Course Catalogue

2024-2025

Modules common to all 5 years

[G-INN-020] Free projects Hub (3-6 ECTS)
French Language module (2 ECTS)

Semester 1 Modules

[B-CPE-100] Unix & C Lab Seminar I (5 ECTS)
[B-CPE-101] Unix & C Lab Seminar II (4 ECTS)
[B-CPE-110] Elementary Programming in C (7 ECTS)
[G-CUS-100] KYT/CAT – IT Fundamentals (1 ECTS)
[G-CUS-101] KYT/CAT – Profesional skills (1 ECTS)
[B-MAT-100] Mathematics (3 ECTS)
[B-MUL-100] C Graphical Programming (5 ECTS)
[B-NSA-100] Networks and Systems (3 ECTS)
[B-PMP-100] Introduction to project management I (1 ECTS)
[B-PSU-100] UNIX system programming (7 ECTS)

Semester 2 Modules

[G-AIA-200] Discovery of Data Analysis (3 ECTS)
[G-AIA-201] Introduction to Data Analysis (5 ECTS)
[B-CPE-200] Elementary programming in C (10 ECTS)
[G-CUS-200] KYT/CAT - Fundamentals of Artificial Intelligence (1 ECTS)
[G-CUS-201] KYT/CAT - Fundamentals of Cybersecurity (1 ECTS)
[B-DOP-200] Introduction to DevOps (3 ECTS)
[G-ING-200] Discovery of Software engineering (3 ECTS)
[G-ING-201] Introduction to Software Engineering (5 ECTS)
[B-MAT-200] Mathematics (3 ECTS)
[B-PMP-200] Introduction to project management (3 ECTS)
[B-PSU-200] Shell programming (10 ECTS)
[G-SEC-200] Discovery of Cyber Security (3 ECTS)
[G-SEC-201] Introduction to Cyber Security (5 ECTS)
[B-WEB-200] Introduction to Web (3 ECTS)

Semester 4 Modules

[B-PDG-300] Paradigms seminar (8 ECTS)
[B-ASM-400] x86_64 Assembly (3 ECTS)
[B-CCP-400] Concurrent programming (5 ECTS)
[G-CNA-400] Computer Numerical Analysis (4 ECTS)
[G-CUS-400] KYT/CAT - Networks and communication (1 ECTS)
[G-CUS-401] KYT/CAT – Processor Architecture (1 ECTS)
[B-DOP-400] DevOps (4 ECTS)
[B-FUN-400] Functional Programming (7 ECTS)
[B-NWP-400] Network programming (7 ECTS)
[B-OOP-400] Object-oriented programming (8 ECTS)
[B-PMP-400] Project management (3 ECTS)
[B-PSU-400] Unix Prog - Instrumentation (7 ECTS)
[B-SEC-400] Cyber security (3 ECTS)
[B-YEP-400] Year-end project Zappy (7 ECTS)

Semester 5 Modules

[B-AIA-500] Artificial intelligence (4 ECTS)
[B-CNA-500] Computer Numerical Analysis (4 ECTS)
[B-CPP-500] Advanced C++ (9 ECTS)
[G-CUS-500] KYT/CAT – Algorithms (1 ECTS)
[G-CUS-501] KYT/CAT - Video games (1 ECTS)
[B-DEV-500] Application development (9 ECTS)
[B-DOP-500] Advanced DevOps (4 ECTS)
[B-FUN-500] Functional Programming (9 ECTS)
[B-SEC-500] Advanced Security (4 ECTS)
[B-SVR-500] Survivor seminar (5 ECTS)

Modules common to all 5 years

[G-INN-020] Free projects Hub

3-6 ECTS	Free projects Hub		
Duration in hours	Course : N/A	TP/TD : N/A	Project : 50-120
ECUE prerequisites	No		
Objectives of the ECUE	• Technical skills: Programming, web development, application development and use of new tools and technologies. • Teamwork: Collaborate with team members, communicate effectively and distribute tasks. • Problem solving: Develop creative solutions to challenges, think independently and solve problems. • Project management: Plan, organize and manage time and resources to meet deadlines. • Innovation and creativity: Think outside the box and experiment with new ideas.		
ECUE content (Main points covered)	• Students will need to demonstrate their ability to define a need and establish the technical and organizational steps required to produce a finished project. • Students will be encouraged to explore a technical field on their own, using an experimental approach to develop monitoring and self-learning mechanisms.		
Teaching methods and/or resources	• Support from the teaching team and mentors, depending on the project.		
Evaluation methods	• Evaluation through regular presentations throughout the project		
Name(s) of person(s) in charge	Fabrice MARCO		
Bibliography/ webography	• https://www.epitech.eu/innovation/		

