



CentraleSupélec

COURSE CATALOGUE

Computer Science Engineer

Third year

Metz Campus of CentraleSupélec

last update: November 21, 2025

Semester 9

ISP-INF-S09-09		Computer Science 2 S08	9.5 ECTS
SPM-INF-022	2.5	Mobile application development	27.0 h
SPM-INF-020	2.5	HPC-HPDA on clusters of multi-cores	27.0 h
SPM-INF-021	2	Deductive systems logic	24.0 h
SPM-INF-019	2.5	Cybersecurity elements	29.5 h
3MD4050	2.5	Statistical models 2	33.0 h

ISP-INF-S09-10		Computer Science 1 S08	6.5 ECTS
3MD4010	2	Machine learning 2	21.5 h
3MD4030	2	HPC-HPDA on GPU with CUDA	22.5 h
SPM-INF-024	2.5	Web technologies	27.0 h
SPM-INF-023	2.5	Safe software Development	27.0 h

ISP-INF-S09-11		Final Project S09	7 ECTS
SPM-PRJ-006	1	Final project	72.0 h

ISP-INF-S09-25		HEP S09	3 ECTS
SPM-HEP-020	1	Legal and regulatory systems	12.0 h
SPM-HEP-015	1	Innovation	35.0 h

ISP-INF-S09-19		Foreign Language S09	4 ECTS
LV1S09	1	Foreign Languages and Culture 1	21.0 h
LV2S09	1	Foreign Languages and Culture 2	21.0 h

Semester 10

ISP-INF-S10-12		Final Project S10	4 ECTS
SPM-PRJ-006	1	Final project	42.0 h

ISP-INF-S10-13		Artificial Intelligence S10	7 ECTS
3MD4120	2	<i>Reinforcement learning</i>	<i>23.0 h</i>
SPM-INF-018	2	<i>Advanced databases</i>	<i>23.0 h</i>
3MD4150	3	Natural language processing	36.0 h
3MD4110	2	Perspectives in Learning and Artificial Intelligence	23.5 h

ISP-INF-S10-26		HEP S10	2 ECTS
SPM-HEP-007	1	Financial management	15.0 h
SPM-HEP-022	1	Management	19.0 h

ISP-INF-S10-14		End-of-studies Internship	15 ECTS
SPM-STA-003	1	End-of-studies internship	0.0 h

ISP-INF-S10-20		Foreign Language S10	2 ECTS
LV1S10	1	Foreign Languages and Culture 1	11.5 h
LV2S10	1	Foreign Languages and Culture 2	11.5 h

MOBILE APPLICATION DEVELOPMENT

Course supervisor: Virginie Galtier

Total: 27.0 h (optional)

CM: 6.0 h, **TP:** 20.0 h

SPM-INF-022

back

Evaluation methods: 1h written test

Evaluated skills:

- Development

CM:

1. introduction : les différentes stratégies pour le mobile (3.0 h)
2. introduction à Android (1.5 h)
3. introduction à Flutter (1.5 h)

TP:

1. développement natif (7.0 h)
2. développement cross-platform (7.0 h)
3. processus de test et publication (6.0 h)

HPC-HPDA ON CLUSTERS OF MULTI-CORES

Course supervisor: Stéphane Vialle

Total: 27.0 h (optional)

CM: 10.5 h, **TD:** 1.5 h, **TP:** 15.0 h

SPM-INF-020

[back](#)

Evaluated skills:

- Development
- System

CM:

1. Cours d'architectures distribuées (1.5 h)
2. Programmation MPI en comm pt-a-pt (1.5 h)
3. Programmation MPI en comm collectives (1.5 h)
4. Déploiement d'application MPI sur cluster de multi-coeurs (1.5 h)
5. Rappels de métriques de performance, et modèles de performances théoriques (1.5 h)
6. Algorithmique et programmation distribuée synchrone (1.5 h)
7. Algorithmique et programmation distribuée asynchrone (1.5 h)

TD:

