

### Semester S5

| Code     | Course Unit                              | ECTS | Code     | Course                                                  | Coeff     | Teacher       | Vol | CM | TD | TP |
|----------|------------------------------------------|------|----------|---------------------------------------------------------|-----------|---------------|-----|----|----|----|
| 5IUSNN03 | Mathematics 1                            | 5    | 5JESNN30 | Complex Analysis                                        | 0,34      | B. Florentin  | 20  | 10 | 10 | 0  |
|          |                                          |      | 5JESNN31 | Mathematics for engineers                               | 0,66      | A. Gueudin    | 32  | 16 | 16 | 0  |
|          |                                          |      | 5JESNN41 | Electrical Circuits and Applications                    | 0,32      | M. Hinaje     | 40  | 18 | 14 | 8  |
| 5IUSNN04 | Signals, Systems and Electrical Circuits | 10   | 5JESNN40 | Modeling of Signals, Systems and Link Graphs            | 0,28      | V. Louis-Dorr | 30  | 14 | 6  | 10 |
|          |                                          |      | 5JESNN42 | Analytical Modeling in Mechanics and Electricity        | 0,4       | A. Pereira    | 40  | 20 | 20 | 0  |
|          |                                          |      | 5JESNN50 | Algorithms and programming                              | 0,44      | ?             | 30  | 7  | 5  | 18 |
| 5IUSNN05 | Information Sciences 1                   | 5    | 5JESNN51 | Discrete Mathematics                                    | 0,56      | J.-F. Pétin   | 40  | 22 | 18 | 0  |
|          |                                          |      | 5JESNN20 | English                                                 | 0,5       | C. Corringer  | 24  | 0  | 24 | 0  |
| 5IUSNN02 | Languages 1                              | 5    | 5JESNN21 | Modern languages 2                                      | 0,5       | A. Quesada    | 24  | 0  | 24 | 0  |
|          |                                          |      | 5JESNN22 | Validation of the French language clearance certificate | pass/fail | A. Quesada    | 1   | 1  | 0  | 0  |
|          |                                          |      | 5JESNN11 | Business environment                                    | 0,3       | F. Tamsamani  | 20  | 14 | 6  | 0  |
| 5IUSNN01 | General Training 1                       | 5    | 5JESNN13 | Electrical authorization and occupational health        | pass/fail | T. Baileau    | 8   | 8  | 0  | 0  |
|          |                                          |      | 5JESNN15 | CSR 1                                                   | pass/fail | V. Louis-Dorr | 11  | 2  | 9  | 0  |
|          |                                          |      | 5JESNN17 | Industrial conferences                                  | pass/fail | P. Villette   | 6   | 6  | 0  | 0  |
|          |                                          |      | 5JESNN12 | Communication                                           | 0,3       | A. Thimon     | 16  | 0  | 16 | 0  |
|          |                                          |      | 5JESNN14 | Project management                                      | 0,4       | J.-C. Marpeau | 18  | 2  | 16 | 0  |
|          |                                          |      | 5JESNN14 | 1st year project                                        | pass/fail | J.-C. Marpeau | 30  | 0  | 0  | 30 |
|          |                                          |      |          |                                                         |           |               |     |    |    |    |