Semester 1 Modules

[B-CPE-100] Unix & C Lab Seminar I

5 ECTS	Unix & C Lab Seminar I		
Duration in hours	Course : 10	TP/TD : 4	Project : 90

ECUE prerequisites	No
Objectives of the ECUE	• A 3-week introduction to the fundamentals of programming using the C language • Basic use of git and GitHub
ECUE content (Main points covered)	• Discovering the working environment (Linux, git, GitHub) • Discovering functions, parameters and returns • Conditions, loops and pointers • String manipulation • Compiling via Makefile and creating dynamic libraries
Teaching methods and/or resources	• 13 days, each with a series of exercises to introduce and deepen programming concepts and the C language. • Two one-week mini-projects to apply the concepts covered during the week • Two "rush" periods (short-term projects) in pairs to review the week's progress
Evaluation methods	• Continuous assessment, with each successful exercise contributing to the validation of one or more associated skills.
Name(s) of person(s) in charge	Jonathan Nau
Bibliography/Webograpy	• https://www.indeed.com/career-advice/career-development/c-programming#:~:text=By%20learning%20C%2C%20you%20can,overall%20concepts%20that%20drive%20programming • "*The C Language - ANSI Standard*" (2e edition, 2014) by Brian W. Kernighan and Dennis M. Ritchie

[B-CPE-101] Unix & C Lab Seminar II

4 ECTS	**Unix & C Lab Seminar II**		
Duration in hours	Course : 2	TP/TD : 5	Project : 70
ECUE prerequisites	Basic knowledge of C programming (provided by UE B-CPE-100)		
Objectives of the ECUE	• Understand the classic project life cycle at Epitech. • Apply the basic C skills learned in Part 1.		
ECUE content (Main points covered)	• Creating a program from A to Z • Discovering variation functions		
Teaching methods and/or resources	• An introductory mini-project to lay the foundations for the final project • 1 2-week project to re-implement a current utility in C.		
Evaluation methods	• Competency-based assessment of projects		

Name(s) of person(s) in charge	Jonathan Nau
Bibliography/webograpy	• "*The C Language - ANSI Standard*" (2e edition, 2014) by Brian W. Kernighan and Dennis M. Ritchie

[B-CPE-110] Elementary Programming in C

7 ECTS	**Elementary Programming in C**		
Duration in hours	Course : 2	TP/TD : 13	Project : 110
ECUE prerequisites	Basic knowledge of C programming (provided by UE B-CPE-100)		
Objectives of the ECUE	• Handling different data structures • Discovering sorting, compression and collision algorithms • Creating entire programs in C		
ECUE content (Main points covered)	• Dynamic programming • Tables and tables of tables • Sorting • Compression / decompression • Linked lists		
Teaching methods and/or resources	• Realization of 3 projects to do on your own; each oriented to the understanding of a type of algorithm and data structure.		
Evaluation methods	Each project is evaluated by automated tests assessing 5 different skills for each project: • Algorithm application • Data structure • Optimization • Syntax analysis • Robustness		
Name(s) of person(s) in charge	Kevin SPEGT		
Bibliography/webography	• https://fr.wikipedia.org/wiki/Programmation_dynamique • https://fr.wikipedia.org/wiki/Algorithme_de_tri • "*The Art of Computer Programming*" by Donald Knuth		

[G-CUS-100] KYT/CAT – IT Fundamentals

1 ECTS	**KYT/CAT – IT Fundamentals**		
Duration in hours	Course : 1	TP/TD : 3	Project : 20
ECUE prerequisites	No		
Objectives of the ECUE	Discover concepts, big names and important dates around the theme of computing.		

ECUE content (Main points covered)	• Computer basics: Understanding hardware (computers, servers, networks) and software (operating systems, applications). • Networks: Principles of computer networks, including the Internet, network protocols (TCP/IP) and network security. • Operating systems: Understand the different operating systems (Windows, Linux, macOS), their architecture and management.
Teaching methods and/or resources	• Self-paced learning in MOOC format
Evaluation methods	• Evaluation via multiple-choice questionnaire
Name(s) of person(s) in charge	Jonathan NAU
Bibliography/webography	• https://en.wikiversity.org/wiki/IT_Fundamentals • https://www.ninjaone.com/blog/information-technology-it-fundamentals-core-concepts/

