CENTRALESUPÉLEC

COURSE CATALOGUE

Computer Science Engineer

Second Year

Metz Campus of CentraleSupélec

last update: June 27, 2025

Semester 7

ISP-INF-S07-05	**Artificial Intelligence S07**	**8 ECTS**
3MD1530 — 2.5	Statistical models 1	29.0 h
3MD1540 — 3	Machine learning 1	35.5 h
3MD4040 — 2.5	Deep learning	28.5 h

ISP-INF-S07-06	**Computer Science 1 S07**	**7 ECTS**
3MD4130 — 2	Big Data computation models	21.0 h

ISP-INF-S07-27	**Computer Science 2 S07**	**7 ECTS**

ISP-INF-S07-23	**HEP S07**	**4 ECTS**
SportS07 — P/F	Sport S07	21.0 h

ISP-INF-S07-17	**Foreign Language S07**	**4 ECTS**
LV1S07 — 1	Foreign language and culture 1	21.0 h
LV2S07 — 1	Foreign language and culture 2	21.0 h

Semester 8

ISP-INF-S08-07	**Software Developpement S08**	**10 ECTS**

ISP-INF-S08-08	**Computer Science S08**	**9 ECTS**

ISP-INF-S08-24		**HEP S08**	**7 ECTS**
SPM-HEP-011	1	Engineer, environment and society	14.0 h
SportS08	P/F	Sport S08	21.0 h

ISP-INF-S08-18		**Foreign Language S08**	**4 ECTS**
LV1S08	1	Foreign language and culture 1	21.0 h
LV2S08	1	Foreign language and culture 2	21.0 h

Course supervisor: Frédéric Pennerath

Total: 29.0 h   **CM:** 16.5 h, **TD:** 4.5 h, **TP:** 6.0 h

Evaluation methods: 2h written test, can be retaken.

Evaluated skills:

- Modelling

- Research and Development

Course supervisor: Hervé Frezza-Buet

Total: 35.5 h   **CM:** 13.5 h, **TP:** 20.0 h

Description: This course sets out the general framework of machine learning, allowing you to situate the different approaches in the field. It covers the notions of data pre-processing, an introduction to statistical learning theory (risks, overlearning, convex proxies, regularization), the difference between frequentist and Bayesian approaches, supervised, unsupervised, semi-supervised and reinforcement learning paradigms. Some approaches are detailed (Kernel methods, SVM, Boosting, Bagging, Decision trees...).

Learning outcomes: At the end of this course, students will be able to recognize the different classes of algorithms in the landscape of the many methods available on the shelf. They will also have the statistical notions that will enable them to make reasoned use of these methods, thus avoiding a black-box approach with blind parameter testing.

Evaluation methods: 2h written test, can be retaken.

Evaluated skills:

- Research and Development
- Development

Deep learning

Course supervisor: Jérémy Fix

Total: 28.5 h   **CM:** 13.5 h, **TP:** 15.0 h

Description: This will cover all the components of deep learning, a sub-field of machine learning that has seen enormous progress in recent years. In particular, we will discuss architectures (multi-layer, convolutional and recurrent networks), computation graphs and optimisation of the parameters of these computation graphs, and regularisation techniques. The 'in-depth' course will focus on computer vision. In particular, various architectures emerging in recent years will be detailed, in particular Vision Transformers, adversarial generative and diffusion models as well as self-supervised learning approaches. The implementation of the concepts discussed in class will be carried out in pytorch.

Assessment through a challenge immerses students in the context of AI research, where scientific results are frequently presented and compared in this way.

Evaluation methods: Taking part in a challenge, cannot be retaken.

Evaluated skills:

- Modelling

- Research and Development

- Management

External resources:

- Site du cours

- Sujets des TPs

Course supervisor: Stéphane Vialle

Total: 21.0 h   **CM:** 10.5 h, **TD:** 1.5 h, **TP:** 9.0 h

Evaluation methods: Practical reports

Evaluated skills:

- Development
- System

Sport S07

Course supervisor: Hervé Frezza-Buet

Total: 21.0 h

TD: 21.0 h

Foreign language and culture 1

Course supervisor: Elisabeth Leuba

Total: 21.0 h   **TD:** 21.0 h

Description: The first foreign language is generally English. Students are divided into level groups ; in class, work is not only focused on the 4 language competences but also on various topics studied in depth according to students' levels. Topics cover a range of fields, such as civilisation, society and the professional world. Limited class size enables active participation and significant improvement in the language. The educational approach is varied: group work, class presentations, specific exercises, research, debates, etc.

Learning outcomes: At the end of the course, students will have improved their ability to communicate in an international professional, academic or personal context.

Evaluated skills:

- Research and Development
- Consulting
- Business Intelligence
- Management

Foreign language and culture 2

Course supervisor: Beate Mansanti

Total: 21.0 h   **TD:** 21.0 h

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Learning outcomes: At the end of the course, students will have improved their ability to communicate in an international professional, academic or personal context.

Evaluated skills:

- Research and Development
- Consulting
- Business Intelligence
- Management

Engineer, environment and society

Course supervisor: Julien Colin

Total: 14.0 h   **TD:** 14.0 h

Sport S08

Course supervisor: Hervé Frezza-Buet

Total: 21.0 h

TD: 21.0 h

Foreign language and culture 1

Course supervisor: Elisabeth Leuba

Total: 21.0 h

Description: The first foreign language is generally English. Students are divided into level groups ; in class, work is not only focused on the 4 language competences but also on various topics studied in depth according to students' levels. Topics cover a range of fields, such as civilisation, society and the professional world. Limited class size enables active participation and significant improvement in the language. The educational approach is varied: group work, class presentations, specific exercises, research, debates, etc.

Learning outcomes: At the end of the course, students will have improved their ability to communicate in an international professional, academic or personal context.

Evaluated skills:

- Research and Development
- Consulting
- Business Intelligence
- Management

Foreign language and culture 2

Course supervisor: Beate Mansanti

Total: 21.0 h   **TD:** 21.0 h

Description: Students are offered a range of second foreign languages at different levels, including for beginners. Students are divided into level groups; in class, work is not only focused on the 4 language competences but also on various topics studied in depth according to students' levels. Topics cover a range of fields, such as civilisation, society and the professional world. Limited class size enables active participation and significant improvement in the language. The educational approach is varied: group work, class presentations, specific exercises, research, debates, etc.

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Evaluated skills:

- Research and Development
- Consulting
- Business Intelligence
- Management