | Lecture 16h<br>Lab 8h | This lecture introduces student to general programming with Python 3. Although most of them know the basics of Python, this | Learnin beginner to medum knowledge with Python | Linux shell, databases, OOP, basic HTML, coding editor or IDE | Written test at the end | Python programming, good practices, Python landscape overview | English | English | none |
| Master 1 | S1 (Fall) | 1S10 | Hardware architecture and functional analysis | Analyse fonctionnelle hardware | Processor, ARM, architecture | 24 | 1,5 | Lecture | This lecture introduces the industrial design of processors by describing the ARM architecture | Learn how ARM processors work and how they are designed | Digital electronics, architecture | Writtent test | ARM architecture | french and english | English | none |
| Master 1 | S1 (Fall) | 1S11 | Hardware & software architecture for IoT | Architecture hardware orientée IoT | low level and high level architecture | 24h | 5/3 | Lecture<br>Tutorial | Sensors overview<br>Main wired communication protocol<br>Power consumption<br>Processing | -Having an wide overview to hardware and software constraints in IoT application<br>- Present a Benchmark of the main sensors/ MCU/ software | Basics in physics, electronics and computer science | Written test | | Englisih | English | |
| Master 1 | S1 (Fall) | 1S12 | RTOS | RTOS | Real Time Operating System, microcontroller, Embedded System | 24 | 5/3 | Lecture/Lab | This lecture is focused on Real Time Operating System for microcontroller. The students will implement FreeRTOS and exploit the | Learning fundamental of an RTOS | Programming C, MCU | Lab Work | RTOS experience, MCU experience | French & English | English | none |
| Master 1 | S1 (Fall) | 1S13 | Labview - Practice | Labview pratique | Labview Software | 24 | 5/3 | Tutorial | Labview Fondamental 1 - Exercices<br>- Labview Navigation<br>- Identification of problems and development of VIs | Getting started with Labview Software | Labview - Theory | Written test | Direct implementation of the theoretical Labview course | French & English | English | Information for visiting students:<br>Download Labview software http://www.ni.com/white-paper/13413/en |
| Master 1 | S1 (Fall) | 1S14 | Labview FPGA | Labview - FPGA | Labview Software, FGPA | 24 | 5/3 | Tutorial | First LabVIEW FPGA Writing Program<br>Implementing Counters in LabVIEW FPGA<br>Using analog inputs and | To be able to realize an elementary functionality by using Labview FPGA… | Labview - Theory & Practice<br>FPGA1 & FPGA2 | Written test | Using the FPGA with an Labview Approach | English | English | Information for visiting students:<br>To know Labview software<br>To already have downloaded Labview software (classical & |
| Master 1 | S1 (Fall) | 1S15 | Labview - Certification | Labview Certification | Labview Software certification | 24 | 5/3 | Tutorial | Preparation of Labview Certification - CLAD | CLAD Certification | Labview - Theory<br>Labview - Practice | Written test | Certification Labview | French & English | English | Download Labview software http://www.ni.com/white-paper/13413/en<br><br>Bibliography |
| Master 1 | S1 (Fall) | 1A | Intermediate English | Anglais (niv. intermédiaire) | English | 32 | 2 | | Acquisition and application of everyday language elements, using the book FCE Practice Test Plus 2 from Pearson. Training in reading various | At the end of this module, the student will have reached level B2 on the Common European Framework of Reference (CEFR) for | Being to sit the Cambridge First Certificate in English. | Written & Speaking | CECR B2 level | English | English | CECR B1 level |
| Master 1 | S1 (Fall) | 1H | Human, economic and social sciences | Sciences humaines économiques et sociales | | 40 | 3 | | | | | | | | | |
| Master 1 - Semestre 2 - SPRING | | | | | | | | | | | | | | | | |
| Master 1 | S2 (Spring) | 2S1 | STM32 & Sensor Application | STM32 & Application Capteur | STM32, Programmation, Sensor | 24 | 5/3 | Lecture | This lecture consists in developing the experience of the students on microcontroleur. It addresses the use of GPIO, Interruption | Learn how to program a microcontroller of 32 bits | Basic knowledge on microntrollers | Lab work | Microntrollers programming | French & English | French | none |
| Master 1 | S2 (Spring) | 2S2 | STM32 & Communication Application | STM32 & Application Communication | STM32, Communication | 24 | 5/3 | Tutorial | This lecture presents most used communications protocols as SPI, UART? I2C for STM32 | Learn how to program a communication protocole on microcontroller of 32 bits | Basic knowledge on microntrollers | Lab work | Microntrollers programming<br>Communication protocols knowledge | French & English | French | none |
| Master 1 | S1 (Fall) | 1S3 | Circuit Design | Conception analogique (filtrage, etc..) | Analog Design, Feedback effect, Filter | 24 | 5/3 | Lecture 8h<br>Tutorial 16h | Getting start on Eagle software II<br>- Reminder of important notions<br>- Be able to realize a circuit | - Become familiar with the use of the softwares MultiSim (NI) Eagle<br><br>- Learn the advantages & | Getting start Eagle software I,<br>Concept of circuit design in analog and digital electronics (Electronics I, Logic I) | Written test. | Being able to realize an analog circuit responding to a given application | English | English | Bibliography<br>https://www.autodesk.com/products/eagle/overview<br>https://www.autodesk.com/products/eagle/free- |
| Master 1 | S2 (Spring) | 2S4 | Security & IC | Sécurisation des systèmes embarqués | Architecture & security introduction | 24 | 5/3 | Lecture | Security Cryptography, Smart Card architecture, Attack method but this course is nott A course on cryptography, hacking guide | Learn how to design & analyze a power electronics circuit to fulfill the recommendations | Fundamentals un electronics | Written test | Introduction of IC design & security | English | English / French | none |
| Master 1 | S2 (Spring) | 2S5 | Architecture & Security | Archi & sécurisation | Architecture, Security | 24 | 5/3 | Lecture | Security Cryptography, Smart Card architecture, Attack method but this course is nott A course on cryptography, hacking guide | To place the Smart Card in its context To evidence its added-value in securing a systemTo identify its functional and security | STM32 Programmation | Lab work | Understand that security & design should be realized at the same time | English | French | none |
| Master 1 | S2 (Spring) | 2S6 | Market & Hacking | Marché & Hacking | Hacker & Solution | 24 | 5/3 | Lecture/Tutorial | Introduction à la sécurité Hardware, Attaques Side Channel Attaques par injection de fautes, … | Design et simulation de contremesures | MOS design, Cadence software | Lab work | How to protect a circuit from hardware and software attacks using hardware solutions | English | French | none |
| Master 1 | S2 (Spring) | 2P1 | Technical project | Projet technique | Microcontroler, IC, Analog Design, System & Application | 72 | 5 | Lab 8h | This course consists in a technical project that students must carry on with the help of their tutor. | Problem Solving experience | none | Lab work. | Problem solving, electronics, informatics | French & English | French & English | none |
| Master 1 | S2 (Spring) | 2S7 | Analog IC Design | Analog IC Design | Integrated circuit design, Analog, Low power, low frequency | 24 | 5/3 | Lecture/Tutorial | Low power conception, Study of all elementary Analog Blocks (current mirror, simple &complex amplifiers, voltage & current references, output | Design of analog low power circuits | Analog electronics | Lab work | Being able to selection & realize the design of an analog circuit | English | French | none |
| Master 1 | S2 (Spring) | 2S8 | Layout | Layout | Layout design | 24 | 5/3 | Lecture/Tutorial | Layout design, Analog « Back-end » designs : From elementary architecture as MOS transistor, inverter to complexe design | Layout, Analog design | Integrated Analog Design | Lab work | Design of all analog Mask for IC design | English | French | none |
| Master 1 | S2 (Spring) | 2S9 | IC Application Design | Analog IC Design Application | IC Application | 24 | 5/3 | Tutorial & Lab | Design & Layout application | Design of analog low power circuits | Integrated Analog Design | TP | Being able to selection & realize the design of an analog circuit | English | French | none |
| Master 1 | S2 (Spring) | 2P2 | Technical project | Projet technique | Microcontroler, IC, Analog Design, System & Application | 72 | 5 | Lab 72h | This course consists in a technical project that students must carry on with the help of their tutor. | Problem Solving experience | none | Lab work. | Problem solving, electronics, informatics | French & English | French & English | none |
| Master 1 | S2 (Spring) | 2A | Intermediate English | Anglais (niv. intermédiaire) | English | 32 | 2 | | Acquisition and application of everyday language elements, using the book FCE Practice Test Plus 2 from Pearson. Training in reading various | At the end of this module, the student will have reached level B2 on the Common European Framework of Reference (CEFR) for | Being to sit the Cambridge First Certificate in English. | Written & Speaking | CECR B2 level | English | English | CECR B1 level |
| Master 1 | S2 (Spring) | 2H | Human, economic and social sciences | SHES | Sciences humaines économiques et sociales | 40 | 3 | | | | | | | | | |
| Master 2 - Semestre 1 - FALL | | | | | | | | | | | | | | | | |
| Master 3 | S1 (Fall) | 3S1 | Microcontroleur Optimisation | Projet STM32 | STM32, Programmation, Microcontroller | 24 | 5/3 | Lecture/Tutorial | This lecture consists in developing application with STM32 sensors/ communications experience | to be able to develop an application using a stm32 | Basic knowledge on microntrollers | Lab work | Microntrollers programming | French & English | French | none |
| Master 3 | S1 (Fall) | 3S6 | Embedded system Modelisation methodology | Modélisation :Verilog AMS | Modelization, VHDL, AMS, Cadence | 24 | 5/3 | Lecture/Tutorial | Modelization of analog & digital circuit allow a time gain for the designer. Methodology to realize a modelization for a given | VHDL - AMS Coding | Analog Design | Project validation | To code with VHDL AMS language an analog design | French & English | French | none |
| Master 3 | S1 (Fall) | 3S3 | Labview RT | Labview RT | Real Time, Labview | 24 | 5/3 | Lecture/Tutorial | - Extend LabVIEW Graphical Programming to Stand-Alone Embedded Systems<br>- Take Advantage of a Real-Time OS for Precise Timing | Use of Real time module of Labview | Labview | Written test & TP | Being able to realize a simple RT application by using Labview interface | French & English | French | none |
| Master 3 | S1 (Fall) | 3S4 | Power management & Low level | Power management & Low level | Embedded System, Power management | 24 | 5/3 | Project | This teaching focuses on the issues related to the speed of calculus of a microcontroller versus the required power consumption | Measure power consumption. Programming MCU optimisations | fundamentals on MCU findamentals in C | Project | Microntrollers programming<br>Power consumption optimisation | french and english | English | none |
| Master 3 | S1 (Fall) | 3S5 | DESIGN RF | DESIGN RF | Antenna Design, 13,56MHz | 24 | 5/3 | Lecture/Tutorial | Cadence application, Antenna & RF communication, RF antenna (13,56MHz), Realization | Design of a RF antenna & Calibration | Analog Design, Cadence software | Project validation | To Design a well calibrated antenna for a given application | French & English | French & English | none |
| Master 3 | S1 (Fall) | 3S6 | Embedded IA | IA et système embarqué | IA, Embedded system | 24 | 5/3 | Lecture/Tutorial | Methodology to implement IA for electronics application | IA | IA | Project validation | To be able to realize an embedded application with IA | French & English | French | none |
| Master 3 | S1 (Fall) | 3P3 | Technical project | Projet technique | Microcontroler, IC, Analog Design, System & Application | 72 | 5 | Lab 60h | This course consists in a technical project that students must carry on with the help of their tutor. | Problem Solving experience | none | Lab work. | Problem solving, electronics, informatics | French & English | French & English | none |
| Master 3 | S1 (Fall) | 3S7 | Test circuit & Operating system | Engineering & Système d'exploitation dédié | Test, Reability & Embedded system & operating system | 24 | 5/3 | Lecture/Tutorial | Methodology to implement operating system for electronics applications & Testing system | Operating system dedicated for embedded system &Test Methodology | No | Written test | Installation of a operating system for embedded application & To test a circuit in a reliable way | French & English | French | none |
| Master 3 | S1 (Fall) | 3S8 | Field Bus & Robotic application | Bus terrain & Robotique | Field Bus | 24 | 5/3 | Lecture/Tutorial | Definition, Model & Norme,Classification, Applications | BUS CAN implementation | Microcontroler programmation | Project validation | Implement a BUS CAN application | French & English | French & English | none |
| Master 3 | S1 (Fall) | 3S9 | Embedded Linux | Linux embarqué | Embedded linux, Embedded system | 24 | 5/3 | Lecture/Tutorial | This lecture proposes an introduction to Real Time Operating system by using the example of Linux used for Raspberry Pi | Learning how to configure a RT OS, its possibilities. | Programming (Python), Linux | Lab Work | RT OS experience, Linux experience | French & English | french and english | none |