[G-CUS-101] KYT/CAT – Professional skills

1 ECTS	**KYT/CAT – Profesional skills**		
Duration in hours	Course : 1	TP/TD : 3	Project : 20
ECUE prerequisites	No		
Objectives of the ECUE	Discover the concepts, great names and important dates around the theme of software development.		
ECUE content (Main points)	• Algorithms and data structures: Study problem-solving algorithms and data structures for efficient data storage, retrieval and manipulation. • Computational theory: Exploration of computational theory, including automata theory, complexity theory and computational limits (P vs. NP). • Programming languages and paradigms: Understanding of various programming languages, their syntax, semantics and paradigms (object-oriented, functional, procedural). • Software engineering: Principles and practices of software design, development, testing and maintenance, including methodologies such as Agile and DevOps.		
Teaching methods and/or resources	• Self-paced learning in MOOC format		
Evaluation methods	• Evaluation via multiple-choice questionnaire		
Name(s) of person(s) in charge	Jonathan NAU		

Bibliography/webography	• https://medium.com/geekculture/the-fundamentals-of-software-development-the-core-process-9ffaa6f8fabf • https://onecoredevit.com/news-and-insights/software-development/software-development-fundamentals-what-you-need-to-know/

[B-MAT-100] Mathematics

3 ECTS	**Mathematics**		
Duration in hours	Course : 4	TP/TD : 10	Project : 35
ECUE prerequisites	Know the basics of programming.		
Objectives of the ECUE	• Learn to code mathematical tools and functions within the framework of scientific programming.		
ECUE content (Main points covered)	• Linear algebra (vector analysis, matrix calculus) • Geometry (geometric transformations and coordinate systems) • Solving non-linear equations (polynomials of degrees 2 and 4)		
Teaching methods and/or resources	5 2-week projects to be carried out in pairs.		
Evaluation methods	Each project is evaluated using automated tests to determine the ability to implement mathematical notions within an IT project. In addition, there are 2 reviews to assess understanding of the mathematical concepts themselves.		
Name(s) of person(s) in charge	Ilias GROSY		
Bibliography/webograpy	• https://fr.wikipedia.org/wiki/Produit_matriciel#Produit_matriciel_ordinaire		

[B-MUL-100] C Graphical Programming

5 ECTS	**C Graphical Programming**		
Duration in hours	Course : 2	TP/TD : 13	Project : 85
ECUE prerequisites	C language fundamentals (B-CPE-100)		
Objectives of the ECUE	Acquire the fundamentals of graphic and event development. Learn to use an external library, and understand its documentation.		
ECUE content (Main points covered)	• Use and understanding of an external C graphics library (CSFML) • Event graphics management • Sprite animation management • Graphic multi-entity management • Crash system calculation		

Teaching methods and/or resources	• 2 projects. Each focusing on different aspects (event, sprite animation then collision, multi-entity). • Practical sessions on each project • Project follow-up sessions for progress
Evaluation methods	• An automatic game • Part manual correction, code review • An oral presentation section
Name(s) of person(s) in charge	Tom KLEIN
Bibliography/webography	• CSFML (SFML / Download / Bindings) (sfml-dev.org)

[B-NSA-100] Networks and systems

3 ECTS	**Networks and Systems**		
Duration in hours	Course : 1	TP/TD : 6	Project : 45
ECUE prerequisites	No		
Objectives of the ECUE	• Discover how virtual machines work • Understand the difference between different operating systems • Basic administration of a Linux installation		
ECUE content (Main points covered)	• Virtual machine creation • Dual-boot installation of different operating systems • System configuration • Installation of essential utilities • Account and group creation (rights management) • File sharing between operating systems		
Teaching methods and/or resources	1 3-week project to be carried out in pairs		
Evaluation methods	The project is evaluated during a presentation in which group members must demonstrate that they have acquired the following skills (on a Linux system): • How to partition a disk • Setting up the environment • Set the language used • Manage groups and users • Manage folder and file permissions • Configuring an SSH server • Mount partitions belonging to other operating systems • Installing and configuring a web server		
Name(s) of person(s) in charge	Aymeric FOUCHAULT & Jordan BANKOLE		
Bibliography/webography	• https://gbp.resinfo.org/?p=261		

[B-PMP-100] Introduction to project management I

1 ECTS	Introduction to project management I		
Duration in hours	Course : 1	TP/TD : 4	Project : 20
ECUE prerequisites	No		
Objectives of the ECUE	Get people thinking about how to work on a project on their own and in a group. • Collaborate as part of a team, sharing values and pooling knowledge, resources, tools and skills with a view to production. • Work independently. • Take the initiative.		
ECUE content (Main points covered)	• Work methodology • Group conflict management • Task management tools		
Teaching methods and/or resources	Oral presentations by the students, in which they explain the project management methods used in the concrete case of their project (from another E.U.). Feedback and advice from teaching staff and peers.		
Evaluation methods	Reviews are evaluated on the following points: • Breaking down the project into tasks • Distribution of work among group members • Implementation of work organization processes (time and task management tools, etc.)		
Name(s) of person(s) in charge	Gildas VINSON		
Bibliography/webography	• https://asana.com/fr/resources/it-project-management		