1. TD-MPI-Clustering (1.5 h)

TP:

1. TP-MPI pb 1D synchrone en MPI+OpenMP et déploiement (3.0 h)
2. TP-MPI pb 2D synchrone en MPI+OpenMP et déploiement (3.0 h)
3. TP-MPI pb asynchrone en MPI+OpenMP et déploiement (3.0 h)
4. TP-MPI-Clustering - part 1 (3.0 h)
5. TP-MPI-Clustering - part 2 (3.0 h)

DEDUCTIVE SYSTEMS LOGIC

Course supervisor: Benoît Valiron

Total: 24.0 h

CM: 12.0 h, **TD:** 3.0 h, **TP:** 9.0 h

SPM-INF-021

back

Evaluated skills:

- Certification

CM:

1. Leçon de choses (3.0 h)
2. Logique propositionnelle, fonctionnement d'un solveur SAT (3.0 h)
3. Extension avec des types, notion de théorie, fonctionnement d'un SMT (3.0 h)
4. Logique de Hoare: logique sur les types du langage de programmation. (1.5 h)
5. Calcul des plus faibles préconditions (WP), chainage, obligations de preuves. (1.5 h)

TD:

1. Logique de Hoare (1.5 h)
2. Exemple de dérivation (1.5 h)

TP:

1. Ecriture d'un solveur SAT (3.0 h)
2. Utilisation de Z3 (3.0 h)
3. Outil Why3, exemple avec un calcul sur des entiers. (3.0 h)

CYBERSECURITY ELEMENTS

Course supervisor: Hervé Frezza-Buet

Total: 29.5 h

CM: 13.5 h, **TP:** 16.0 h

SPM-INF-019

[back](#)

Evaluated skills:

- System

CM:

1. Cours-1 (1.5 h)
2. Cours-2 (1.5 h)
3. Cours-3 (1.5 h)
4. Cours-4 (1.5 h)
5. Cours-5 (1.5 h)
6. Cours-6 (1.5 h)
7. Cours-7 (1.5 h)
8. Cours-8 (1.5 h)
9. Cours-9 (1.5 h)

TP:

1. TP-1 (4.0 h)
2. TP-2 (4.0 h)
3. TP-3 (4.0 h)
4. TP-4 (4.0 h)

STATISTICAL MODELS 2

Course supervisor: Frédéric Pennerath

Total: 33.0 h

CM: 12.0 h, **TD:** 6.0 h, **TP:** 12.0 h

3MD4050

[*back*](#)

Description: This course is an extension of the ModStat1 course. It is structured around the three fundamental concepts of stochastic processes, latent variables and approximate inference techniques. The first part of the course on processes focuses on three main families of processes: point processes, Markov processes and Gaussian processes. The notion of latent variable is then addressed through mixture models and the EM algorithm. The two notions are then combined to develop hidden Markov models, for both discrete (HMM) and continuous states (Kalman filters). Finally, approximate inference techniques are presented, with sampling techniques (MCMC) and variational inference.

Prerequisites: - Having followed the course "Statistical Models 1" - Beginner level in Python / Numpy programming

Learning outcomes: At the end of this course, students will be able to associate the corresponding type of stochastic process with data series and apply the associated estimation methods. They will also be able to specify a model incorporating hidden variables and apply the EM algorithm to estimate its parameters. They will be able to model a clustering problem in the form of a mixture model. They will be able to specify an HMM or a Kalman filter to model the dynamic behavior of a discrete or continuous state system.

Evaluation methods: 3h written test with documents, can be retaken.