### Semester S6

| Code                        | Course Unit                               | ECTS | Code                        | Course                                                  | Coeff     | Teacher       | Vol | CM | TD | TP  |
|-----------------------------|-------------------------------------------|------|-----------------------------|---------------------------------------------------------|-----------|---------------|-----|----|----|-----|
| 6IUSNN05                    | Mathematics 2                             | 5    | 6JESNN51                    | Numerical Analysis                                      | 0,6       | ?             | 36  | 16 | 20 | 0   |
|                             |                                           |      | 6JESNN50                    | Probability and statistics                              | 0,4       | ?             | 36  | 18 | 18 | 0   |
| 6IUSNN06                    | Automation, thermodynamics and simulation | 5    | 6JESNN60                    | Dynamics of Energy Systems & Applied Kinematics CATIA   | 0,44      | B. Remy       | 30  | 10 | 8  | 12  |
|                             |                                           |      | 6JESNN61                    | Automatic - Dynamics and Control of Systems             | 0,56      | J. Daafouz    | 36  | 14 | 7  | 15  |
| 6IUSNN04                    | Study office                              | 5    | 6JESNN40                    | SAMI design office                                      | 1         | V. Louis-Dorr | 45  | 0  | 0  | 45  |
| 6IUSNN07                    | Computer science                          | 5    | 6JESNN70                    | Algorithmics and Object-Oriented Programming            | 0,36      | V. Chevrier   | 30  | 7  | 5  | 18  |
|                             |                                           |      | 6JESNN71                    | Databases                                               | 0,28      | ?             | 18  | 6  | 3  | 9   |
|                             |                                           |      | 6JESNN72                    | Algorithms and data structures                          | 0,36      | YQ Song       | 27  | 9  | 6  | 12  |
| 6IUSNN02                    | Languages 2                               | 5    | 6JESNN20                    | English                                                 | 0,5       | C. Corringer  | 24  | 0  | 24 | 0   |
|                             |                                           |      | 6JESNN21                    | Modern Languages 2                                      | 0,5       | A. Quesada    | 24  | 0  | 24 | 0   |
|                             |                                           |      | 6JESNN22                    | Validation of the French language clearance certificate | pass/fail | A. Quesada    | 1   | 1  | 0  | 0   |
| 6IUSNN01                    | General Training 2                        | 5    | 6JESNN12                    | Management                                              | 0,2       | F. Tamsamani  | 16  | 10 | 6  | 0   |
|                             |                                           |      | 6JESNN14                    | Innovation and Entrepreneurship                         | 0,2       | F. Tamsamani  | 12  | 0  | 12 | 0   |
|                             |                                           |      | 6JESNN13                    | Electrical authorization and occupational health        | pass/fail | T. Baileau    | 0,5 | 0  | 0  | 0,5 |
|                             |                                           |      | 6JESNN15                    | CSR 2                                                   | pass/fail | C. Laurent    | 14  | 8  | 6  | 0   |
|                             |                                           |      | 6JESNN16                    | Industrial conferences                                  | pass/fail | P. Villette   | 6   | 6  | 0  | 0   |
|                             |                                           |      | 6JESNN11                    | Communication and professional integration              | 0,2       | A. Thimon     | 14  | 2  | 12 | 0   |
|                             |                                           |      | 6JESNN10                    | 1st year project                                        | 0,4       | N. Marpeau    | 20  | 0  | 0  | 20  |
| Projects (foreign students) |                                           | 25   | Projects (foreign students) |                                                         | 1         | S. Gallaire   |     |    |    |     |