[B-PSU-100] UNIX system programming

7 ECTS	Unix system programming		
Duration in hours	Course : 2	TP/TD : 13	Project : 110
ECUE prerequisites	Fundamentals of C programming.		
Objectives of the ECUE	Discover the fundamentals of Unix programming through system calls using the C language.		
ECUE content (Main points covered)	• File management and rights • Advanced terminal management (signals) • Discovering and using a library (Ncurses)		
Teaching methods and/or resources	• Completion of 3 projects (2 on their own, and one in pairs)		
Evaluation methods	Automated tests on each project.		

Name(s) of person(s) in charge	Joffrey RIELA & Johan Tay-Nam
Bibliography/webography	• https://man7.org/linux/man-pages/man1/ls.1.html • https://man7.org/linux/man-pages/man7/signal.7.html

Semester 2 modules

[G-AIA-200] Discovery of Data Analysis

3 ECTS	**Discovery of Data Analysis**		
Duration in hours	Course : 1	TP/TD : 3	Project : 45
ECUE prerequisites	• Fundamentals of C programming. • Basic understanding of algorithmic principles		
Objectives of the ECUE	• Introduce the principles of "artificial intelligence" through data analysis • Create a library to facilitate data analysis		
ECUE content (Main points covered)	• Recreate a library for reading and analyzing data in CSV format • Pandas discovery		
Teaching methods and/or resources	1 2-week project to be carried out in groups of 2, consisting of recoding a light version of Pandas in C. Retrieve data from a CSV file, identify the columns and their type, filter and order the data and analyze it using mathematical tools.		
Evaluation methods	The project is evaluated by automated tests and a presentation.		
Name(s) of person(s) in charge	Julien CALENGE & Léo SAROCHAR		
Bibliography/webography	• https://pandas.pydata.org/		

[G-AIA-201] Introduction to Data Analysis

5 ECTS	**Introduction to Data Analysis**		
Duration in hours	Course : 1	TP/TD : 6	Project : 90
ECUE prerequisites	• Fundamentals of C programming. • Basic understanding of algorithmic principles		
Objectives of the ECUE	• Use data analysis tools to select, clean and analyze data • Discovering how to use Jupyter • Using data with an A.I. model		
Teaching methods and/or resources	1 6-week project to be carried out in groups of 3.		
Evaluation methods	The project is evaluated by automated tests and a presentation.		

Name(s) of person(s) in charge	Julien CALENGE & Léo SAROCHAR
Bibliography/webography	• https://pandas.pydata.org/ • https://jupyter.org/

[B-CPE-200] Elementary programming in C

10 ECTS	**Elementary programming in C**		
Duration in hours	Course : 2	TP/TD : 15	Project : 185
ECUE prerequisites	Programming fundamentals. Understanding basic algorithms.		
Objectives of the ECUE	Pushing the student's algorithmic thinking through complex elementary programming projects. Learn about new types of data structures.		
ECUE content (Main points covered)	• Shortest path search algorithm • Graph theory		
Teaching methods and/or resources	• 3 projects, each focused on understanding a different type of algorithm and data structure. • The final project is an "assessment" project, applying the concepts learned during the course of the year.		
Evaluation methods	Each project is evaluated by automated tests assessing 5 different skills for each project: • Algorithm application • Data structure • Optimization • Syntax analysis • Robustness		
Name(s) of person(s) in charge	Kevin SPEGT		
Bibliography/webography	• http://sdz.tdct.org/sdz/le-pathfinding-avec-dijkstra.html • https://fre.myservername.com/graph-implementation-c-using-adjacency-list • https://www.techiedelight.com/fr/implement-graph-data-structure-c/		

[G-CUS-200] KYT/CAT - Fundamentals of Artificial Intelligence

1 ECTS	**Fundamentals of Artificial Intelligence**		
Duration in hours	Course : 1	TP/TD : 3	Project : 20
ECUE prerequisites	No		
Objectives of the ECUE	Discover concepts, big names and important dates around the theme of computing.		