Evaluated skills:

- Modelling
- Research and Development

CM:

1. Processus ponctuels (1.5 h)
2. Processus de Markov (1.5 h)
3. Processus gaussiens (1.5 h)
4. Modèles de mélanges (1.5 h)
5. Modèles de Markov cachés (1.5 h)
6. Filtre de Kalman (1.5 h)
7. Echantillonnage (1.5 h)
8. Inférence variationnelle (1.5 h)

TD:

1. Processus de Poisson et de Markov (1.5 h)
2. Modèles de Markov cachés (1.5 h)
3. Filtre de Kalman (1.5 h)
4. Echantillonnage (1.5 h)

TP:

1. Processus gaussiens (3.0 h)
2. Modèles de mélange (3.0 h)
3. Filtre de Kalman et particul. (3.0 h)
4. Echantillonnage (3.0 h)

MACHINE LEARNING 2

Course supervisor: Arthur Hoarau

Total: 21.5 h

CM: 10.5 h, **TP:** 9.0 h

3MD4010

back

Description: This course complements Machine Learning 1 with notions of data processing (dimension reduction, etc.), unsupervised learning, active and semi-supervised learning, explicability issues.

Learning outcomes: By the end of this course, students will have completed their breadth approach to machine learning.

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

Evaluated skills:

- Research and Development
- Development

CM:

1. Réduction de dimension (1.5 h)
2. Partitionnement (1.5 h)
3. Quantification vectorielle (1.5 h)
4. Détection anomalies (1.5 h)
5. Apprentissage semi-supervisé (1.5 h)
6. Apprentissage actif (1.5 h)
7. Explicabilité (1.5 h)

TP:

1. Réduction de dimension (3.0 h)
2. Apprentissage non supervisé (3.0 h)
3. Apprentissage semi-supervisé (3.0 h)

HPC-HPDA ON GPU WITH CUDA

Course supervisor: Stéphane Vialle

Total: 22.5 h

CM: 6.0 h, **TD:** 4.5 h, **TP:** 12.0 h

3MD4030

[back](#)

Description: This course aims to introduce high performance algorithmics and programming on GPU, with experiments on Machine Learning algorithms run on GPU servers.

Content: GPU architecture Algorithmic principles of fine grained GPU parallelism (SIMD and SMT models) CUDA programming Usage of CUBLAS library Optimization of GPU and CPU-GPU CUDA codes Design and experiment of K-means algorithms on GPU

Prerequisites: 1st year common course: "Systèmes d'Information et Programmation" (1CC1000) 1st year common course: "Algorithmique & Complexité" (1CC2000) C++ Advanced programming course (3MD1020) of SDI mention at Metz Automatic Learning course (3MD1040) of SDI mention at Metz

Learning outcomes: At the end of this course, students will be able: Learning Outcome AA1: to analyse the adequacy of a mathematical solution with an implementation and execution on GPU, Learning Outcome AA2: to design a GPU algorithm, or to adapt an algorithm to increase its efficiency on GPU, Learning Outcome AA3: to design hybrid algorithms for CPU-GPU systems, overlapping data transfers and computations, Learning Outcome AA4: to implement algorithms and to debug codes on GPU, Learning Outcome AA5: to analyse and to summarize GPU software.

Means: Development and execution platform: GPU servers of the Data Center for Education of CentraleSupélec Metz Campus. NVIDIA CUDA development environment.

Evaluation methods: Evaluation of Lab results about parts 2 and 3, and final and individual exam Reports of the Lab about parts 2 and 3 (the content and the number of pages of the reports are constrained, in order to force the students to an effort of synthesis and clarity) In the event of unjustified absence from a practical work, the mark of 0 will be applied, in the event of justified absence the average mark of other labs will be applied. The remedial exam will be a 1 hour oral exam, which will constitute 100

Evaluated skills:

- Development

CM:

1. Architecture des GPU (1.5 h)
2. Bases d'algorithmique de programmation CUDA (1.5 h)
3. Coalescence et mémoire partagée (1.5 h)
4. Optimisations avancées en CUDA (1.5 h)

TD:

1. Conception et estimation de performances d'un code CUDA (1.5 h)
2. Optimisation et accélération d'un code CUDA (1.5 h)
3. K-means sur GPU (1.5 h)

TP:

1. Produit de matrices en CUDA : implantation et expérimentation (3.0 h)
2. Produit de matrices en CUDA : optimisation et mesure de gain (3.0 h)
3. K-means sur GPU : conception, implantation et expérimentation (3.0 h)
4. K-means sur GPU : optimisations multiples (3.0 h)