| Master 3 | S1 (Fall) | 3P4 | Technical project | Projet technique | Microcontroler, IC, Analog Design, System & Application | 72 | 5 | Lab 72h | This course consists in a technical project that students must carry on with the help of their tutor. | Problem Solving experience | none | Lab work. | Problem solving, electronics, informatics | French & English | French & English | none |
| Master 3 | S1 (Fall) | 3H | Advanced English | Anglais (niv. avancé) | English | 32 | 2 | | Acquisition and application of everyday language elements, using the book FCE Practice Test Plus 2 from Pearson. Training in reading various | At the end of this module, the student will have reached level C1 on the Common European Framework of Reference (CEFR) for | | Written & Speaking | CECR C1 level | English | English | CECR B2 level |
| Master 3 | S1 (Fall) | 3H | Human, economic and social sciences | SHES | | 40 | 3 | | | | | | | | | |

| Cursus | Semester | Course code | Course title | Titre FR | Keywords | Hourly volume | ECTS | Course type | Summary | Objectives | Prior knowledge | Assessment | Learning outcomes | Doc. language | Teach. language | Complementary information |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Master 1 - Semestre 1 - FALL | | | | | | | | | | | | | | | | |
| Master 1 | S1 (Fall) | 1E1 | Basis databases BDD | Bases de données relationnelles | database, relational, management system | 24 | 5/3 | Lecture 4h<br>Lab 20h | This lecture pursues the introduction to databases seen in third year. It begins with some recalls on the SQL language, presents new | Learning medium to advanced knowledge on relational databases | Linux shell, databases and SQL language basics, basics on relational model | MCQ each week, and written test at the end | use of database server, SQL operators, embedded programming on a database server | English | English | none |
| Master 1 | S1 (Fall) | 1E2 | Linux shell | Systèmes d'exploitation (Shell) | kernel, shell, bash, scripting | 24 | 5/3 | Lab 24h | This lecture pursues the introduction to Linux shell seen in third year. Practical class is realized under Linux. | Learning medium to advanced knowledge on Linux shell | Fundamentals on Linux. | Written test. | Knowledge on Linux shell and bash scripting | French & English | English | none |
| Master 1 | S1 (Fall) | 1E6 | AI and neural networks | Réseaux de neurones / Intelligence Artificielle | neural networks, AI, automated learning, logical reasoning | 24 | 5/3 | Lecture 10h<br>Lab 14h | This lectures is an introduction to artificial intelligence, neural networks, automated learning, hybrid computation | Learning fundamental knowledge on neural networks and machine learning. | Fundamentals on programming languages and data structures. | Written test. | Knowledge on the most widely use theoretical and practical machine learning structures. | English | English | none |
| Master 1 | S1 (Fall) | 1E4 | System programming | Programmation système | operating system, services, kernel, shell | 24 | 5/3 | Lecture 4h Lab 20h | This lecture pursues the introduction to operating systems seen in third year. Practical class is realized under Linux | Learning medium to advanced knowledge on operating systems | Fundamentals on operating systems. | Written test. | Knowledge on operating systems | french and english | English | none |
| Master 1 | S1 (Fall) | 1E5 | Intermediate Network | Réseau - Intermédiaire | network | 24 | 5/3 | Lab 24h | This lecture pursues the introduction to networks seen in third year. | Learning medium to advanced knowledge on networks | Fundamentals on networking. | Test on a computer, using Packet Tracer Software. | Network advanced | English | English | none |
| Master 1 | S1 (Fall) | 1E6 | UML | UML | object-oriented programming, UML, modelling, classes, diagrams | 24 | 5/3 | Lab 24h | This lecture presents the use of UML modelling language for object-oriented programming: use cases diagrams, class diagrams, and | Learning fundamentals and medium knowledge on UML formalism. | Fundamentals on object-oriented programming, basics on Java language. | Written test. | Knowledge on UML and object-oriented modelling. | French & English | English | none |
| Master 1 | S1 (Fall) | 1E7 | Advanced HTML5 | HTML5 | HTML5, CSS3, JavaScript | 24 | 5/3 | Lecture 8h<br>Lab 16h | This lecture presents advanced capabilities provided by HTML5 and JavaScript (Websockets, workers API, geolocation | Learning medium to advanced knowledge on HTML5, CSS3 and JavaScript | Fundamentals on HTML5, CSS3, JavaScript. | Lab work. | Knowledge on Web technologies | English | English | none |
| Master 1 | S1 (Fall) | 1E8 | Advanced JavaScript and PHP | Javascript avancée (AngularJS, NodeJS) | AngularJS, NodeJS, jQuery | 24 | 5/3 | Lecture 8h<br>Lab 16h | This lecture presents widely used JavaScript libraries like AngularJS, NodeJS or jQuery. The purpose is to undestand the architecture of Web | Learning medium to advanced knowledge on well-known JavaScript libraries | Fundamentals on HTML5, CSS3, JavaScript. | Lab work. | Knowledge on Web technologies | English | English | none |
| Master 1 | S1 (Fall) | 1E9 | Server-side programming with Python | Programmation dynamique coté serveur (PHP, Python) | python, django | 24 | 5/3 | Lecture 4h<br>Lab 20h | This lecture introduces student to general programming with Python 3. Although most of them know the basics of Python, this | Learnin beginner to medum knowledge with Python | Linux shell, databases, OOP, basic HTML, coding editor or IDE | Written test at the end | Python programming, good practices, Python landscape overview | french and english | English | none |
| Master 1 | S1 (Fall) | 1S10 | Hardware architecture and functional analysis | Analyse fonctionnelle hardware | Processor, ARM, architecture | 24 | 1,5 | Lecture | This lecture introduces the industrial design of processors by describing the ARM architecture | Learn how ARM processors work and how they are designed | Digital electronics, architecture | Writtent test | ARM architecture | french and english | English | none |
| Master 1 | S1 (Fall) | 1S11 | Hardware & software architecture for IoT | Architecture hardware orientée IoT | low level and high level architecture | 24h | 5/3 | Lecture<br>Tutorial | Sensors overview<br>Main wired communication protocol<br>Power consumption<br>Processing | -Having an wide overview to hardware and software constraints in IoT application<br>- Present a Benchmark of the main sensors/ MCU/ software | Basics in physics, electronics and computer science | Written test | | Englisih | English | |
| Master 1 | S1 (Fall) | 1S12 | RTOS | RTOS | Real Time Operating System, microcontroller, Embedded System | 24 | 5/3 | Lecture/Lab | This lecture is focused on Real Time Operating System for microcontroller. The students will implement FreeRTOS and exploit the | Learning fundamental of an RTOS | Programming C, MCU | Lab Work | RTOS experience, MCU experience | French & English | English | none |
| Master 1 | S1 (Fall) | 1P1 | Technical project | Projet technique | IoT, embedded system, mobile development | 72 | 5 | Lab 72h | This course consists in a technical project that students must carry on with the help of their tutor. | Problem Solving experience | none | Lab work. | Problem solving, electronics, informatics | French & English | French & English | none |
| Master 1 | S1 (Fall) | 1A | Intermediate English | Anglais (niv. intermédiaire) | English | 32 | 2 | | Acquisition and application of everyday language elements, using the book FCE Practice Test Plus 2 from Pearson. Training in reading various | At the end of this module, the student will have reached level B2 on the Common European Framework of Reference (CEFR) for | Being to sit the Cambridge First Certificate in English. | Written & Speaking | CECR B2 level | English | English | CECR B1 level |
| Master 1 | S1 (Fall) | 1H | Human, economic and social sciences | Sciences humaines économiques et sociales | | 40 | 3 | | | | | | | | | |
| Master 1 - Semestre 2 - SPRING | | | | | | | | | | | | | | | | |
| Master 1 | S2 (Spring) | 2S1 | STM32 & Sensor Application | STM32 & Application Capteur | STM32, Programmation, Sensor | 24 | 5/3 | Lecture | This lecture consists in developing the experience of the students on microcontroleur. It addresses the use of GPIO, Interruption | Learn how to program a microcontroller of 32 bits | Basic knowledge on microntrollers | Lab work | Microntrollers programming | French & English | French | none |
| Master 1 | S2 (Spring) | 2O2 | Swift programmation | Swift programmation | Mobile Apps | 24 | 5/3 | Lectrue & lab | This lecture presents how to realize mobile apps based on swift programmation or ios mobile | learning how to developp a mobile app with swift | swift, ios | lab work | experience using swift | French & English | French & English | none |
| Master 1 | S2 (Spring) | 1S3 | Circuit Design | Conception analogique (filtrage, etc..) | Analog Design, Feedback effect, Filter | 24 | 5/3 | Lecture 8h<br>Tutorial 16h | Getting start on Eagle software II<br>- Reminder of important notions<br>- Be able to realize a circuit | - Become familiar with the use of the softwares MultiSim (NI) Eagle<br>- Learn the advantages & | Getting start Eagle software I,<br>Concept of circuit design in analog and digital electronics (Electronics I, Logic I) | Written test. | Being able to realize an analog circuit responding to a given application | English | English | Bibliography<br>https://www.autodesk.com/products/eagle/overview<br>https://www.autodesk.com/products/eagle/free- |
| Master 1 | S2 (Spring) | 2E4 | Introduction to security | Sécurité institutionnelle | security, hacking, threats, authentication, software flaws, prevention and detection systems | 24 | 5/3 | Lecture 4h<br>Lab 20h | This lecture is an introduction to systems security, including the presentation of legal environment, auditing | Learning fundamental to medium knowledge on how to secure an operating system or an application. | Fundamentals on operating systems, Linux shell, programming languages and algorithms, and virtual machines | MCQ test. | Knowledge on the fundamental principles about securing codes and systems. | French & English | English | none |
| Master 1 | S2 (Spring) | 3I12 | Software Security | Sécurité Informatique | TLS, hacker attacks, Cryptography | 24 | 5/3 | Lecture (8h) and Lab (16h) | This course presents different informatics hacker attacks, and explain how systems can be protected, how to implement secure | Learn the basics of informatics systems and communication security | Informatics (Linux, Python, web) | Labwork | Experience in systems security | French & English | French & English | none |
| Master 1 | S2 (Spring) | 3I13 | Hardware Security | Sécurité hardware | Physical attacks, redundancy, Intrusion detection | 1 | 5/3 | Lecture | This lecture presents how hardware systems can be hacked, and how security can be implemented at the hardware level on IOT | Learn the basics of hardware security, data leak, redundancy needs, cryptography | Digital electronics | Written test | Experience in hardware data leaks and security improvements | French | French & English | none |
| Master 1 | S2 (Spring) | 2P1 | Technical project | Projet technique | IoT, Communication, hardware & software application | 72 | 5 | Lab 48h | This course consists in a technical project that students must carry on with the help of their tutor. | Problem Solving experience | none | Lab work. | Problem solving, electronics, informatics | French & English | French & English | none |
| Master 1 | S1 (Fall) | 2E7 | Advanced JavaScript and PHP | Javascript avancée (AngularJS, NodeJS) | AngularJS, NodeJS, jQuery | 24 | 5/3 | Lecture/lab | This lecture presents widely used JavaScript libraries like AngularJS, NodeJS or jQuery. The purpose is to undestand the architecture of Web | Learning medium to advanced knowledge on well-known JavaScript libraries | Fundamentals on HTML5, CSS3, JavaScript. | Lab work. | Knowledge on Web technologies | French & English | French & English | none |
| Master 1 | S2 (Spring) | 2O8 | fablab (prototiping) | Fab Lab | 3D printer, packaging | 28 | 5/3 | lab | The aim of this course is to design a packaging for an electronic device. It allows to learn the use of 3D modeling software as well as the use of | learn how to use 3D modeler software and 3D printers | none | lab work. | | French & English | French & English | |
| Master 1 | S2 (Spring) | 2E10 | C++ programming | Programmation avancée C++ | C++ langage, object oriented programming | 24 | 5/3 | Lab 24h | This lecture presents the fundamentals of object oriented programming using C++ langage | Learning how to realize object oriented projects using C ++ langage | programming (C, Python, …) | Written test | Object oriented programming, C++ langage | French & English | French & English | none |
| Master 1 | S2 (Spring) | 2P2 | Technical project | Projet technique | IoT, Communication, hardware & software application | 72 | 5 | Lab 72h | This course consists in a technical project that students must carry on with the help of their tutor. | Problem Solving experience | none | Lab work. | Problem solving, electronics, informatics | French & English | French & English | none |