ECUE content (Main points)	• Machine Learning: supervised, unsupervised and reinforcement learning • Neural networks • Automatic natural language processing • Ethics and Bias
Teaching methods and/or resources	Self-paced learning in MOOC format
Evaluation methods	Evaluation via multiple-choice questionnaire
Name(s) of person(s) in charge	Jonathan NAU
Bibliography/webography	• https://learn.microsoft.com/fr-fr/credentials/certifications/azure-ai-fundamentals/

[G-CUS-201] KYT/CAT - Fundamentals of Cybersecurity

1 ECTS	**Fundamentals of Cybersecurity**		
Duration in hours	Course : 1	TP/TD : 3	Project : 20
ECUE prerequisites	No		
Objectives of the ECUE	Discover the concepts, great names and important dates around the theme of software development.		
ECUE content (Main points covered)	• Triad CIA: Confidentiality, Integrity and Availability • Cryptography • Risk management • Network security		
Teaching methods and/or resources	Self-paced learning in MOOC format		
Assessment methods	Evaluation via multiple-choice questionnaire		
Name(s) of person(s) in charge	Jonathan NAU		
Bibliography/webography	• https://learn.microsoft.com/en-us/credentials/certifications/security-compliance-and-identity-fundamentals • https://learn.microsoft.com/en-us/training/paths/describe-basic-concepts-of-cybersecurity/		

[B-DOP-200] Introduction to DevOps

3 ECTS	**Introduction to DevOps**		
Duration in hours	Course : 1	TP/TD : 11	Project : 35
ECUE prerequisites	No		

Objectives of the ECUE	Discover DevOps practices and related fundamental concepts
ECUE content (Main points covered)	• Containerization with Docker • Basic orchestration with Docker Compose • Task automation with GitHub Actions
Teaching methods and/or resources	• 1 project to deploy an existing application using containers. • 1 second project focusing on the principles of process automation via Github Actions
Evaluation methods	• The first project is evaluated via automated tests, and the second via a presentation. • The module concludes with a review in which students demonstrate their understanding of specific principles.
Name(s) of person(s) in charge	Hugo PEREZ
Bibliography/webography	• https://www.docker.com/ • https://docs.docker.com/compose/ • https://github.com/features/actions

[G-ING-200] Discovery of Software Engineering

3 ECTS	**Discovery of Software Engineering**		
Duration in hours	Course : 1	TP/TD : 3	Project : 45
ECUE prerequisites	C language fundamentals (B-CPE-100) Fundamentals of graphic and event development (B-MUL-100)		
Objectives of the ECUE	• Learn to use an external library and understand its documentation. • Learn how to design and create a user interface • Learn the basics of game and level design		
ECUE content (Main points covered)	• Use and understanding of an external C graphics library (CSFML) • Graphical visualization of raw data		
Teaching methods and/or resources	• Group synthesis project • Practical work sessions on each project • Project follow-up sessions for progress		
Evaluation methods	• An automatic game • Part manual correction, code review • A keynote		
Name(s) of person(s) in charge	Tom KLEIN		
Bibliography/webography	• CSFML (SFML / Download / Bindings) (sfml-dev.org) • Level design - Wikipedia (wikipedia.org)		

	• Game design - Wikipedia (wikipedia.org)

[G-ING-201] Introduction to Software Engineering

5 ECTS	Introduction to Software Engineering		
Duration in hours	Course : 1	TP/TD : 6	Project : 90
ECUE prerequisites	C language fundamentals (B-CPE-100) Fundamentals of graphic and event development (B-MUL-100)		
Objectives of the ECUE	• Learn to use an external library and understand its documentation. • Learn how to design and create a user interface • Learn the basics of game and level design		
ECUE content (Main points)	• Use and understanding of an external C graphics library (CSFML) • Design and create a video game by thinking about game design and level design		
Teaching methods and/or resources	• Group synthesis project • Practical work sessions on each project • Project follow-up sessions for progress		
Evaluation methods	• An automatic game • Part manual correction, code review • A keynote		
Name(s) of person(s) in charge	Tom KLEIN		
Bibliography/webography	• CSFML (SFML / Download / Bindings) (sfml-dev.org) • Level design - Wikipedia (wikipedia.org) • Game design - Wikipedia (wikipedia.org)		

[B-MAT-200] Mathematics

3 ECTS	Mathematics		
Duration in hours	Course : 4	TP/TD : 10	Project : 35
ECUE prerequisites	Know the basics of programming.		
Objectives of the ECUE	Learn to code mathematical tools and functions for scientific programming.		
ECUE content (Main points covered)	• Numerical sequences • Calculation and analysis of functions (derivatives, integrals)		
Teaching methods and/or resources	5 2-week projects to be carried out in pairs.		
Evaluation methods	Each project is evaluated using automated tests to determine the ability to implement mathematical concepts within an IT		

	project. In addition, there are 2 reviews to assess understanding of the mathematical concepts themselves.
Name(s) of person(s) in charge	Ilias GROSY
Bibliography/webograpy	• https://fr.wikipedia.org/wiki/D%C3%A9rivation_num%C3%A9rique