WEB TECHNOLOGIES

Course supervisor: Michel Ianotto

Total: 27.0 h (optional)

CM: 9.0 h, **TP:** 17.0 h

SPM-INF-024

back

Evaluated skills:

- Development

CM:

1. Concepts de base des applications Web (1.5 h)
2. Langages utilisés côté client (1.5 h)
3. L'authentification (session et cookies) (1.5 h)
4. Les Architecture 3-tiers et le modèle MVC (1.5 h)
5. Présentation d'un framework de développement d'applications Web (1.5 h)
6. Intégration continue et déploiement d'une application Web dans le cloud (1.5 h)

TP:

1. Développement de la partie frontend d'une application (4.0 h)
2. L'authentification (session et cookies) (3.0 h)
3. Les Architecture 3-tiers et le modèle MVC (3.0 h)
4. Développement de la partie backend d'une application et présentation d'un framework de développement d'applications Web (3.0 h)
5. Intégration continue (qualité du code, tests) et déploiement d'une application Web dans le cloud (4.0 h)

Evaluated skills:

- Development
- Certification

CM:

1. Introduction à la méthode Event-B (1.5 h)
2. L'activité de preuve dans la méthode Event-B (1.5 h)
3. Le raffinement d'un modèle Event-B (1.5 h)
4. Introduction au Model-Checking (1.5 h)
5. Validation d'une spécification Event-B par Model-Checking (1.5 h)
6. Spécification et vérification formelle avec Frama-C/WP (3.0 h)
7. Vérification formelle de propriété de sécurité avec Frama-C/MetAcsL (3.0 h)

TD:

1. Introduction à la méthode Event-B (1.5 h)
2. L'activité de preuve dans la méthode Event-B (1.5 h)
3. Le raffinement d'un modèle Event-B (1.5 h)
4. Introduction au Model-Checking (1.5 h)
5. Validation d'une spécification Event-B par Model-Checking (1.5 h)

TP:

1. Etude de cas - s1 (3.0 h)
2. Etude de cas - s2 (3.0 h)

FINAL PROJECT

Course supervisor: Hervé Frezza-Buet

Total: 72.0 h

Projet: 72.0 h

SPM-PRJ-006

back

Evaluated skills:

- Development
- Modelling
- Management
- Research and Development

LEGAL AND REGULATORY SYSTEMS

Course supervisor: Damien Rontani, Hervé Frezza-Buet

Total: 12.0 h

CM: 6.0 h, **TD:** 6.0 h

SPM-HEP-020

back

CM:

1. Acteurs et instruments de la transition énergétique (3.0 h)
2. Appréhender les grands ensembles normatifs (3.0 h)

TD:

1. présentation du projet (1.5 h)
2. identifier les démarches à accomplir (urbanisme, environnement) et les interlocuteurs (3.0 h)
3. rédaction de la note de synthèse (1.5 h)

INNOVATION

Course supervisor: Ninel Kokanyan

Total: 35.0 h

CM: 17.0 h, **TD:** 16.0 h

SPM-HEP-015

back

CM:

1. Introduction : L'entrepreneur et l'intrapreneur au cœur de la destruction créative comme moteur de l'innovation. (2.0 h)
2. Design Thi'nk'ing, de l'idéation au prototype. (2.0 h)
3. Eléments d'éco-design et innovation. (1.0 h)
4. Le business model canvas comme outil de visualisation des projets d'innovation. (2.0 h)
5. L'innovation ouverte comme accélérateur d'innovation. (3.0 h)
6. Protéger l'innovation grâce aux outils de la PI. (2.0 h)
7. L'innovation et le droit des entreprises : créer son entreprise. (2.0 h)
8. Créer son business plan et rechercher des financements. (2.0 h)
9. Pitcher son projet comme une start-up : outils. (1.0 h)

TD:

1. Créativité et problématisation des projets d'innovation. Brainstorming et Value-Proposition Canvas (2.0 h)
2. Créativité et Design thi'nk'ing, vers un premier prototype par groupe projet (2.0 h)
3. La fresque du numérique et l'impact environnemental du numérique (3.0 h)
4. Créativité et Design thi'nk'ing, suite du prototype par groupe projet (4.0 h)
5. Mise en pratique du BMC dans les contextes des groupes projet (2.0 h)
6. Pitch des BMC devant jury (1.0 h)
7. Pitcher son projet comme une start-up : outils, atelier et mise en pratique. (2.0 h)

FOREIGN LANGUAGES AND CULTURE 1

Course supervisor: Elisabeth Leuba

Total: 21.0 h

TD: 21.0 h

LV1S09

[*back*](#)

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.

Evaluation methods: Assessment will be by continuous assessment according to criteria to be determined by each teacher, taking into account personal investment in the course. Each course will be marked out of 20 at the end of the semester.

Evaluated skills:

- Research and Development
- Consulting
- Business Intelligence
- Management

TD:

1. Cours (21.0 h)

FOREIGN LANGUAGES AND CULTURE 2

Course supervisor: Beate Mansanti

Total: 21.0 h

TD: 21.0 h

LV2S09

[*back*](#)

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.

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

Evaluation methods: Assessment will be by continuous assessment according to criteria to be determined by each teacher, taking into account personal investment in the course. Each course will be marked out of 20 at the end of the semester.

Evaluated skills:

- Research and Development
- Consulting
- Business Intelligence
- Management

TD:

1. Cours (21.0 h)

FINAL PROJECT

Course supervisor: Hervé Frezza-Buet

Total: 42.0 h

Projet: 42.0 h

SPM-PRJ-006

back

Evaluated skills:

- Development
- Modelling
- Management
- Research and Development

REINFORCEMENT LEARNING

Course supervisor: Hervé Frezza-Buet

Total: 23.0 h (optional)

CM: 9.0 h, **TD:** 3.0 h, **TP:** 9.0 h

3MD4120

back

Description: The course presents the theoretical foundations of reinforcement learning as well as the principles of the most common algorithms. Through practical work, these elements will be extended to more complex situations, making it possible to introduce the most recent algorithms that have, for example, enabled computers to master the game of Go.

Content: Reinforcement learning is introduced using the formal framework of the Markov Decision Processes. After having shown the existence and uniqueness of a solution in the form of the value function, we will discuss the classical algorithms used to calculate this function. We will then see how approximate methods (linear approximation, monte carlo estimation, bandits, deep learning) can be used to tackle more complex contexts.

Learning outcomes: Understand the theoretical foundations of reinforcement learning. Implement these methods in a way that is adapted to the problems to be solved. Sharpen your critical thinking skills.

Teaching methods: Taking into account the context (group size), lectures will be as interactive as possible and will aim to present the theoretical and algorithmic concepts underlying reinforcement learning. The purpose of the practical work is to really confront the methods by implementing and testing the algorithms to better understand how they work and their limitations.

Means: Courses and practical work are provided by Alain DUTECH, Hervé FREZZA-BUET and Jérémy FIX. The practical work will be based on the Python language and its scientific libraries.

Evaluation methods: The module will be evaluated by a written exam, where the idea is to test the student's ability to use methods in a clever way, to analyze the results of an algorithm, etc.