| Master 1 | S2 (Spring) | 2A | Intermediate English | Anglais (niv. intermédiaire) | English | 32 | 2 | | Acquisition and application of everyday language elements, using the book FCE Practice Test Plus 2 from Pearson. Training in reading various | At the end of this module, the student will have reached level B2 on the Common European Framework of Reference (CEFR) for | Being to sit the Cambridge First Certificate in English. | Written & Speaking | CECR B2 level | English | English | CECR B1 level |
| Master 1 | S2 (Spring) | 2H | | SHES | | 40 | 3 | | | | | | | | | |
| Master 2 - Semestre 1 - FALL | | | | | | | | | | | | | | | | |
| Master 3 | S1 (Fall) | 3E1 | NoSQL databases: presentation, data modelling, and implementation. | Présentation générale, Modèles de données et utilisation de BDD NoSQL | NoSQL, NewSQL, document oriented, query languages, graph oriented, peer to peer, client, server, load balancing | 24 | 5/3 | Lecture 8h<br>Lab 16h | This course presents to programmers the NoSQL and NewSQL databases.<br>At the end of this course, the participants will | Learning medium to advanced knowledge on non-relational storage systems. | Fundamentals on relational databases, UNIX shell, and C language. | Team project. | Knowledge on how to set-up and run a non relational database. | French & English | French & English | none |
| Master 3 | S1 (Fall) | 3E2 | HP Vertica and time-series databases | Formations HP Vertica et BDD de séries temporelles | Vertica, Big Data, time-series, analysis | 24 | 5/3 | Lecture 4h<br>Lab 4h | This course presents Vertica storage system from Hewlett-Packard.<br>At the end of this course, the participants will | Learning basic to medium knowledge on HP Vertica. | Fundamentals on relational databases and Big Data. | Team project, MCQ. | Knowledge on the characteristics of HP Vertica, its analytical and administration functions. | French & English | French & English | none |
| Master 3 | S1 (Fall) | 3E3 | Service Web | AWS - Service Web | Web, AWS, Certification | 24 | 5/3 | Lab 24h | This course presents Amazon service, AWS Certification | AWS Certification | Fundamentals on Big Data. | Lab Work & Examination | Certification valorisation | French & English | French & English | none |
| Master 3 | S1 (Fall) | 3S6 | Power management & Low level | Power management & Low level | Embedded System, Power management | 24 | 5/3 | Project | This teaching focuses on the issues related to the speed of calculus of a microcontroller versus the required power consumption | Measure power consumption. Programming MCU optimisations | fundamentals on MCU findamentals in C | Project | Microntrollers programming<br>Power consumption optimisation | french and english | English | none |
| Master 3 | S1 (Fall) | 3I7 | Metrology & Telecommunication | Metrologie et communication | Microwave, Radio Frequency Measurement | 24 | 5/3 | Course/Lab | This course presents the measurement methodology for microwave devices. The students will learn and practice how to use the main | RF measurement RF circuit performances | fundamentals in telecommunication and RF | Labwork | RF & microwave measurement | french and english | English | none |
| Master 3 | S1 (Fall) | 3I8 | Modelization Simulation RF (ADS) | Modélisation et simulation RF (ADS) | Microwave, Radio Frequency Simulation | 24 | 5/3 | Course/Lab | This course introduces RF simulation with Keysight ADS which is one of the most used simulator in this domain. The student will simulated main | RF simulation/modelisation RF circuit performances | fundamentals in telecommunication and RF | Labwork | RF & microwave modelisation | french and english | English | none |
| Master 3 | S1 (Fall) | 3P1 | Technical project | Projet technique | IoT, Communication, hardware & software application | 72 | 5 | Lab 42h | This course consists in a technical project that students must carry on with the help of their tutor. | Problem Solving experience | none | Lab work. | Problem solving, electronics, informatics | French & English | French & English | none |
| Master 3 | S1 (Fall) | 3O7 | Modelization Simulation RF (ADS) | Modélisation et simulation RF (ADS) | Microwave, Radio Frequency Simulation | 24 | 5/3 | Course/Lab | This course introduces RF simulation with Keysight ADS which is one of the most used simulator in this domain. The student will simulated main | RF simulation/modelisation RF circuit performances | fundamentals in telecommunication and RF | Labwork | RF & microwave modelisation | french and english | English | none |
| Master 3 | S1 (Fall) | 3O8 | Metrology & Telecommunication | Metrologie et communication | Microwave, Radio Frequency Measurement | 24 | 5/3 | Course/Lab | This course presents the measurement methodology for microwave devices. The students will learn and practice how to use the main | RF measurement RF circuit performances | fundamentals in telecommunication and RF | Labwork | RF & microwave measurement | french and english | English | none |
| Master 3 | S1 (Fall) | 3O9 | Telecommunication | Télécommunications analogiques | Transmission lines, S-parameters, Impedance matching, FRIIS | 24 | 5/3 | Lecture | This lecture presents the fundamentals of telecommunication, from transmission lines equations to impedance matching, by | Learn how to optimize a Radio Frequency signal transmission on embedded systems | Mathematics, signal processing | Written test | Telecommunication basic knowledge for radio frequency systems design | French & English | French & English | none |
| Master 3 | S1 (Fall) | 3P2 | Technical project | Projet technique | IoT, Communication, hardware & software application | 72 | 5 | Lab 72h | This course consists in a technical project that students must carry on with the help of their tutor. | Problem Solving experience | none | Lab work. | Problem solving, electronics, informatics | French & English | French & English | none |
| Master 3 | S1 (Fall) | 3H | Advanced English | Anglais (niv. avancé) | English | 32 | 2 | | Acquisition and application of everyday language elements, using the book FCE Practice Test Plus 2 from Pearson. Training in reading various | At the end of this module, the student will have reached level C1 on the Common European Framework of Reference (CEFR) for | | Written & Speaking | CECR C1 level | English | English | CECR B2 level |
| Master 3 | S1 (Fall) | 3H | Human, economic and social sciences | SHES | | 40 | 3 | | | | | | | | | |

| Cursus | Semester | Course code | Course title | Titre FR | Keywords | Hourly volume | ECTS | Course type | Summary | Objectives | Prior knowledge | Assessment | Learning outcomes | Doc. language | Teach. language | Complementary information |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Master 1 - Semestre 1 - FALL | | | | | | | | | | | | | | | | |
| Master 1 | S1 (Fall) | 1E1 | Basis databases BDD | Bases de données relationnelles | database, relational, management system | 24 | 5/3 | Lecture 4h<br>Lab 20h | This lecture pursues the introduction to databases seen in third year. It begins with some recalls on the SQL language, presents new operators (foreign key matching, outer joins, relational division), shows how to embed calculus inside the database server (using views, SQL | Learning medium to advanced knowledge on relational databases | Linux shell, databases and SQL language basics, basics on relational model | MCQ each week, and written test at the end | use of database server, SQL operators, embedded programming on a database server | English | English | none |
| Master 1 | S1 (Fall) | 1E2 | Linux shell | Systèmes d'exploitation (Shell) | kernel, shell, bash, scripting | 24 | 5/3 | Lab 24h | This lecture pursues the introduction to Linux shell seen in third year. Practical class is realized under Linux. | Learning medium to advanced knowledge on Linux shell | Fundamentals on Linux. | Written test. | Knowledge on Linux shell and bash scripting | French & English | English | none |
| Master 1 | S1 (Fall) | 1E6 | AI and neural networks | Réseaux de neurones / Intelligence Artificielle | neural networks, AI, automated learning, logical reasoning | 24 | 5/3 | Lecture 10h<br>Lab 14h | This lectures is an introduction to artificial intelligence, neural networks, automated learning, hybrid computation and models of perception. | Learning fundamental knowledge on neural networks and machine learning. | Fundamentals on programming languages and data structures. | Written test. | Knowledge on the most widely use theoretical and practical machine learning structures. | English | English | none |
| Master 1 | S1 (Fall) | 1E4 | System programming | Programmation système | operating system, services, kernel, shell | 24 | 5/3 | Lecture 4h Lab 20h | This lecture pursues the introduction to operating systems seen in third year. Practical class is realized under Linux. | Learning medium to advanced knowledge on operating systems | Fundamentals on operating systems. | Written test. | Knowledge on operating systems | french and english | English | none |
| Master 1 | S1 (Fall) | 1A5 | CAPM (Certified Associate in Project Management) - PMI (Project Management Institute) Certification | Certification CAPM du PMI | International Project Management Certification, PMBOK(r) Guide (Project Management Body of Knowledge) | 24 | 3/5 | Lecture 16h | This module will mix lectures and workshop to cover both the Project Management Body of Knowledge from PMI (Project Management Institute) and the role of Project Managers. The scope of the course is the full content of the PMBOK(r) Guide, 5th or 6th Edition to cover the 10 | At the end of the training an attendee has the required knowledge to take the CAPM(r) (Certified Associate in Project Management) | Project Management | 150 multiple choice questions in 3 hours :<br>- 4 choices, 1 best answer, score is 1 or 0<br>- succcess = 61-65% good | Able to conduct a project | French & English | French & English | A PMBOK(r) Guide and a strong motivation are recommanded ! |
| Master 1 | S1 (Fall) | 1E6 | UML | UML | object-oriented programming, UML, modelling, classes, diagrams | 24 | 5/3 | Lab 24h | This lecture presents the use of UML modelling language for object-oriented programming: use cases diagrams, class diagrams, and generation of code from the models. The practice is provided as a complete use case, using Modelio software. | Learning fundamentals and medium knowledge on UML formalism. | Fundamentals on object-oriented programming, basics on Java language. | Written test. | Knowledge on UML and object-oriented modelling. | French & English | English | none |
| Master 1 | S1 (Fall) | 1E7 | Advanced HTML5 | HTML5 | HTML5, CSS3, JavaScript | 24 | 5/3 | Lecture 8h<br>Lab 16h | This lecture presents advanced capabilities provided by HTML5 and JavaScript (Websockets, workers API, geolocation, offline Web app). | Learning medium to advanced knowledge on HTML5, CSS3 and JavaScript | Fundamentals on HTML5, CSS3, JavaScript. | Lab work. | Knowledge on Web technologies | English | English | none |
| Master 1 | S1 (Fall) | 1E8 | Advanced JavaScript and PHP | Javascript avancée (AngularJS, NodeJS) | AngularJS, NodeJS, jQuery | 24 | 5/3 | Lecture 8h<br>Lab 16h | This lecture presents widely used JavaScript libraries like AngularJS, NodeJS or jQuery. The purpose is to undestand the architecture of Web applications bases on those librairies. | Learning medium to advanced knowledge on well-known JavaScript libraries | Fundamentals on HTML5, CSS3, JavaScript. | Lab work. | Knowledge on Web technologies | English | English | none |
| Master 1 | S1 (Fall) | 1E9 | Server-side programming with Python | Programmation dynamique coté serveur (PHP, Python) | python, django | 24 | 5/3 | Lecture 4h<br>Lab 20h | This lecture introduces student to general programming with Python 3. Although most of them know the basics of Python, this course allows them to experiment and practice in different domains especially Web programming with django and flask. Several ORMs are also introduced. | Learning beginner to medum knowledge with Python | Linux shell, databases, OOP, basic HTML, coding editor or IDE | Written test at the end | Python programming, good practices, Python landscape overview | french and english | English | none |
| Master 1 | S1 (Fall) | 1A10 | Digital Marketing | Marketing | User Experience, marketing | 24 | 5/3 | Lecture and workshop | | Learning the habit & tools for marketing engineer | | | | English and French | English | None |
| Master 1 | S1 (Fall) | 1E11 | Search Engine Optimization | Moteurs de recherche (SEO) | seo, web, crawler, google, page rank, ranking, keywords, web page | 24 | 5/3 | Lecture 8h<br>Lab 16h | This lecture is an introduction to Search Engine Optimization techniques. It presents the methods of the most widely used web crawlers for ranking web sites, and the techniques and tools used by webmasters and seo managers for optimizing their position in query results. | Learning beginner to medum knowledge about SEO. | Web technologies (HTML5, JavaScript). Web clients (browsers) and servers (Apache). | MCQ, team project. | Knowledge on SEO techniques. | French & English | English | none |
| Master 1 | S1 (Fall) | 1A12 | Qualitative survey | Analyse qualitative | User Experience, ethnology, scenario, utility, usability | 24 | 5/3 | Lecture and workshop | Innovators design tools and services that need to be integrated by users into their current practices. It is crucial issue to understand that, for a user, an ICT artefact will deliver more that just a practical use : it also brings emotion, fashion, a more or less friendly usability | Students can perform the analysis of the user experience by using qualitative tools | | A user experience analysis exercise | Students can choose the correct analysis method, perform a field observation, analyze and use the obtained results | English and French | English | None |