[B-PMP-200] Introduction to project management

3 ECTS	**Introduction to project management**		
Duration in hours	Course : 1	TP/TD : 5	Project : 50
ECUE prerequisites	No		
Objectives of the ECUE	Deepen your knowledge of project and group management. • Developing test policies • Collaborate within a team, sharing values and pooling knowledge, resources, tools and skills with a view to production. • Work independently. • Take the initiative. • Manage a project (design, steering, team coordination, implementation and management, evaluation, dissemination) that can mobilize multidisciplinary skills within a collaborative framework.		
ECUE content (Main points covered)	• Work methodology • Group conflict management • Task management tools • Unit testing • Integration tests		
Teaching methods and/or resources	Oral presentations by the students, in which they explain the project management methods used in the concrete case of their project (from another E.U.). Feedback and advice from teaching staff and peers.		
Evaluation methods	Reviews are evaluated on the following points: • Breaking down the project into tasks • Distribution of work among group members • Implementation of work organization processes (time and task management tools, etc.) • Setting up a test policy • Unit test coverage rate		
Name(s) of person(s) in charge	Gildas VINSON		
Bibliography/webography	• https://asana.com/fr/resources/it-project-management		

	• https://learn.microsoft.com/fr-fr/visualstudio/test/unit-test-basics?view=vs-2022

[B-PSU-200] Shell programming

10 ECTS	**Shell programming**		
Duration in hours	Course : 2	TP/TD : 15	Project : 185
ECUE prerequisites	Fundamentals of C programming.		
Objectives of the ECUE	Discover process management on a Unix system.		
ECUE content (Main points covered)	• Create your own shell (command interpreter) • Writing a complex parser • Environment context management • Running processes in the background • Group work		
Teaching methods and/or resources	The creation of a command interpreter is divided into 3 successive parts (projects): • Minishell1, command line interpretation and process execution • Minishell2, more complex command line and management of I/O redirection between processes (piping) • 42sh, full-featured command interpreter		
Evaluation methods	Automated tests to validate the knowledge acquired on each project, plus a keynote session for students to present their final results.		
Name(s) of person(s) in charge	Joffrey RIELA & Johan Tay-Nam		
Bibliography/webography	• https://fr.wikipedia.org/wiki/Bourne-Again_shell • https://fr.wikipedia.org/wiki/Analyse_LL		

[G-SEC-200] Discovery of Cyber Security

3 ECTS	**Discovery of Cyber Security**		
Duration in hours	Course : 1	TP/TD : 4	Project : 45
ECUE prerequisites	No		
Objectives of the ECUE	Discover standard hacking, enumeration and privilege elevation techniques.		
ECUE content (Main points covered)	• Command injection • SQL injection • SSTI (Server Side Template Injection) operation • SUID vulnerability exploitation • Exploiting vulnerabilities Capabilities		

	• Exploitation of CVEs (Common Vulnerabilities Exposures)
Teaching methods and/or resources	• Attack on vulnerable virtual machines made available to students by the school, each focusing on different types of vulnerability. • Capture The Flag project to be carried out in pairs
Evaluation methods	Assessment is based on the number of flags found (each flag corresponding to a technical skill expected in the module). The assessment is completed by an oral presentation in which students present their methodology and the application of acquired skills.
Name(s) of person(s) in charge	Théo CAMPOS
Bibliography/webography	• https://tryhackme.com/ • https://www.root-me.org/fr/Capture-The-Flag/

[G-SEC-201] Introduction to Cyber Security

5 ECTS	**Introduction to Cyber Security**		
Duration in hours	Course : 1	TP/TD : 6	Project : 90
ECUE prerequisites	No		
Objectives of the ECUE	Discover binary security and how to exploit vulnerabilities to gain access.		
ECUE content (Main points covered)	• Buffer overflow • Exploiting formatting chains • Integer overflow/underflow • Access to uninitialized memory		
Teaching methods and/or resources	• A project to be carried out in a group, representing a simulation of a program from which information is to be obtained. • Report on vulnerabilities and their exploitation		
Evaluation methods	Assessment is by oral presentation.		
Name(s) of person(s) in charge	Théo CAMPOS		
Bibliography/webography	• https://ctf101.org/binary-exploitation/what-is-binary-security/		