### Semester S7

| Code     | Course Unit                           | ECTS | Code     | Course                                     | Coeff     | Teacher       | Vol | CM | TD | TP |
|----------|---------------------------------------|------|----------|--------------------------------------------|-----------|---------------|-----|----|----|----|
| 7IUSNN01 | Optimization / discrete event systems | 5    | 7JESNN10 | Modeling, control and evaluation of SEDs   | 0,64      | J.-F. Pétin   | 36  | 12 | 8  | 16 |
|          |                                       |      | 7JESNN11 | Static optimization                        | 0,36      | P. Riedinger  | 18  | 8  | 10 | 0  |
| 7IUSNN04 | Automation & Data Analysis            | 5    | 7JESNN40 | Nonlinear Systems and Robustness           | 0,5       | J. Daafouz    | 34  | 20 | 6  | 8  |
|          |                                       |      | 7JESNN41 | Dynamic Optimization                       | 0,25      | P. Riedinger  | 18  | 8  | 10 | 0  |
|          |                                       |      | 7JESNN42 | Data analysis                              | 0,25      | R. Ranta      | 16  | 8  | 8  | 0  |
| JUSNN03  | Computer science                      | 5    | 7JESNN30 | Software Analysis and Design               | 0,7       | H. Cirstea    | 40  | 20 | 6  | 14 |
|          |                                       |      | 7JESNN31 | Algorithms and complexity                  | 0,3       | V. Chevrier   | 20  | 10 | 10 | 0  |
| 7IUSNN02 | Signal and information processing     | 5    | 7JESNN21 | Transmission of Information                | 0,5       | V. Louis-Dorr | 36  | 16 | 4  | 16 |
|          |                                       |      | 7JESNN20 | Signal Processing                          | 0,5       | D. Wolf       | 36  | 20 | 12 | 4  |
| 7IUSNN06 | Systems and networks                  | 5    | 7JESNN60 | Computer networks                          | 0,5       | YQ Song       | 18  | 6  | 2  | 10 |
|          |                                       |      | 7JESNN61 | System programming and C language          | 0,5       | ?             | 18  | 6  | 0  | 12 |
| 7IUSNN05 | General training 3                    | 5    | 7JESNN54 | CSR 3                                      | pass/fail | B. Remy       | 14  | 10 | 4  | 0  |
|          |                                       |      | 7JESNN56 | Industrial conferences                     | pass/fail | P. Villette   | 6   | 6  | 0  | 0  |
|          |                                       |      | 7JESNN50 | Communication and professional integration | 0,15      | F. Tamsamani  | 14  | 6  | 8  | 0  |
|          |                                       |      | 7JESNN51 | Accounting Management                      | 0,25      | J. Binet      | 18  | 6  | 12 | 0  |
|          |                                       |      | 7JESNN52 | English                                    | 0,3       | C. Corringer  | 24  | 0  | 24 | 0  |
|          |                                       |      | 7JESNN53 | Living Language 2                          | 0,3       | A. Quesada    | 24  | 0  | 24 | 0  |
|          |                                       |      |          |                                            |           |               |     |    |    |    |