Evaluated skills:

- Modelling
- Research and Development

CM:

1. Intro (1.5 h)
2. Prog. Dynamique (1.5 h)
3. Apprentissage par Renforcement (1.5 h)
4. Méthodes approchées (1.5 h)
5. Difficultés classiques (1.5 h)
6. Apprentissage par Renforcement Profond (1.5 h)

TD:

1. Modéliser une Question (3.0 h)

TP:

1. Probl. Académiques (3.0 h)
2. Probl. Continus (3.0 h)
3. App. Renf. Profond (3.0 h)

ADVANCED DATABASES

Course supervisor: Stéphane Vialle

Total: 23.0 h (optional)

CM: 9.0 h, **TD:** 3.0 h, **TP:** 6.0 h, **Projet:** 4.5 h

SPM-INF-018

back

Evaluation methods: Project report and defense

Evaluated skills:

- Modelling
- System
- Development

CM:

1. Cours d'indexation et d'optimisation d'une BdD relationnelle (1.5 h)
2. Cours de principes et d'exemples d'ORM (1.5 h)
3. Cours d'introduction aux BdD NoSQL : émergence et types de bases) (1.5 h)
4. Cours d'introduction aux BdD NoSQL : mécanismes, construction de bases, déploiement) (1.5 h)
5. Cours de présentation de MongoDB (1.5 h)
6. Cours sur la nécessité du nettoyage et de la préparation des données (1.5 h)

TD:

1. TD d'optimisation d'une BdD relationnelle (1.5 h)
2. TD de préparation des données en MongoDB (1.5 h)

TP:

1. TP d'optimisation d'une BdD relationnelle (3.0 h)
2. TP d'interrogation d'une BdD MongoDB (3.0 h)

Course supervisor: Joël Legrand

Total: 36.0 h

CM: 9.0 h, **TP:** 25.0 h

3MD4150

[*back*](#)

Description: This course explores the fundamentals of automatic natural language processing (ANLP), covering topics such as word embeddings, language models, recurrent and recursive neural networks and transformers, enabling students to master text analysis and generation.

Content: This course introduces the main linguistic theories used to model natural language (e.g. formal grammars, dependency grammars, etc.). It presents the various natural language processing (NLP) tools available and the statistical models on which they are based. Particular emphasis will be placed on the deep learning methods that constitute the state of the art for most NLP tasks.

Learning outcomes: By the end of this course, participants will have acquired a thorough understanding of the fundamental concepts of NLP. They will be able to apply text preprocessing techniques to clean and organize linguistic data, as well as use pre-trained language models for various tasks such as text classification, text generation, machine translation. Learners will be proficient in the use of popular natural language processing libraries such as NLTK, SpaCy, Transformers.

Teaching methods: Each session will include a lecture part during which new concepts will be introduced, followed by a practical work session. Practical work sessions will be direct applications concepts seen in lectures. All teaching materials will be provided to students.

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

Evaluated skills:

- Research and Development
- Business Intelligence

CM:

1. Word representations (1.0 h)
2. Language models (1.0 h)
3. Sequence labeling (1.0 h)
4. Sentence classification (1.0 h)
5. Syntactic analysis: constituency parsing (1.0 h)
6. Syntactic analysis and RNN (1.0 h)
7. Machine translation (1.0 h)
8. Machine translations with Seq2seq RNN and attention mechanisms (1.0 h)
9. Le modèle transformer (1.0 h)

TP:

1. Word representations (2.0 h)
2. Word embeddings (2.0 h)
3. Sequence labeling (2.0 h)
4. LSTM (2.0 h)
5. RNN language model (2.0 h)
6. Sentiment analysis with RNN (2.0 h)
7. Machine translation (2.0 h)
8. Machine translations with Seq2seq RNN and attention mechanisms (2.0 h)
9. Le modèle transformer (2.0 h)
10. Fine-tuning de transformers génératifs (4.0 h)
11. Retrieval-augmented generation (RAG) (3.0 h)

PERSPECTIVES IN LEARNING AND ARTIFICIAL INTELLIGENCE

Course supervisor: Joël Legrand

Total: 23.5 h

CM: 8.5 h, **TP:** 15.0 h

3MD4110

back

Description: This module offers insight into real-world applications of machine learning through talks by researchers and industry professionals. Each session highlights a specific application domain (healthcare, finance, energy, robotics, etc.), illustrating how classical or advanced techniques are used to address real-world problems. These talks complement academic instruction by exposing students to more advanced approaches at times, thereby fostering a broader understanding of current challenges and practices in professional or research settings.