| Master 1 | S1 (Fall) | 1P1 | Technical project | Projet technique | Virtual reality, project management, creative problem solving | 72 | 5 | Team work | Students are expected to work in autnomy to produce a functional prototype that meets the need of a client. They identify the client's need, fully manage the project, report to the tutor and present to a jury. Technical focus of this year is virtual reality. Other technologies may be | Conduct an engineering project in full autonomy | Project management | 360° assessment by peers, presentation before a jury | Programming languages (for web and mobile), VR, project management cycle, communication | French and English | English | none |
| Master 1 | S1 (Fall) | 1A | Intermediate English | Anglais (niv. intermédiaire) | English | 30 | 2 | | Acquisition and application of everyday language elements, using the book FCE Practice Test Plus 2 from Pearson. Training in reading various documents, in writing, listening and oral expression. | At the end of this module, the student will have reached level B2 on the Common European Framework of Reference (CEFR) for | Being to sit the Cambridge First Certificate in English. | Written & Speaking | CECR B2 level | English | English | CECR B1 level |
| Master 1 | S1 (Fall) | | Human, economic and social sciences | Sciences humaines économiques et sociales | | 72 | 3 | | | | | | | | | |
| Master 1 - Semestre 2 - SPRING | | | | | | | | | | | | | | | | |
| Master 1 | S2 (Spring) | 2E1 | Native mobile development - 1 | Développement mobile natif sur Android | android, native, application, mobile | 40 | 2,5 | Lecture 8h<br>Lab 24h | Learn the fundamentals and the methods used to develop native mobile application for Android operating system. The lecture will show how an application works, and the lab will highlight the processes followed for the development, using an IDE. | Learning fundamentals, medium and advanced knowledge on mobile development. | Linux, Java language, algorithmics. | Team project. | Knoweldge on how to develop a mobile application. | French & English | French & English | none |
| Master 1 | S2 (Spring) | 2E2 | Native mobile development - 2 | Développement mobile multi-plateforme | Ionic, android, java, mobile phone | 32 | 2,5 | Lecture 8h<br>Lab 32h | Learn the fundamentals and the methods used to develop native mobile application for Android operating system. The lecture will show how an application works, and the lab will highlight the processes followed for the development, using an IDE. | Learning fundamentals, medium and advanced knowledge on cross-platform mobile development. | Linux shell, algorithmics. | Team project. | Knoweldge on how to develop a mobile application. | French & English | French & English | none |
| Master 1 | S2 (Spring) | 2A4 | CAPM (Certified Associate in Project Management) - PMI (Project Management Institute) Certification | Certification CAPM du PMI | International Project Management Certification, PMBOK(r) Guide (Project Management Body of Knowledge) | 24 | 3/5 | Lecture 16h | This module will mix lectures and workshop to cover both the Project Management Body of Knowledge from PMI (Project Management Institute) and the role of Project Managers. The scope of the course is the full content of the PMBOK(r) Guide, 5th or 6th Edition to cover the 10 | At the end of the training an attendee has the required knowledge to take the CAPM(r) (Certified Associate in Project Management) | Project Management | 150 multiple choice questions in 3 hours :<br>- 4 choices, 1 best answer, score is 1 or 0<br>- succcess = 61-65% good | Able to conduct a project | French & English | French & English | A PMBOK(r) Guide and a strong motivation are recommanded ! |
| Master 1 | S2 (Spring) | 2C1 | JEE | JEE | Java, JEE, application server, beans, Jakarta | 24 | 5/3 | Lecture 10h<br>Lab 30h | This course aims at discovering the Java Enterprise Edition platform (Java EE) and to put into practice its various specifications through concrete projects.<br>At the end of this course, the participants will have a precise idea of the area and the advantages of the | Learning beginner to medum knowledge about JavaEE. | Java language, algorithmics, Web technologies. | MCQ each week, lab work and written test at the end. | Knoweldge on JEE application development. | French & English | French & English | none |
| Master 1 | S2 (Spring) | 2E8 | Python for data science | Python pour data science | Python, big data, analysis, data sets | 24 | 5/3 | Lecture 8h<br>Lab 16h | The goal of this lecture is to learn how to analize big data sets using Python language : with tools like Jupyter, Numpy, Pandas, scikit and how to store and retrieve data with HDF5. | Learning fundamentals and medium knowledge on data analysis with Python. | Basics of Python language. | Lab work and written test. | Knowledge on how to analyze big data sets using Python. | French & English | French & English | none |
| Master 1 | S2 (Spring) | 2P1 | Technical project | Projet technique | Software application, Business | 72 | 5 | Lab 72h | This course consists in a technical project that students must carry on with the help of their tutor. | Problem Solving experience | none | Lab work. | Problem solving, electronics, informatics | French & English | French & English | none |
| Master 1 | S2 (Spring) | 2A8 | Business Model | Affaires | | 24 | 5/3 | Lecture 8h<br>Lab 16h | The course introduces the law of the contracts (definition of the contract, freedom of contract, stages of the formation of the contract) and the bases of the labor law | The aim is to acquire basic notions in contract law: types of contracts, disputes, risks and notions of labor law, taking into account the point | none | A practical case in contract law | none | French | French | none |
| Master 1 | S2 (Spring) | 2A7 | Human ressource management | Gestion des ressources humaines | | 24 | 5/3 | Lecture 4h,<br>workshop 12h | This course will mix lectures and workshop to cover both the Human Resources Management, the role of all Managers and the expectations employees should have on HR. It will also dig on the "employee engagement" agenda, leading to best leadership & management | Trigger interest & intelligence to the "human" factor in leading projects / businesses | Having followed the "Keys to build a career @ the digital / global age" | To be defined | Able to describe the HR agenda & business case; Keys to enable early leadership practices | English | English / French based on target audience | none |
| Master 1 | S2 (Spring) | 2A9 | Corporate social responsibility | Responsabilité sociétale des entreprises | sustainable development, societal commitment, the environment, company governance, human rights | 24 | 5/3 | Lecture 8h<br>Lab 16h | Objectives The objective is to acquire basic notions in contract law: types of contracts, disputes, risks and notions of labor law, taking into account the point of view of the employee, the entrepreneur and the employer. | The purpose is to anderstand what are generally agreed, by all stakeholders in civil society and the Member States, to be the best | basics on the French legal system | MCQ and<br>written test at the end | develop Corporate Social Responsibility (CSR) to digital products and services. Extend CSR counselling services. | French | French | none |
| Master 1 | S2 (Spring) | 2P2 | Technical project | Projet technique | Virtual reality, project management, creative problem solving | 72 | 5 | Team work | Students are expected to work in autnomy to produce a functional prototype that meets the need of a client. They identify the client's need, fully manage the project, report to the tutor and present to a jury. Technical focus of this year is virtual reality. Other technologies may be | Conduct an engineering project in full autonomy | Project management | 360° assessment by peers, presentation before a jury | Programming languages (for web and mobile), VR, project management cycle, communication | French and English | English | none |
| Master 1 | S2 (Spring) | 2A | Intermediate English | Anglais (niv. intermédiaire) | English | 30 | 2 | | Acquisition and application of everyday language elements, using the book FCE Practice Test Plus 2 from Pearson. Training in reading various documents, in writing, listening and oral expression. | At the end of this module, the student will have reached level B2 on the Common European Framework of Reference (CEFR) for | Being to sit the Cambridge First Certificate in English. | Written & Speaking | CECR B2 level | English | English | CECR B1 level |
| Master 1 | S2 (Spring) | 2H | Human, economic and social sciences | SHES | | 40 | 3 | | | | | | | | | |
| Master 2 - Semestre 1 - FALL | | | | | | | | | | | | | | | | |
| Master 3 | S1 (Fall) | 3E1 | NoSQL databases: presentation, data modelling, and implementation. | Présentation générale, Modèles de données et utilisation de BDD NoSQL | NoSQL, NewSQL, document oriented, query languages, graph oriented, peer to peer, client, server, load balancing | 24 | 5/3 | Lecture 8h<br>Lab 16h | This course presents to programmers the NoSQL and NewSQL databases.<br>At the end of this course, the participants will have acquired knowledge to start any project involving a non-relational database thanks | Learning medium to advanced knowledge on non-relational storage systems. | Fundamentals on relational databases, UNIX shell, and C language. | Team project. | Knowledge on how to set-up and run a non relational database. | French & English | French & English | none |
| Master 3 | S1 (Fall) | 3E2 | HP Vertica and time-series databases | Formations HP Vertica et BDD de séries temporelles | Vertica, Big Data, time-series, analysis | 24 | 5/3 | Lecture 4h<br>Lab 4h | This course presents Vertica storage system from Hewlett-Packard.<br>At the end of this course, the participants will have acquired knowledge to use HP Vertica.<br>This course reserves a part important to TP for | Learning basic to medium knowledge on HP Vertica. | Fundamentals on relational databases and Big Data. | Team project, MCQ. | Knowledge on the characteristics of HP Vertica, its analytical and administration functions. | French & English | French & English | none |
| Master 3 | S1 (Fall) | 3E3 | Service Web | AWS - Service Web | Web, AWS, Certification | 24 | 5/3 | Lab 24h | This course presents Amazon service, AWS Certification | AWS Certification | Fundamentals on Big Data. | Lab Work & Examination | Certification valorisation | French & English | French & English | none |
| Master 3 | S1 (Fall) | 3I6 | Alternative managment | Management alternatif | CNV, Released Companies, Mindfulness, Accountability | 24 | 5/3 | Lecture and workshop | Management, its rules, rituals and tools allow us to produce collectively and sometimes effectively ... results we do not want anymore: stress, pollution, violence, social decommissioning, isolation, inequities, etc.<br>In this course, we will theoretically and through practical | Give students an alternative vision on how to organize the collective activity | Basic knowledge of management, organization and project management. | "50% Production of individual deliverables During the course<br>50% Participation in collective workshops " | To be able to communicate in a generative and active way, to know alternative modes of decision making, to understand the | French | French | none |
| Master 3 | S1 (Fall) | 3I7 | Customer relationships and negociation | Relation client et négociation | Commercial interaction, negotiation, customer relationship, pre-sales | 24 | 5/3 | Workshop | The course introduces the fundamentals of a complex sales business: the process, the techniques of maintenance, listening to the customer, the art of asking questions, the technical-commercial proposal. Students are trained in the principles of business negotiation: | The objectives of the course are: to recognize the importance of communication in any commercial interaction; | none | QCM and written test. | Conduct a business interview, make a technical-commercial proposal, know how to negotiate a sale | French | French | none |
| Master 3 | S1 (Fall) | 3E5 | IA & IBM Bluemix | Plateforme IBM Bluemix | cloud computing, IBM, Bluemix, watson, AI | 24 | 5/3 | Lecture 4h<br>Lab 12h | This lecture is a discovery of the IBM cloud platform through examples of Web development, using an account on IBM Bluemix.<br>The lab work focuses on the development of an IoT application with the cloud platform and using ARM | Learning medium to advanced knowledge on IBM Bluemix. | Fundamentals on networking, operating systems, Web technologies and shell. | Lab work, team project. | Knowledge on how to develop an application based on cloud services. | French & English | French & English | none |
| Master 3 | S1 (Fall) | 3P1 | Technical project | Projet technique | Software application, Business | 48 | 10/3 | Lab48h | This course consists in a technical project that students must carry on with the help of their tutor. | Problem Solving experience | none | Lab work. | Problem solving, electronics, informatics | French & English | French & English | none |