### Semester S8

| Code                        | Course Unit                                                 | ECTS | Code                        | Course                                                | Coeff         | Teacher          | Vol | CM | TD | TP |
|-----------------------------|-------------------------------------------------------------|------|-----------------------------|-------------------------------------------------------|---------------|------------------|-----|----|----|----|
| 8IUSNN01                    | General Training 4                                          |      | 8JESNN10                    | English                                               | 0,25          | C. Corringier    | 24  | 0  | 24 | 0  |
|                             |                                                             |      | 8JESNN11                    | Modern Languages 2                                    | 0,25          | A. Quesada       | 24  | 0  | 24 | 0  |
|                             |                                                             | 6    | 8JESNN13                    | CSR                                                   | 0,25          | F. Tamsamani     | 14  | 8  | 6  | 0  |
|                             |                                                             |      | 8JESNN14                    | Industrial Conferences - Research Day                 | pass/fail     | B. Remy          | 12  | 12 | 0  | 0  |
|                             |                                                             |      | 8JESNN12                    | Marketing Strategy & Business Simulation              | 0,25          | J.-C. Marpeau    | 21  | 3  | 18 | 0  |
| ?                           | 8_SA1 AI and Machine Learning                               |      | ?                           | Identification of Systems                             | ?             | M.Giaccaogli     | 18  | 8  | 0  | 10 |
|                             |                                                             | 6    | ?                           | SA Learning Methods                                   | ?             | M.Kallas-Edelson | 20  | 10 | 10 | 0  |
|                             |                                                             |      | ?                           | Reinforcement learning                                | ?             | J. Daafouz       | 22  | 8  | 6  | 8  |
| ?                           | 8_SA2 Control and optimization                              |      | ?                           | Digital Control SA                                    | ?             | J. Kreiss        | 28  | 10 | 8  | 10 |
|                             |                                                             | 6    | ?                           | Predictive ordering                                   | ?             | P. Riedinger     | 16  | 4  | 12 | 0  |
|                             |                                                             |      | ?                           | Event order                                           | ?             | R. Postoyan      | 16  | 6  | 2  | 8  |
| ?                           | 8_SA3 Embedded and distributed systems                      |      | ?                           | Digital Systems Design SA                             | ?             | M.Kallas-Edelson | 26  | 6  | 4  | 16 |
|                             |                                                             | 6    | ?                           | Computer vision design office                         | ?             | S. Le Cam        | 22  | 0  | 0  | 22 |
|                             |                                                             |      | ?                           | IoT systems                                           | ?             | YQ Song          | 16  | 5  | 2  | 9  |
| ?                           | 8_SA4 Safety, security                                      |      | ?                           | Safety of Operation SA                                | ?             | N. Brinzei       | 40  | 20 | 2  | 18 |
|                             |                                                             | 6    | ?                           | Security of Automated Systems                         | ?             | ?                | 16  | 6  | 2  | 8  |
| 8IUSNN06                    | 8_SLE1 Preparatory                                          | 6    | 8JESNN62                    | SLE Learning Methods                                  | 0,5           | M.Kallas-Edelson | 20  | 10 | 10 | 0  |
|                             |                                                             |      | 8JESNN61                    | Cybersecurity Awareness                               | 0,5           | R. Badonnel      | 20  | 12 | 4  | 4  |
| 8IUSNN07                    | 8_SLE2 Control and design of embedded and real-time systems |      | 8JESNN70                    | SLE Digital Control                                   | 0,33          | J. Daafouz       | 30  | 10 | 8  | 12 |
|                             |                                                             | 9    | 8JESNN71                    | SLE Digital Systems Design                            | 0,33          | M.Kallas-Edelson | 30  | 6  | 4  | 20 |
|                             |                                                             |      | 8KEJON57                    | Real-Time Systems                                     | 0,33          | V. Bombardier    | 40  | 8  | 16 | 16 |
| 8IUSNN08                    | 8_SLE3 Systems Engineering and Safety                       |      | 8JESNN80                    | SLE Operational Safety                                | 0,33          | N. Brinzei       | 40  | 20 | 2  | 18 |
|                             |                                                             | 9    | 8JESNN81                    | SLE System Engineering                                | 0,33          | E. Levrat        | 20  | 8  | 12 | 0  |
|                             |                                                             |      | 8KEJON58                    | Modeling, Verification and Experimentation of Systems | 0,33          | D. Mery          | 40  | 20 | 20 | 0  |
| Projects (foreign students) |                                                             | 25   | Projects (foreign students) |                                                       | 1 S. Gallaire |                  |     |    |    |    |