[B-WEB-200] Introduction to web development

3 ECTS	**Introduction to web development**		
Duration in hours	Course : 1	TP/TD : 5	Project : 40
ECUE prerequisites	Programming fundamentals		
Objectives of the ECUE	• Understand the basic principles of web development		

	• Discovering the back-end/front-end difference • Discover how to use a database • Introduction to NodeJS and REST APIs
ECUE content (Main points covered)	• Creating a to-do list application • Communication between back-end and front-end via an API • SQL database • http protocol (verbs, response code, authentication, etc.)
Teaching methods and/or resources	• 1 project for a group of 2 or 3 people to create an API for managing a to-do list.
Evaluation methods	The project is evaluated during a presentation in which the group members must demonstrate that their project works on the following points: • Project architecture • Authentication implementation • Persistence through a database • How the API works • Respecting REST conventions
Name(s) of person(s) in charge	Enes KOC & Jonathan NAU
Bibliography/webography	• https://blog.logrocket.com/build-rest-api-node-express-mysql/ • https://developer.mozilla.org/fr/docs/Learn/Server-side/Express_Nodejs/Introduction

Semester 4 Modules

[B-PDG-300] Paradigms Seminar

8 ECTS	**Paradigms Seminar**		
Duration in hours	Course : 15	TP/TD : 5	Project : 130
ECUE prerequisites	Imperative programming in C		
Objectives of the ECUE	• Acquire the technical tools needed to carry out advanced projects in the 2nd year. • Preparation for module B-OOP-400, B-FUN-400		
ECUE content (Main points covered)	• Introduction to 3 programming paradigms : • Functional programming in Haskell • Modular programming in CPObject-oriented programming in C++		
Teaching methods and/or resources	• 1 introductory session on the paradigms addressed • 13 days of intensive tutored exercises, discovering each paradigm through a series of progressive exercises • 3 group pojects applying the paradigms studied during the week		

	• 3 project presentations
Evaluation methods	Identification of validated skills based on : • Exercise day results • Group project presentations enabling each student to showcase the skills acquired in the course of the project • Final keynote
Name(s) of person(s) in charge	Guillaume DEVOILLE, Léo FORNES and Mattéo VOLPI
Bibliography/webography	• https://wiki.haskell.org/Functional_programming • https://en.wikipedia.org/wiki/Modular_programming • https://developer.mozilla.org/en-US/docs/Learn/JavaScript/Objects/Object-oriented_programming

[B-ASM-400] x86_64 Assembly

3 ECTS	**x86_64 Assembly**		
Duration in hours	Course : 1	TP/TD : 5	Project : 40
ECUE prerequisites	Basic knowledge of the C language		
Objectives of the ECUE	Discover x86-64 assembler programming so you can write small applications in assembler and understand disassembled code.		
ECUE content (Main points covered)	Creation of a dynamic library containing a number of glibC functions recoded in x86-64 assembler.		
Teaching methods and/or resources	1 individual project		
Evaluation methods	Automated project testing		
Name(s) of person(s) in charge	Ilias GROSY		
Bibliography/ webography	• https://en.wikipedia.org/wiki/X86-64 • https://www.intel.com/content/www/us/en/developer/articles/technical/intel-sdm.html		

[B-CCP-400] Concurrent programming

5 ECTS	**Concurrent programming**		
Duration in hours	Course : 1	TP/TD : 10	Project : 85
ECUE prerequisites	Knowledge of C programming and fundamentals of C++ programming (B-PDG-300).		
Objectives of the ECUE	Discover parallelism and concurrent programming		
ECUE content (Main points covered)	• Discover threads, mutexes and conditional variables • Implementation of a parallel producer/consumer diagram. • Managing competition between multiple processes and threads		

Teaching methods and/or resources	1 introductory project on parallelism to be done on your own, followed by a group project asking you to implement a more complex concurrency program.
Evaluation methods	Assessment by automated tests, supplemented by a defense.
Name(s) of person(s) in charge	Jonathan NAU
Bibliography/ webography	• https://blog.engineering.publicissapient.fr/2008/08/13/programmation-concurrentielle-notions-fondamentales/