| Master 3 | S1 (Fall) | 3I8 | Lean start up | Lean start up | | 24 | 5/3 | Lecture and workshop | Create the perfect product by spending months or years without showing it don't make any sense. Lean Startup methodology is a scientific approach to creating and managing startups and get a desired product from the user perspective. In this class, we learn how to use this | Learning different process and tools to reach the desired product. | Basics usage of spreadsheets, forms, prototyping tools and statistics. | MCQ at the end to validate the theory. | Use of the methodology with basic approach. | English | English and French | none |
| Master 3 | S1 (Fall) | 3A8 | Fabweek | Fabweek | | 40 | 10/30 | Team work | A week dedicated to creating an innovative solution based on customer needs analysis, field observation and / or data analysis. Work in multidisciplinary teams composed of students from ISEN and Kedge design school and Kedge business school | Consolidate and activate the knowledge acquired during the engineering curriculum in the field of creation of innovative solutions | Customer needs analysis, field observation, business template template | Presentation of the prototype to the jury | Innovative solution design from a customer's need, data analysis, innovative solutions pitch | French & English | French & English | none |
| Master 3 | S1 (Fall) | 3A9 | Python for Data science, level 2 | Python pour data science | Python, machine learning, time series, cross-sectional data | 24 | 5/3 | Lecture 8h, workshop 16h | The goal of this lecture is to learn how to analize big data sets using advanced techniques offered by Python libraries Jupyter, Numpy, Pandas and scikit. The focus is made on analysis of time series data cross-sectional data sets | Learning econometric and machine learning techniques for time series and cross-sectional data analytics | Basics of Python libraries for data analytics and machine learning | Lab work and written test. | Knowledge on how to analyze big data sets using Python. | English and French | | none |
| Master 3 | S1 (Fall) | 3P2 | Technical project | Projet technique | Software application, Business | 48 | 10/3 | Lab48h | This course consists in a technical project that students must carry on with the help of their tutor. | Problem Solving experience | none | Lab work. | Problem solving, electronics, informatics | French & English | French & English | none |
| Master 3 | S1 (Fall) | 3H | Advanced English | Anglais (niv. avancé) | English | 30 | 2 | | Acquisition and application of everyday language elements, using the book FCE Practice Test Plus 2 from Pearson. Training in reading various documents, in writing, listening and oral expression. | At the end of this module, the student will have reached level C1 on the Common European Framework of Reference (CEFR) for | | Written & Speaking | CECR C1 level | English | English | CECR B2 level |
| Master 3 | S1 (Fall) | 3H | Human, economic and social sciences | SHES | | 72 | 3 | | | | | | | | | |

| Cursus | Semester | Course code | Course title | Titre FR | Keywords | Hourly volume | ECTS | Course type | Summary | Objectives | Prior knowledge | Assessment | Learning outcomes | Doc. language | Teach. language | Complementary information |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Master 1 - Semestre 1 - FALL | | | | | | | | | | | | | | | | |
| Master 1 | S1 (Fall) | 1E1 | Basis databases BDD | Bases de données relationnelles | database, relational, management system | 24 | 5/3 | Lecture 4h Lab 20h | This lecture pursues the introduction to databases seen in third year. It begins with some recalls on the SQL language, presents new operators (foreign key matching, outer joins | Learning medium to advanced knowledge on relational databases | Linux shell, databases and SQL language basics, basics on relational model | MCQ each week, and written test at the end | use of database server, SQL operators, embedded programming on a database server | English | English | none |
| Master 1 | S1 (Fall) | 1E2 | Linux shell | Systèmes d'exploitation (Shell) | kernel, shell, bash, scripting | 24 | 5/3 | Lab 24h | This lecture pursues the introduction to Linux shell seen in third year. Practical class is realized under Linux. | Learning medium to advanced knowledge on Linux shell | Fundamentals on Linux. | Written test. | Knowledge on Linux shell and bash scripting | French & English | English | none |
| Master 1 | S1 (Fall) | 1E6 | AI and neural networks | Réseaux de neurones / Intelligence Artificielle | neural networks, AI, automated learning, logical reasoning | 24 | 5/3 | Lecture 10h Lab 14h | This lectures is an introduction to artificial intelligence, neural networks, automated learning, hybrid computation and models of perception | Learning fundamental knowledge on neural networks and machine learning. | Fundamentals on programming languages and data structures. | Written test. | Knowledge on the most widely use theoretical and practical machine learning structures. | English | English | none |
| Master 1 | S1 (Fall) | 1E4 | System programming | Programmation système | operating system, services, kernel, shell | 24 | 5/3 | Lecture 4h Lab 20h | This lecture pursues the introduction to operating systems seen in third year. Practical class is realized under Linux. | Learning medium to advanced knowledge on operating systems | Fundamentals on operating systems. | Written test. | Knowledge on operating systems | french and english | English | none |
| Master 1 | S1 (Fall) | 1E5 | Intermediate Network | Réseau - Intermédiaire | network | 24 | 5/3 | Lab 24h | This lecture pursues the introduction to networks seen in third year. | Learning medium to advanced knowledge on networks | Fundamentals on networking. | Test on a computer, using Packet Tracer Software. | Network advanced | English | English | none |
| Master 1 | S1 (Fall) | 1E6 | UML | UML | object-oriented programming, UML, modelling, classes, diagrams | 24 | 5/3 | Lab 24h | This lecture presents the use of UML modelling language for object-oriented programming: use cases diagrams, class diagrams, and generation of code from the models | Learning fundamentals and medium knowledge on UML formalism. | Fundamentals on object-oriented programming, basics on Java language. | Written test. | Knowledge on UML and object-oriented modelling. | French & English | English | none |
| Master 1 | S1 (Fall) | 1E7 | Advanced HTML5 | HTML5 | HTML5, CSS3, JavaScript | 24 | 5/3 | Lecture 8h Lab 16h | This lecture presents advanced capabilities provided by HTML5 and JavaScript (Websockets, workers API, geolocation, offline Web app). | Learning medium to advanced knowledge on HTML5, CSS3 and JavaScript | Fundamentals on HTML5, CSS3, JavaScript. | Lab work. | Knowledge on Web technologies | English | English | none |
| Master 1 | S1 (Fall) | 1E8 | Advanced JavaScript and PHP | Javascript avancée (AngularJS, NodeJS) | AngularJS, NodeJS, jQuery | 24 | 5/3 | Lecture 8h Lab 16h | This lecture presents widely used JavaScript libraries like AngularJS, NodeJS or jQuery. The purpose is to undestand the architecture of Web applications bases on these | Learning medium to advanced knowledge on well-known JavaScript libraries | Fundamentals on HTML5, CSS3, JavaScript. | Lab work. | Knowledge on Web technologies | English | English | none |
| Master 1 | S1 (Fall) | 1E9 | Server-side programming with Python | Programmation dynamique coté serveur (PHP, Python) | python, django | 24 | 5/3 | Lecture 4h Lab 20h | This lecture introduces student to general programming with Python 3. Although most of them know the basics of Python, this course allows them to experiment and practice in | Learnin beginner to medum knowledge with Python | Linux shell, databases, OOP, basic HTML, coding editor or IDE | Written test at the end | Python programming, good practices, Python landscape overview | french and english | English | none |
| Master 1 | S1 (Fall) | 1M10 | Energy Challenge + Solar | Etude/optimisation de la production d'un panneau sur l'année ? (influence des angles, des nuages, tracking). Éventuellement conclure | REN Energy | 24 | 5/3 | Lecture/ Lab | The objective of this course is to teach the fundamentals of electrical grid architecture & make them practice on Xcos | Electrical grid fundamental | Electrical grid fundamental | Written test./project | ARM architecture | french and english | English | none |
| Master 1 | S1 (Fall) | 1S11 | Hardware & software architecture for IoT | Architecture hardware orientée IoT | low level and high level architecture | 24h | 5/3 | Lecture Tutorial | Sensors overview<br>Main wired communication protocol<br>Power consumption<br>Processing<br>Contactless communication overview | -Having an wide overview to hardware and software constraints in IoT application<br>- Present a Benchmark of the main sensors/ MCU/ software | Basics in physics, electronics and computer science | Written test | | Englisih | English | |
| Master 1 | S1 (Fall) | 1S12 | RTOS | RTOS | Real Time Operating System, microcontroller, Embedded System | 24 | 5/3 | Lecture/ Lab | This lecture is focused on Real Time Operating System for microcontroller. The students will implement FreeRTOS and exploit the capabilities in a MCU | Learning fundamental of an RTOS | Programming C, MCU | Lab Work | RTOS experience, MCU experience | French & English | English | none |
| Master 1 | S1 (Fall) | 1P1 | Technical project | Projet technique | IoT, embedded system, mobile development | 72 | 5 | Lab 72h | This course consists in a technical project that students must carry on with the help of their tutor. | Problem Solving experience | none | Lab work. | Problem solving, electronics, informatics | French & English | French & English | none |
| Master 1 | S1 (Fall) | 1A | Intermediate English | Anglais (niv. intermédiaire) | English | 32 | 2 | | Acquisition and application of everyday language elements, using the book FCE Practice Test Plus 2 from Pearson. Training in reading various documents, in writing | At the end of this module, the student will have reached level B2 on the Common European Framework of Reference (CEFR) for | Being to sit the Cambridge First Certificate in English. | Written & Speaking | CECR B2 level | English | English | CECR B1 level |
| Master 1 | S1 (Fall) | 1H | Human, economic and social sciences | Sciences humaines économiques et sociales | | 40 | 3 | | | | | | | | | |
| Master 1 - Semestre 2 - SPRING | | | | | | | | | | | | | | | | |
| Master 1 | S2 (Spring) | 2S1 | STM32 & Sensor Application | STM32 & Application Capteur | STM32, Programmation, Sensor | 24 | 5/3 | Lecture | This lecture consists in developing the experience of the students on microcontroleur. It addresses the use of GPIO, Interruption, DAC & ADC for signal processing . | Learn how to program a microcontroller of 32 bits | Basic knowledge on microntrollers | Lab work | Microntrollers programming | French & English | French | |
| Master 1 | S2 (Spring) | 2M2 | Linky enedis | Linky | Linky | 24 | 5/3 | Lecture (8h) and Lab (16h) | The objective of this course is to teach the fundamentals of electrical grid architecture & make them practice on Xcos | Electrical grid fundamental | MCQ test. | Lab work | Knowledge on the fundamental principles about securing codes and systems. | French & English | English | |
| Master 1 | S2 (Spring) | 2M3 | Electrical grid intro + Simulation part 1 | introduction to electric network architecture, players + simulation loadflow on Xcos | electrical grid, Xcos | 24 | 5/3 | Lecture (8h) and Lab (16h) | Learning fundamental to medium knowledge on how to secure an operating system or an application. | Fundamentals on operating systems, Linux shell, programming languages and algorithms, and virtual machines | STM32 Programmation | Written test | | French & English | French | none |
| Master 1 | S1 (Fall) | 2E4 | Introduction to security | Sécurité institutionnelle | security, hacking, threats, authentication, software flaws, prevention and detection systems | 24 | 5/3 | Lecture 4h Lab 20h | This lecture is an introduction to systems security, including the presentation of legal environment, auditing methods and tools. | Learning fundamental to medium knowledge on how to secure an operating system or an application. | Fundamentals on operating systems, Linux shell, programming languages and algorithms, and virtual machines | MCQ test. | Knowledge on the fundamental principles about securing codes and systems. | French & English | English | none |
| Master 1 | S2 (Spring) | 2S5 | Architecture & Security | Archi & sécurisation | Architecture, Security | 24 | 5/3 | Lecture | Security Cryptography, Smart Card architecture, Attack method but this course is nott A course on cryptography, hacking guide, … | To place the Smart Card in its context To evidence its added-value in securing a systemTo identify its functional and security | STM32 Programmation | Lab work | Understand that security & design should be realized at the same time | English | French | none |
| Master 1 | S2 (Spring) | 2E6 | Python for data science | Python pour data science | Python, big data, analysis, data sets | 24 | 5/3 | Lecture 8h Lab 16h | The goal of this lecture is to learn how to analize big data sets using Python language : with tools like Jupyter, Numpy, Pandas, scikit and how to store and retrieve data with | Learning fundamentals and medium knowledge on data analysis with Python. | Basics of Python language. | Lab work and written test. | Knowledge on how to analyze big data sets using Python. | French & English | French & English | none |