### Semester S9

| Code     | Course Unit                                                  | ECTS | Code      | Course                                                   | Coeff     | Teacher                    | Vol | CM | TD | TP |
|----------|--------------------------------------------------------------|------|-----------|----------------------------------------------------------|-----------|----------------------------|-----|----|----|----|
| 9KUFGN14 | General Training 5                                           | 5    | 9KEFGN61  | Bank English                                             | 0,5       | C. Corringier              | 24  | 0  | 24 | 0  |
|          |                                                              |      | 9KEFGN64  | Professional integration                                 | 0,5       | F. Tensamani               | 30  | 15 | 15 | 0  |
|          |                                                              |      | 9KEFGN66  | Industrial conferences                                   | pass/fail | V. Chevrier                | 20  | 20 | 0  | 0  |
|          |                                                              |      |           | Validation of international experience                   | pass/fail | S. Gallaire                |     |    |    |    |
| 9KUISN09 | Project                                                      | 5    | 9KEISN92  | Academic R&D Project - Industrial R&D Project            | 1         | N. Brinzei                 | 60  | 0  | 0  | 60 |
| 9KUISN12 | S9 - SA - 01 Signal and image                                | 4    | 9KEISN93  | Basis of image processing                                | 0,35      | D. Wolf                    | 20  | 16 | 4  | 0  |
|          |                                                              |      | 9KEISN33  | Signal detection, extraction and reconstruction          | 0,35      | R. Ranta                   | 20  | 12 | 0  | 8  |
|          |                                                              |      | 9KEISN22  | Biomedical Signals and Systems                           | 0,3       | D. Wolf                    | 16  | 16 | 0  | 0  |
| 9KUISN11 | S9 - SA - 02 Control and piloting                            | 4    | 9KEISN11  | Aero Application                                         | 0,33      | M.Jungers                  | 16  | 4  | 0  | 12 |
|          |                                                              |      | 9KEISDN61 | Autonomous Flight of a Drone                             | 0,33      | P. Riedinger               | 16  | 8  | 8  | 0  |
|          |                                                              |      | 9KEISN14  | Multi-Agent Systems Management                           | 0,33      | C. Morarescu               | 16  | 8  | 8  | 0  |
| 9KUISN13 | S9 - SA - 03 Safety and security                             | 4    | 9KEISN32  | Monitoring and Diagnosis                                 | 0,33      | S. Maza                    | 16  | 12 | 4  | 0  |
|          |                                                              |      | 9KEISN31  | Formal verification of automated systems                 | 0,33      | J.-F. Pétin                | 16  | 2  | 2  | 12 |
|          |                                                              |      | 9KEISN34  | Security of Automated Systems                            | 0,33      | ? / J. Daafouz             | 16  | 6  | 2  | 8  |
| 9KUISN14 | S9 - SA - 04 Distributed systems                             | 4    | 9KEISN43  | Distributed Algorithms and Blockchain                    | 0,33      | ?                          | 16  | 6  | 2  | 8  |
|          |                                                              |      | 9KEISN44  | Distributed Systems                                      | 0,33      | V. Chevrier                | 16  | 8  | 2  | 6  |
|          |                                                              |      | 9KEISN45  | IoT systems                                              | 0,33      | YQ Song                    | 16  | 5  | 2  | 9  |
| 9KUISN15 | S9 - SA - 05 Robotics and Autonomous Vehicles                | 4    | 9KEISN52  | Introduction to Robotics                                 | 0,3       | D. Wolf                    | 16  | 8  | 0  | 4  |
|          |                                                              |      | 9KEISN53  | Autonomous Vehicle Design Office                         | 0,7       | ? / J. Kreiss              | 28  | 0  | 0  | 28 |
| 9KUISN17 | S9 - SLE - 01 Intelligent communicating systems and security | 6    | 9KEJON54  | Mobile Applications and Internet of Things               | 0,33      | T. Cholez                  | 24  | 6  | 10 | 8  |
|          |                                                              |      | 9KEISN73  | Industrial embedded networks                             | 0,33      | YQ Song                    | 20  | 8  | 4  | 8  |
|          |                                                              |      | 9KEISN74  | Security of an embedded system                           | 0,33      | ?                          | 20  | 8  | 0  | 12 |
| 9KUISN18 | S9 - SLE - 02 Advanced Machine Architecture                  | 8    | 9KEISN82  | Distributed and distributed systems - Edge-Fog computing | 0,25      | ?                          | 20  | 6  | 2  | 12 |
|          |                                                              |      | 9KEJON56  | Parallel and distributed programming                     | 0,25      | S. Lefebvre / J. Martinez  | 22  | 6  | 16 | 0  |
|          |                                                              |      | 9KEJON55  | Design and development of a system on a chip             | 0,5       | Y. Berviller / S. Lefebvre | 70  | 4  | 2  | 64 |
| 9KUISN19 | S9 - SLE - 03 Advanced technologies for embedded systems     | 6    | 9KEISN95  | Image Processing                                         | 0,33      | S. Le Cam                  | 20  | 8  | 8  | 4  |
|          |                                                              |      | 9KEISN96  | Urbanloop design office                                  | 0,67      | ? / V. Bombardier          | 20  | 10 |    | 10 |
|          | Projects (foreign students)                                  | 25   |           | Projects (foreign students)                              | 1         | S. Gallaire                |     |    |    |    |

### Semester S10

| Code     | Course Unit                   | ECTS | Code     | Course                 | Coeff | Teacher | Vol | CM | TD | TP |
|----------|-------------------------------|------|----------|------------------------|-------|---------|-----|----|----|----|
| OKSTAN01 | Engineering or R&D Internship | 30   | OKSTAN10 | Engineering Internship | 1     |         |     |    |    |    |