Learning outcomes: At the end of this module, students will have gained a broad perspective on real-world applications of machine learning across various sectors. They will be able to analyze real-world problems through the lens of AI, understand the methodological choices made by experts, and identify the specific constraints related to implementing solutions in industrial or research contexts. This module will also enhance their ability to engage in dialogue with professionals in the field and to envision themselves contributing to interdisciplinary projects involving machine learning.

Means: Each module (5 in total) is given by an industrialist or a researcher. It consists of a 1h30 lecture followed by a 3h practical session.

Evaluation methods: At the end of each practical session, a submission will be required by the instructor. One submission will then be randomly selected for evaluation by the instructor. The grade given will serve as the assessment for the entire module.

Evaluated skills:

- Research and Development
- Development

CM:

1. Introduction (1.0 h)
2. Conférence 1 (1.5 h)
3. Conférence 2 (1.5 h)
4. Conférence 3 (1.5 h)
5. Conférence 4 (1.5 h)
6. Conférence 5 (1.5 h)

TP:

1. Conférence 5 (3.0 h)
2. Conférence 5 (3.0 h)
3. Conférence 5 (3.0 h)
4. Conférence 5 (3.0 h)
5. Conférence 5 (3.0 h)

FINANCIAL MANAGEMENT

Course supervisor: Hervé Frezza-Buet, Damien Rontani

Total: 15.0 h

CM: 7.5 h, **TD:** 7.5 h

SPM-HEP-007

back

Evaluated skills:

- Business Intelligence

CM:

1. Introduction à la gestion financière pour l'innovation (1.0 h)
2. Lecture des états financiers : bilan, compte de résultat, flux de trésorerie (1.0 h)
3. Comptabilité analytique & analyse de rentabilité (1.0 h)
4. Trésorerie et besoin en fonds de roulement (BFR) (1.0 h)
5. Méthodes d'évaluation des startups (1.5 h)
6. Stratégies de financement de l'innovation (1.0 h)
7. Gestion des risques financiers liés à l'innovation (1.0 h)

TD:

1. Analyse d'états financiers simplifiés (2.0 h)
2. Application à la structure de coûts de la startup (1.0 h)
3. Construction d'un plan de trésorerie (1.0 h)
4. Valorisation de la startup fictive (1.5 h)
5. Construction d'une stratégie de financement (1.0 h)
6. Finalisation & restitution de l'étude de cas (1.0 h)

MANAGEMENT

Course supervisor: Damien Rontani, Hervé Frezza-Buet

Total: 19.0 h

TD: 19.0 h

SPM-HEP-022

[back](#)

Evaluated skills:

- Management

TD:

1. tbd (19.0 h)

END-OF-STUDIES INTERNSHIP

Course supervisor: Hervé Frezza-Buet, Damien Rontani

SPM-STA-003

[*back*](#)

Evaluated skills:

- Modelling
- Research and Development
- Development
- Certification
- System
- Consulting
- Business Intelligence
- Management

FOREIGN LANGUAGES AND CULTURE 1

Course supervisor: Elisabeth Leuba

Total: 11.5 h

TD: 11.5 h

LV1S10

[*back*](#)

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.

Evaluation methods: Assessment will be by continuous assessment according to criteria to be determined by each teacher, taking into account personal investment in the course. Each course will be marked out of 20 at the end of the semester.

Evaluated skills:

- Research and Development
- Consulting
- Business Intelligence
- Management

TD:

1. Cours (11.5 h)

FOREIGN LANGUAGES AND CULTURE 2

Course supervisor: Beate Mansanti

Total: 11.5 h

TD: 11.5 h

LV2S10

[*back*](#)

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.

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

Evaluation methods: Assessment will be by continuous assessment according to criteria to be determined by each teacher, taking into account personal investment in the course. Each course will be marked out of 20 at the end of the semester.

Evaluated skills:

- Research and Development
- Consulting
- Business Intelligence
- Management

TD:

1. Cours (11.5 h)