| Master 1 | S2 (Spring) | 2P1 | Technical Project | Projet technique | Renewable Energy, Electronics, informatics | 72 | 10/3 | Lab 72h | This course consists in a technical project that students must carry on with the help of their tutor. | Problem Solving experience | none | Lab work. | Problem solving, electronics, informatics | French & English | French & English | none |
| Master 1 | S1 (Fall) | 2E7 | Advanced JavaScript and PHP | Javascript avancée (AngularJS, NodeJS) | AngularJS, NodeJS, jQuery | 24 | 5/3 | Lecture/ lab | This lecture presents widely used JavaScript libraries like AngularJS, NodeJS or jQuery. The purpose is to undestand the architecture of Web applications bases on these | Learning medium to advanced knowledge on well-known JavaScript libraries | Fundamentals on HTML5, CSS3, JavaScript. | Lab work. | Knowledge on Web technologies | French & English | French & English | none |
| Master 1 | S2 (Spring) | 2O8 | fablab (prototiping) | Fab Lab | 3D printer, packaging | 28 | 5/3 | lab | The aim of this course is to design a packaging for an electronic device. It allows to learn the use of 3D modeling software as well as the use of 3D printer | learn how to use 3D modeler software and 3D printers | none | lab work. | | French & English | French & English | |
| Master 1 | S2 (Spring) | 2M9 | autoconsommation enedis | autoconsommation enedis | Consumption | 24 | 5/3 | Lab 24h | The objective of this course is to teach the fundamentals of electrical grid architecture | | | Written test | Object oriented programming, C++ langage | French & English | French & English | none |
| Master 1 | S2 (Spring) | 2P2 | Technical Project | Projet technique | Renewable Energy, Electronics, informatics | 72 | 5 | Lab 72h | This course consists in a technical project that students must carry on with the help of their tutor. | Problem Solving experience | none | Lab work. | Problem solving, electronics, informatics | French & English | French & English | none |
| Master 1 | S2 (Spring) | 2A | Intermediate English | Anglais (niv. intermédiaire) | English | 30 | 2 | | Acquisition and application of everyday language elements, using the book FCE Practice Test Plus 2 from Pearson. Training in reading various documents, in writing | At the end of this module, the student will have reached level B2 on the Common European Framework of Reference (CEFR) for | Being to sit the Cambridge First Certificate in English. | Written & Speaking | CECR B2 level | English | English | CECR B1 level |
| Master 1 | S2 (Spring) | 2H | Human, economic and social sciences | Sciences humaines économiques et sociales | | 72 | 3 | | | | | | | | | |
| Master 1 - Semestre 2 - SPRING | | | | | | | | | | | | | | | | |
| Master 2 | S1 (Fall) | 3M1 | Microgrid | Microgrid | Wind turbine ,photovolataic, cogeneration, port | 24 | 5/3 | Lab 24h | This lecture will present all technologies, solar panel, wind turbine, autonomous port, cogeneration | Electrical network basic knowledge | Basic knowledge on renewables energy | Lab Work | RT OS experience, Linux experience | French | French & English | none |
| Master 2 | S1 (Fall) | 3M2 | Maintenance predictive | Predictive management | Prediction | 24 | 5/3 | Lab 24h | This lecture will present all technologies, solar panel, wind turbine, autonomous port, cogeneration | Electrical network basic knowledge | Basic knowledge on renewables energy | Lab Work | RT OS experience, Linux experience | French | French & English | none |
| Master 2 | S1 (Fall) | 3M3 | V2E Enedis | Vehicule électrique | Automotive, Electrical | 24 | 5/3 | Lecture (8h) and Lab (32h) | Presentation of the ultrasonic defects, vibration analysis, infrared thermography | Learn how to realize Smart Home solutions | digital electronics, telecommunication basics, microcontrollers or raspberry Pi | Labwork | Experience in Smart Home devices design : grid connection, telecommunication et prototyping | French & English | French & English | none |
| Master 3 | S1 (Fall) | 3S4 | Power management & Low level | Power management & Low level | Embedded System, Power management | 24 | 5/3 | Project | This teaching focuses on the issues related to the speed of calculus of a microcontroller versus the required power consumption. | Measure power consumption. Programming MCU optimisations | fundamentals on MCU findamentals in C | Project | Microntrollers programming Power consumption optimisation | french and english | English | none |
| Master 3 | S1 (Fall) | 3M5 | Electrical grid intro - Simulation part 2 | Electrical grid intro - Simulation part 2 | Electrical grid | 24 | 5/3 | Lecture/ Tutorial | Presentation of the ultrasonic defects, vibration analysis, infrared thermography | Fundamentals on predictive maintenance. | Fundamentals on predictive maintenance. | Project validation | To Design a well calibrated antenna for a given application | French & English | French & English | none |
| Master 3 | S1 (Fall) | 3S6 | Embedded IA | IA et système embarqué | IA, Embedded system | 24 | 5/3 | Lecture/ Tutorial | Methodology to implement IA for electronics application | IA | IA | Project validation | To be able to realize an embedded application with IA | French & English | French | none |
| Master 2 | S1 (Fall) | 3P3 | Technical project | Projet technique | Renewable Energy, Electronics, informatics | 72 | | Lab 72h | This course consists in a technical project that students must carry on with the help of their tutor. | Problem Solving experience | none | Lab work. | Problem solving, electronics, informatics | French & English | French & English | none |
| Master 3 | S1 (Fall) | 3E7 | Data science, statistics, and analysis tools | Data science, statistiques, et outils d'analyse (Predicsis, Splunk) | Hadoop, analysis, predictions | 24 | 2/1 | Lecture 8h Lab 16h | This course targets students with experience in any programming language (functional or object-oriented) who want to get an introduction to the Big Data | Learning medium to advanced knowledge on Big Data analysis tools. | Fundamentals on databases and Big Data. | Team project, MCQ. | Design a Big Data solution, import datasets, know how to do ETL, evaluate the quality of imported data. | French & English | French & English | none |
| Master 3 | S1 (Fall) | 3O8 | Metrology & Telecommunication | Metrologie et communication | Microwave, Radio Frequency Measurement | 24 | 5/3 | Course/ Lab | This course presents the measurement methodology for microwave devices. The students will learn and practice how to use the main RF measurement | RF measurement RF circuit performances | fundamentals in telecommunication and RF | Labwork | RF & microwave measurement | french and english | English | none |
| Master 3 | S1 (Fall) | 3O9 | Telecommunication | Télécommunications analogiques | Transmission lines, S-parameters, Impedance matching, FRIIS | 24 | 5/3 | Lecture | This lecture presents the fundamentals of telecommunication, from transmission lines equations to impedance matching, by introducing S-parameters and FRIIS equation | Learn how to optimize a Radio Frequency signal transmission on embedded systems | Mathematics, signal processing | Written test | Telecommunication basic knowledge for radio frequency systems design | French & English | French & English | none |
| Master 2 | S1 (Fall) | 3P2 | Technical project | Projet technique | Renewable Energy, Electronics, informatics | 72 | | Lab 72h | This course consists in a technical project that students must carry on with the help of their tutor. | Problem Solving experience | none | Lab work. | Problem solving, electronics, informatics | French & English | French & English | none |
| Master 3 | S1 (Fall) | 3H | Advanced English | Anglais (niv. avancé) | English | 30 | 2 | | Acquisition and application of everyday language elements, using the book FCE Practice Test Plus 2 from Pearson. Training in reading various documents, in writing | At the end of this module, the student will have reached level C1 on the Common European Framework of Reference (CEFR) for | | Written & Speaking | CECR C1 level | English | English | CECR B2 level |
| Master 3 | S1 (Fall) | 3H | Human, economic and social sciences | SHES | | 72 | 3 | | | | | | | | | |

| Cursus | Semester | Course | Course title | Titre FR | Keywords | Hourly | ECTS | Course type | Summary | Objectives | Prior knowledge | Assessment | Learning outcomes | Doc. language | Teach. language | Complementary information |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Master 1 - Semestre 1 - FALL | | | | | | | | | | | | | | | | |
| Master 1 | S1 (Fall) | 1E1 | Basis databases BDD | Bases de données relationnelles | database, relational, management system | 24 | 5/3 | Lecture 4h<br>Lab 20h | This lecture pursues the introduction to databases seen in third year. It begins with some recalls on the SQL language, presents new | Learning medium to advanced knowledge on relational databases | Linux shell, databases and SQL language basics, basics on relational model | MCQ each week, and written test at the end | use of database server, SQL operators, embedded programming on a database server | English | English | none |
| Master 1 | S1 (Fall) | 1E2 | Linux shell | Systèmes d'exploitation (Shell) | kernel, shell, bash, scripting | 24 | 5/3 | Lab 24h | This lecture pursues the introduction to Linux shell seen in third year. Practical class is realized under Linux. | Learning medium to advanced knowledge on Linux shell | Fundamentals on Linux. | Written test. | Knowledge on Linux shell and bash scripting | French & English | English | none |
| Master 1 | S1 (Fall) | 1E6 | AI and neural networks | Réseaux de neurones / Intelligence Artificielle | neural networks, AI, automated learning, logical reasoning | 24 | 5/3 | Lecture 10h<br>Lab 14h | This lectures is an introduction to artificial intelligence, neural networks, automated learning, hybrid computation | Learning fundamental knowledge on neural networks and machine learning. | Fundamentals on programming languages and data structures. | Written test. | Knowledge on the most widely use theoretical and practical machine learning structures. | English | English | none |
| Master 1 | S1 (Fall) | 1S4 | Physics of solids, semiconductors & devices | Physique du composant | Atoms, Solids, Band structure, Crystallography, Semiconductors, electrons & holes, space charge layer, PN junction | 24 | 5/3 | Lecture 12h<br>Tutorial 12h | Starting from the electronic structure of atoms and molecules, we study the properties of solids from their electronic band | - Basics in Physics of Solids<br>- Understanding of the interest of semiconductors in the realization of electronic components | Basic quantum physics | Written test. | Understanding of the physics phenomena leading to currents in devices, the way to control them and basic calculations of currents in | English | English | Bibliography<br>[1] Physics of semiconductor devices, S.M.SZE, John Wiley & Sons (1981)<br>[2] D.K. SCHRODER : |
| Master 1 | S1 (Fall) | 1S5 | Labview (Theoretical) | Labview Théorique | LabVIEW, Naional Instrument | 24 | 5/3 | Lecture and Lab | This lectures presents the basics of LabVIEW programming by introducing the way the language works and how it is used by | Learn how LabVIEW works, and get basic knowledge to prepare for CLAD certification | Basics in Informatics | MCQ | Labview programming theory | French & English | English | none |
| Master 1 | S1 (Fall) | 1S6 | Conception of Digital circuits: From semiconductors to Integrated Circuits | Conception de circuits digitaux | Semiconductors, Integrated Resistance, MOS Capacitance, MOSFET, CMOS cells, FDSOI node | 24 | 5/3 | Lecture and tutorial | This courses begins with a thorough review of actual digital circuits with a short history of circuit integration. Its goal is to develop a | - Knowledge of basic elements and components for the design of integrated circuits, focusing on the tradeoff between | Physics of semiconductors, Basics from electrostatics, Family Components, logic operation | Written test. | Know how to use proper modeling based on a degree of accuracy for a digital MOS circuit design application | English | English | Information for visiting students:<br>Calculate the basic parameters for resistance, capacitance and n-channel |
| Master 1 | S1 (Fall) | 1S7 | FPGA1 | FPGA1 | FPGA | 24 | 5/3 | Tutorial | - To Understand the design process for implementing a digital design onto a FPGA<br>- VHDL Programmation - Step | Getting started with the FPGA and realization of different functional structures in VHDL language | VHDL | Written test | FPGA level 1 and VHDL coding | English | English | Download Vivado (required for using BASYS 3 board)<br><br>Bibliography<br>FPGA Design: Best Practices |
| Master 1 | S1 (Fall) | 1S8 | FPGA 2 | FPGA 2 | FPGA, VHDL, Cryptography | 24 | 5/3 | Tutorial | Introduction of cryptography solutions (AES, DES, ....)<br>Cryptographic Applications using FPGA Technology<br>FPGA Implementation of AES | Using FPGA, on an cryptographic application | FPGA1 | Written test | FPGA level 2 and cryptographie application (AES) | English | English | Download Vivado (required for using BASYS 3 board)<br><br>Bibliography<br>FPGA Design: Best Practices |
| Master 1 | S1 (Fall) | 1E9 | Server-side programming with Python | Programmation dynamique coté serveur (PHP, Python) | python, django | 24 | 5/3 | Lecture 16h<br>Lab 8h | This lecture introduces student to general programming with Python 3. Although most of them know the basics of Python, this | Learnin beginner to medum knowledge with Python | Linux shell, databases, OOP, basic HTML, coding editor or IDE | Written test at the end | Python programming, good practices, Python landscape overview | English | English | none |
| Master 1 | S1 (Fall) | 1S10 | Hardware architecture and functional analysis | Analyse fonctionnelle hardware | Processor, ARM, architecture | 24 | 1,5 | Lecture | This lecture introduces the industrial design of processors by describing the ARM architecture | Learn how ARM processors work and how they are designed | Digital electronics, architecture | Writtent test | ARM architecture | french and english | English | none |
| Master 1 | S1 (Fall) | 1S11 | Hardware & software architecture for IoT | Architecture hardware orientée IoT | low level and high level architecture | 24h | 5/3 | Lecture<br>Tutorial | Sensors overview<br>Main wired communication protocol<br>Power consumption<br>Processing | -Having an wide overview to hardware and software constraints in IoT application<br>- Present a Benchmark of the main sensors/ MCU/ software | Basics in physics, electronics and computer science | Written test | | Englisih | English | |
| Master 1 | S1 (Fall) | 1S12 | RTOS | RTOS | Real Time Operating System, microcontroller, Embedded System | 24 | 5/3 | Lecture/Lab | This lecture is focused on Real Time Operating System for microcontroller. The students will implement FreeRTOS and exploit the | Learning fundamental of an RTOS | Programming C, MCU | Lab Work | RTOS experience, MCU experience | French & English | English | none |
| Master 1 | S1 (Fall) | 1S13 | Labview - Practice | Labview pratique | Labview Software | 24 | 5/3 | Tutorial | Labview Fondamental 1 - Exercices<br>- Labview Navigation<br>- Identification of problems and development of VIs | Getting started with Labview Software | Labview - Theory | Written test | Direct implementation of the theoretical Labview course | French & English | English | Information for visiting students:<br>Download Labview software http://www.ni.com/white-paper/13413/en |
| Master 1 | S1 (Fall) | 1S14 | Labview FPGA | Labview - FPGA | Labview Software, FGPA | 24 | 5/3 | Tutorial | First LabVIEW FPGA Writing Program<br>Implementing Counters in LabVIEW FPGA<br>Using analog inputs and | To be able to realize an elementary functionality by using Labview FPGA... | Labview - Theory & Practice<br>FPGA1 & FPGA2 | Written test | Using the FPGA with an Labview Approach | English | English | Information for visiting students:<br>To know Labview software<br>To already have downloaded Labview software (classical & |
| Master 1 | S1 (Fall) | 1S15 | Labview - Certification | Labview Certification | Labview Software certification | 24 | 5/3 | Tutorial | Preparation of Labview Certification - CLAD | CLAD Certification | Labview - Theory<br>Labview - Practice | Written test | Certification Labview | French & English | English | Download Labview software http://www.ni.com/white-paper/13413/en<br><br>Bibliography |
| Master 1 | S1 (Fall) | 1A | Intermediate English | Anglais (niv. intermédiaire) | English | 32 | 2 | | Acquisition and application of everyday language elements, using the book FCE Practice Test Plus 2 from Pearson. Training in reading various | At the end of this module, the student will have reached level B2 on the Common European Framework of Reference (CEFR) for | Being to sit the Cambridge First Certificate in English. | Written & Speaking | CECR B2 level | English | English | CECR B1 level |
| Master 1 | S1 (Fall) | 1H | Human, economic and social | Sciences humaines | | 40 | 3 | | | | | | | | | |
| Master 1 - Semestre 2 - SPRING | | | | | | | | | | | | | | | | |
| Master 1 | S2 (Spring) | 2S1 | STM32 & Sensor Application | STM32 & Application Capteur | STM32, Programmation, Sensor | 24 | 5/3 | Lecture | This lecture consists in developing the experience of the students on microcontroleur. It addresses the use of GPIO, Interruption | Learn how to program a microcontroller of 32 bits | Basic knowledge on microntrollers | Lab work | Microntrollers programming | French & English | French | none |
| Master 1 | S2 (Spring) | 2S2 | STM32 & Communication Application | STM32 & Application Communication | STM32, Communication | 24 | 5/3 | Tutorial | This lecture presents most used communications protocols as SPI, UART? I2C for STM32 | Learn how to program a communication protocole on microcontroller of 32 bits | Basic knowledge on microntrollers | Lab work | Microntrollers programming<br>Communication protocols knowledge | French & English | French | none |
| Master 1 | S1 (Fall) | 1S3 | Circuit Design | Conception analogique (filtrage, etc..) | Analog Design, Feedback effect, Filter | 24 | 5/3 | Lecture 8h<br>Tutorial 16h | Getting start on Eagle software II<br>- Reminder of important notions<br>- Be able to realize a circuit | - Become familiar with the use of the softwares MultiSim (NI) Eagle<br>- Learn the advantages & | Getting start Eagle software I,<br>Concept of circuit design in analog and digital electronics (Electronics I, Logic I) | Written test. | Being able to realize an analog circuit responding to a given application | English | English | Bibliography<br>https://www.autodesk.com/products/eagle/overview<br>https://www.autodesk.com/products/eagle/free- |
| Master 1 | S2 (Spring) | 2S4 | Security & IC | Sécurisation des systèmes embarqués | Architecture & security introduction | 24 | 5/3 | Lecture | Security Cryptography, Smart Card architecture, Attack method but this course is nott A course on cryptography, hacking guide | Learn how to design & analyze a power electronics circuit to fulfill the recommendations | Fundamentals un electronics | Written test | Introduction of IC design & security | English | English / French | none |
| Master 1 | S2 (Spring) | 2S5 | Architecture & Security | Archi & sécurisation | Architecture, Security | 24 | 5/3 | Lecture | Security Cryptography, Smart Card architecture, Attack method but this course is nott A course on cryptography, hacking guide | To place the Smart Card in its context To evidence its added-value in securing a systemTo identify its functional and security | STM32 Programmation | Lab work | Understand that security & design should be realized at the same time | English | French | none |
| Master 1 | S2 (Spring) | 2S6 | Market & Hacking | Marché & Hacking | Hacker & Solution | 24 | 5/3 | Lecture/Tutorial | Introduction à la sécurité Hardware, Attaques Side Channel Attaques par injection de fautes, … | Design et simulation de contremesures | MOS design, Cadence software | Lab work | How to protect a circuit from hardware and software attacks using hardware solutions | English | French | none |
| Master 1 | S2 (Spring) | 2P1 | Technical project | Projet technique | Microcontroler, IC, Analog Design, System & Application | 72 | 5 | Lab 8h | This course consists in a technical project that students must carry on with the help of their tutor. | Problem Solving experience | none | Lab work. | Problem solving, electronics, informatics | French & English | French & English | none |
| Master 1 | S2 (Spring) | 2R7 | Power electronics | Electronique de puissance théorique | Power Circuit | 24 | 5/3 | Lecture | This lecture introduces the basics of power electronics, by addressing step up & step down converters, buck-boos converters, flyback & | Learn how to design & analyze a power electronics circuit to fulfill the recommendations | Fundamentals un electronics | Written test | DC-DC converters designs, AC to DC / DC to AC converters design | French & English | French & English | none |
| Master 1 | S2 (Spring) | 2R8 | Robot moving | Moteur commande optimisé | strategies de deplacement de robot basé sur l'image | 24 | 5/3 | Lab 24h | Application project with motors and image processing | | Basic image processing and control motor | Lab work | Basic image processing and control motor | French | English | none |
| Master 1 | S2 (Spring) | 2E10 | Advanced programming with C++ | Programmation avancée C++ | C++, programming, design patterns | 24 | 5/3 | Lecture 8h<br>Lab 16h | This course presents to programmers the main differences between JAVA and C ++ and approaches some advanced | Learning medium to advanced knowledge on C++ and design patterns. | C language, procedural programming, bascis of object-oriented programming. | Written test. | Knowledge on how to design an application in C++ following the most well know design patterns. | French & English | French & English | none |
| Master 1 | S2 (Spring) | 2P2 | Technical project | Projet technique | Application, Technical solution implementation | 72 | 5 | Lab 72h | Direct application of different lessons<br>Applied practical work<br>Project with an application selected by the students | Being able to apply the course with relative autonomy | STM32 | Project validation | | English | English | none |
| Master 1 | S2 (Spring) | 2A | Intermediate English | Anglais (niv. intermédiaire) | English | 30 | 2 | | Acquisition and application of everyday language elements, using the book FCE Practice Test Plus 2 from Pearson. Training in reading various | At the end of this module, the student will have reached level B2 on the Common European Framework of Reference (CEFR) for | Being to sit the Cambridge First Certificate in English. | Written & Speaking | CECR B2 level | English | English | CECR B1 level |
| Master 1 | S2 (Spring) | 2H | | SHES | Sciences humaines économiques et sociales | 72 | 3 | | | | | | | | | none |
| Master 2 - Semestre 1 - FALL | | | | | | | | | | | | | | | | |
| University Program - Double Diploma | | | | | | | | | | | | | | | | |

| Cursus | Semester | Course code | Course title | Titre FR | Keywords | Hourly volume | ECTS | Course type | Summary | Objectives | Prior knowledge | Assessment | Learning outcomes | Doc. language | Teach. language | Complementary information |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Master 1 - Semestre 1 - FALL | | | | | | | | | | | | | | | | |
| Master 1 | S1 (Fall) | 1E1 | Basis databases BDD | Bases de données relationnelles | database, relational, management system | 24 | 5/3 | Lecture 4h<br>Lab 20h | This lecture pursues the introduction to databases seen in third year. It begins with some recalls on the SQL language, presents new | Learning medium to advanced knowledge on relational databases | Linux shell, databases and SQL language basics, basics on relational model | MCQ each week, and written test at the end | use of database server, SQL operators, embedded programming on a database server | English | English | none |
| Master 1 | S1 (Fall) | 1E2 | Linux shell | Systèmes d'exploitation (Shell) | kernel, shell, bash, scripting | 24 | 5/3 | Lab 24h | This lecture pursues the introduction to Linux shell seen in third year. Practical class is realized under Linux. | Learning medium to advanced knowledge on Linux shell | Fundamentals on Linux. | Written test. | Knowledge on Linux shell and bash scripting | French & English | English | none |
| Master 1 | S1 (Fall) | 1E6 | AI and neural networks | Réseaux de neurones / Intelligence Artificielle | neural networks, AI, automated learning, logical reasoning | 24 | 5/3 | Lecture 10h<br>Lab 14h | This lectures is an introduction to artificial intelligence, neural networks, automated learning, hybrid computation | Learning fundamental knowledge on neural networks and machine learning. | Fundamentals on programming languages and data structures. | Written test. | Knowledge on the most widely use theoretical and practical machine learning structures. | English | English | none |
| Master 1 | S1 (Fall) | 1E4 | System programming | Programmation système | operating system, services, kernel, shell | 24 | 5/3 | Lecture 4h Lab 20h | This lecture pursues the introduction to operating systems seen in third year. Practical class is realized under Linux. | Learning medium to advanced knowledge on operating systems | Fundamentals on operating systems. | Written test. | Knowledge on operating systems | french and english | English | none |
| Master 1 | S1 (Fall) | 1E5 | Intermediate Network | Réseau - Intermédiaire | network | 24 | 5/3 | Lab 24h | This lecture pursues the introduction to networks seen in third year. | Learning medium to advanced knowledge on networks | Fundamentals on networking. | Test on a computer, using Packet Tracer Software. | Network advanced | English | English | none |
| Master 1 | S1 (Fall) | 1E6 | UML | UML | object-oriented programming, UML, modelling, classes, diagrams | 24 | 5/3 | Lab 24h | This lecture presents the use of UML modelling language for object-oriented programming: use cases diagrams, class diagrams, and | Learning fundamentals and medium knowledge on UML formalism. | Fundamentals on object-oriented programming, basics on Java language. | Written test. | Knowledge on UML and object-oriented modelling. | French & English | English | none |
| Master 1 | S1 (Fall) | 1E7 | Advanced HTML5 | HTML5 | HTML5, CSS3, JavaScript | 24 | 5/3 | Lecture 8h<br>Lab 16h | This lecture presents advanced capabilities provided by HTML5 and JavaScript (Websockets, workers API, geolocation | Learning medium to advanced knowledge on HTML5, CSS3 and JavaScript | Fundamentals on HTML5, CSS3, JavaScript. | Lab work. | Knowledge on Web technologies | English | English | none |
| Master 1 | S1 (Fall) | 1E8 | Advanced JavaScript and PHP | Javascript avancée (AngularJS, NodeJS) | AngularJS, NodeJS, jQuery | 24 | 5/3 | Lecture 8h<br>Lab 16h | This lecture presents widely used JavaScript libraries like AngularJS, NodeJS or jQuery. The purpose is to undestand the architecture of Web | Learning medium to advanced knowledge on well-known JavaScript libraries | Fundamentals on HTML5, CSS3, JavaScript. | Lab work. | Knowledge on Web technologies | English | English | none |
| Master 1 | S1 (Fall) | 1C9 | Cybersecurity Introduction - Level 1 | Cybersecurity Introduction - Level 1 | Cybersecurity | 24 | 5/3 | Lecture 16h<br>Lab 8h | During this session, we explore the history of nework and computer hacking and analysis some of the biggest attacks having occured in the | Introducing cybersecurity history, vocabulary and concept | Linux shell | Written test. | Cybersecurity- Hacking capability | English | English | none |
| Master 1 | S1 (Fall) | 1E10 | Parallel computing | Techniques de parallélisation | parallelism, threading, hardware, algorithmics | 24 | 5/3 | Lecture 10h<br>Lab 14h | This lecture is a presentation of most of the well-known techniques used for parallelizing algorithms execution, and the | Learning medium to advanced knowledge on multi-threaded programming, vectorization of code, and hardware | Fundamentals on operating systems, C language, oriented-object programming, and computer components like CPU and | Written test. | Knowledge on methods to apply for parallelizing computations. | French & English | English | none |
| Master 1 | S1 (Fall) | 1C11 | Cybersecurity Introduction - Level 2 | Cybersecurity Introduction - Level 2 | Cybersecurity | 24 | 5/3 | Lecture 8h<br>Lab 16h | Since its introduction at the beginning of the 90', web technologies are everywhere, from web to mobile applications, from connected | Learn web application penetration testing through hands-on labs | linux shell, databases and SQL language basics, basics on relational model | QCM | Cybersecurity & Vulnaribility | French & English | English | none |
| Master 1 | S1 (Fall) | 1C12 | Programming language security | Programming language security | Programmation, Security | 24 | 5/3 | Lab 24h | Many, many programming languages are in active use, and many more have been created.<br>What makes them different | Goroutines, await/async, undefined behavior, and SMT solvers, all in one module! | Fluency with at least one programming language. | QCM + project | Problem solving, electronics, informatics | French & English | English | none |
| Master 1 | S1 (Fall) | 1P1 | Technical project | Projet technique | Microcontroler, IC, Analog Design, System & Application | 72 | 5 | Lab 72h | This course consists in a technical project that students must carry on with the help of their tutor. | Problem Solving experience | none | Lab work. | Problem solving, electronics, informatics | French & English | French & English | none |
| Master 1 | S1 (Fall) | 1A | Intermediate English | Anglais (niv. intermédiaire) | English | 32 | 2 | | Acquisition and application of everyday language elements, using the book FCE Practice Test Plus 2 from Pearson. Training in reading various | At the end of this module, the student will have reached level B2 on the Common European Framework of Reference (CEFR) for | Being to sit the Cambridge First Certificate in English. | Written & Speaking | CECR B2 level | English | English | CECR B1 level |
| Master 1 | S1 (Fall) | 1H | Human, economic and social sciences | Sciences humaines économiques et sociales | | 40 | 3 | | | | | | | | | |
| Master 1 - Semestre 2 - SPRING | | | | | | | | | | | | | | | | |
| Master 1 | S2 (Spring) | 2E1 | Native mobile development - 1 | Développement mobile natif sur Android | android, native, application, mobile | 40 | 2,5 | Lecture 8h<br>Lab 24h | Learn the fundamentals and the methods used to develop native mobile application for Android operating system. The lecture will show how an | Learning fundamentals, medium and advanced knowledge on mobile development. | Linux, Java language, algorithmics. | Team project. | Knoweldge on how to develop a mobile application. | French & English | French & English | none |
| Master 1 | S2 (Spring) | 2C2 | Mobile security | Mobile security | Security | 32 | 2,5 | Lecture 8h<br>Lab 32h | The training starts with a description of the context of mobile security, including the key figures and the main attacks. Then we go through | Understand mobile security landscape and how to exploit vulnerabilities in mobile applications | Android Operating system, Android IDE | Project | | French & English | French & English | none |
| Master 1 | S1 (Fall) | 2C4 | Cryptography | Cryptography | Cryptography | 40 | 5/3 | Lecture 4h<br>Lab 20h | This course starts by presenting the basic algorithms used in modern cryptography to provide encryption, hashing | Understand the cryptographic algorithms to use them safely as a security engineer | maths for engineers (modular arithmetic, finite fields), high level programming language (e.g. Java), computer security basics | two projects and a final written evaluation | | French & English | English | none |
| Master 1 | S2 (Spring) | 2C5 | Hardware Security | Hardware Security | Hardware | 24 | 5/3 | Lecture 10h<br>Lab 30h | Since 20 years, various physical attacks have been published to extract cryptographic keys from secure applications run by | Learn cyber attack at the hardware level to defeat crypto secure elements | Previous knowledge required: cryptographic standards (DES, AES, RSA, ECC), algorithmic, basics in Matlab programming would be a plus (please | Written test | | French & English | French & English | none |
| Master 1 | S2 (Spring) | 2P1 | Technical project | Projet technique | Microcontroler, IC, Analog Design, System & Application | 32 | 5/2 | Lab 8h | This course consists in a technical project that students must carry on with the help of their tutor. | Problem Solving experience | none | Lab work. | Problem solving, electronics, informatics | French & English | French & English | none |
| Master 1 | S1 (Fall) | 2C6 | IOT Security | IOT Security | IOT | 40 | 5/2 | Linux Security | Linux Security | Linux Security | Linux Security | Linux Security | Linux Security | Linux Security | Linux Security | Linux Security |
| Master 1 | S1 (Fall) | 2C7 | Linux Security | Linux Security | Linux | 40 | 5/3 | Lecture/lab | We're used to see IoT security breaches in the press, admire the smart guys that highlighted the problems, and blame the | Understand complexity of IoT solutions and discover good practices to design/evaluate IoT Solutions with consistent security level | Basic security notions, PKI, javascript | Project | | French & English | French & English | none |
| Master 1 | S2 (Spring) | 2C8 | Secure Supply Chain | Secure Supply Chain | Static Application Security Testing (SAST), Dynamic Application Security Testing (DAST), Continuous Integration / Delivery / | 32 | 5/3 | Lecture 8h<br>Lab 16h | This course gives the students a practical hands-on experience on how to securely build and deploy applications in the cloud. The | Building a Secure Supply Chain for applications in the cloud | Kubernetes, Docker, AWS | QCM | | French & English | French & English | none |
| Master 1 | S2 (Spring) | 2E9 | Advanced programming with C++ | Programmation avancée C++ | C++, programming, design patterns | 24 | 5/3 | Lecture 8h<br>Lab 16h | This course presents to programmers the main differences between JAVA and C ++ and approaches some advanced | Learning medium to advanced knowledge on C++ and design patterns. | C language, procedural programming, bascis of object-oriented programming. | Written test. | Knowledge on how to design an application in C++ following the most well know design patterns. | French & English | French & English | none |
| Master 1 | S2 (Spring) | 2P2 | Technical project | Projet technique | Microcontroler, IC, Analog Design, System & Application | 24 | 5 | Lab 72h | This course consists in a technical project that students must carry on with the help of their tutor. | Problem Solving experience | none | Lab work. | Problem solving, electronics, informatics | French & English | French & English | none |
| Master 1 | S2 (Spring) | 2C10 | Cybersecurity threat response team training | | | 48 | | PEM | During the last decade, aiming to defend ever more digitalized combat vessels on networks, the French navy has developed effective | Understand and exploit common network weaknesses and vulnerabilites | Network fundamentals, Linux & Windows OS, C, Shell & PowerShell | Students will be evaluated during the final exercise. They will acquire points by realizing technical actions and understanding the attack | Cybersecurity management | French & English | French & English | none |
| Master 1 | S2 (Spring) | 2A | Intermediate English | Anglais (niv. intermédiaire) | English | 32 | 2 | | Acquisition and application of everyday language elements, using the book FCE Practice | At the end of this module, the student will have reached level B2 on the Common | Being to sit the Cambridge First Certificate in English. | Written & Speaking | CECR B2 level | English | English | CECR B1 level |
| Master 1 | S2 (Spring) | 2H | Human, economic and social sciences | SHES | | 40 | 3 | | | | | | | | | |
| Master 2 - Semestre 1 - FALL | | | | | | | | | | | | | | | | |
| Master 3 | S1 (Fall) | 3C1 | Assembly language | Programmation bas niveau | Assembler | 40 | 5/2 | Lecture & Lab | Assembly language, the machine representation of instructions, and memory organization are presented in this course. Students will | Become familiar with x86 assembly language and how a modern Intel processor works. | Computer architecture | QCM + Project | Being able to code in assembly language | French & English | French & English | none |
| Master 3 | S1 (Fall) | 3E2 | Malware reverse engineering | Digital Investigation | Attaque, Protection | 32 | 5/2 | Lecture & Lab | Nowadays cybercriminals are smarter and develop complex and sophisticated malware to drive cyberattack. At the end of the module, students will | Learn how to analyse malware | Windows / Linux (Registry, Scheduled task memory) , Architecture CPU x86 + ASM, Network (IP/TPC, DNS, Traffic redirection), VBA / | Project | | French & English | French & English | none |
| Master 3 | S1 (Fall) | 3C5 | Security Operations Center | Sécurité des systèmes répartis et des architectures cloud | security, auditing, applications, databases, operating systems | 40 | 5/2 | Lecture & Lab | During this session, students will discover the purpose of a Security Operations Center. They will learn about the | Become familiar with SOC goals and how it works. | | QCM | Medium to advanced knowledge on how to secure an application (distributed or not), and how to respond to an attack or a potential | French & English | French & English | none |
| Master 3 | S1 (Fall) | 3C6 | Cloud Security | Plateforme IBM Bluemix | cloud computing, IBM, Bluemix, watson, AI | 32 | 5/2 | Lecture & Lab | During this session, students will discover the security world in Public Cloud. We will see an overview of the main principal security pilars | Learn how to implement security in the Cloud in few days ! | Bash, Basic knowledge in Linux, Already a first basic experience on AWS | QCM | Knowledge on how to develop an application based on cloud services. | French & English | French & English | none |
| Master 3 | S1 (Fall) | 3P3 | Technical project | Projet technique | Microcontroler, IC, Analog Design, System & Application | 72 | 2,5 | Lab 72h | This course consists in a technical project that students must carry on with the help of their tutor. | Problem Solving experience | none | Lab work. | Problem solving, electronics, informatics | French & English | French & English | none |
| Master 3 | S1 (Fall) | 3C7 | Incident Management | Gestion des incidents | Incident | 40 | 5/2 | Lecture 8h<br>Lab 16h | Last past years, cyberattacks increased significantly and strike companies. New security needs and skills appeared to investigate these | Learn how to properly manage cyber security incident | Windows / Linux (Registry, Scheduled task memory) , Architecture CPU x86 + ASM, Network (IP/TPC, DNS, Traffic redirection), VBA / | Project | Design a Big Data solution, import datasets, know how to do ETL, evaluate the quality of imported data. | French & English | French & English | none |
| Master 3 | S1 (Fall) | 3C8 | Information security management | Gestion de la sécurité des informations | Gestion information | 32 | 5/2 | Lecture 8h<br>Lab 16h | This course gives students the best practices of cybersecurity management, as specified in the ISO / IEC 27001:2013 standard, as well | Learning fundamental knowledge on cyber risk and cybersecurity management systems. | | Project | Knowledge on how to set-up and manage an hypervised architecture. | French & English | French & English | none |
| Master 3 | S1 (Fall) | 3A | Technical project | Projet technique | Microcontroler, IC, Analog Design, System & Application | 72 | 5 | Lab 72h | This course consists in a technical project that students must carry on with the help of their tutor. | Problem Solving experience | none | Lab work. | Problem solving, electronics, informatics | French & English | French & English | none |
| Master 3 | S1 (Fall) | 3H | Advanced English | Anglais (niv. avancé) | English | 32 | 2 | | Acquisition and application of everyday language elements, using the book FCE Practice Test Plus 2 from Pearson. Training in reading various | At the end of this module, the student will have reached level C1 on the Common European Framework of Reference (CEFR) for | | Written & Speaking | CECR C1 level | English | English | CECR B2 level |
| Master 3 | S1 (Fall) | 3H | Human, economic and social sciences | SHES | | 40 | 3 | | | | | | | | | |