[G-CNA-400] Computer Numerical Analysis

3 ECTS	**Computer Numerical Analysis**		
Duration in hours	Course : 5	TP/TD : 20	Project : 50
ECUE prerequisites	Programming knowledge		
Objectives of the ECUE	Learn to code mathematical tools and functions for scientific programming		
ECUE content (Main points covered)	• Probability (random variables, random experiments, events, binomial law, Poisson's law) • Combinatorial calculation • Statistics (descriptive statistics, correlations, sampling) • Expectation, variance, standard deviation		
Teaching methods and/ or resources	9 2-week projects to be carried out in pairs		
Evaluation methods	Each project is evaluated using automated tests to determine the ability to implement mathematical concepts within an IT project. There are also 2 reviews to assess understanding of the mathematical concepts themselves.		
Name(s) of person(s) in charge	Ilias GROSY		
Bibliography/webography			

[G-CUS-400] KYT/CAT-Networks & communication

1 ECTS	**KYT/CAT-Networks & communication**		
Duration in hours	Course : 1	TP/TD : 3	Project : 20
ECUE prerequisites	No		
Objectives of the ECUE	Discover concepts, big names and important dates around the theme of networks and digital communication.		
ECUE content (Main points covered)	• OSI model • Network devices (router, switch, gateway) • History of telecommunications		

	• Internet
Teaching methods and/or resources	Autonomous learning on a corpus of resources provided
Evaluation methods	3 Q.C.M.
Name(s) of person(s) in charge	Jonathan NAU
Bibliography/webography	• https://fr.wikipedia.org/wiki/Mod%C3%A8le_OSI • https://www.oreilly.com/library/view/routing-and-switching/9780133476200/

[G-CUS-401] KYT/CAT - Processor Architecture

1 ECTS	**KYT/CAT - Processor Architecture**		
Duration in hours	Course : 1	TP/TD : 3	Project : 20
ECUE prerequisites	No		
Objectives of the ECUE	Discover the concepts, great names and important dates around the theme of video games		
ECUE content (Main points)	• The professions behind video games • Working conditions in the video game industry • How a "game loop" works • The societal challenges of video games		
Teaching methods and/or resources	Independent learning on a corpus of provided resources		
Evaluation methods	3 Q.C.M.		
Name(s) of person(s) in charge	Jonathan NAU		
Bibliography/ webography	• http://snjv.org/wp-content/uploads/2021/09/Barometre-SNJV-2021-1.pdf • https://www.theguardian.com/technology/2018/oct/11/tech-gender-problem-amazon-facebook-bias-women		

[B-DOP-400] DevOps

4 ECTS	**DevOps**		
Duration in hours	Course : 5	TP/TD : 10	Project : 60
ECUE prerequisites	Basic knowledge of Docker and automation is recommended (B-DOP-200)		
Objectives of the ECUE	Continued learning of DevOps practices and a deeper understanding of automation.		
ECUE content (Main points covered)	• Task automation with Jenkins • Configuration management with Ansible		

Teaching methods and/or resources	• 1 project to discover the concept of "configuration-as-code" and deploy an instance of Jenkins • 1 project discovering task automation via Ansible
Evaluation methods	• The first project is evaluated via automated tests, and the second via a presentation. • The module concludes with a review, enabling students to demonstrate their understanding of specific principles.
Name(s) of person(s) in charge	Hugo PEREZ
Bibliography/webography	• https://www.jenkins.io/ • https://www.ansible.com/

[B-FUN-400] Functional Programming

7 ECTS	**Functional Programming**		
Duration in hours	Course : 3	TP/TD : 10	Project : 115
ECUE prerequisites	Basic functional programming (B-PDG-300)		
Objectives of the ECUE	Deepen your understanding of the functional paradigm and the Haskell language.		
ECUE content (Main points covered)	• Application design based on the functional paradigm • Recursive functions and higher-order functions • Handling lists, tuples and data structures • I/O management with the IO monad • Error handling with the Maybe monad		
Teaching methods and/or resources	• Implementation of Wolfram's elementary cellular automata in Haskell (two-week project to be carried out alone) • Implementation of an image compression tool using the K-Means algorithm • Conversion between different text formats (markdown, html, json)		
Evaluation methods	Automated project testing		
Name(s) of person(s) in charge	Marc PLANARD		
Bibliography/ webography	• https://mathworld.wolfram.com/ElementaryCellularAutomaton.html • https://towardsdatascience.com/three-versions-of-k-means-cf939b65f4ea		

[B-NWP-400] Network programming

7 ECTS	**Network programming**		
Duration in hours	Course : 1	PT/DT : 11	Project : 110
ECUE prerequisites	Knowledge of C programming.		

Objectives of the ECUE	• Discover network programming using TCP/IP sockets
ECUE content (Main points covered)	• Creating a client/server architecture • Manage several customers in parallel • Using TCP packets • Implementing an existing protocol • Create and document an "in-house" protocol
Teaching methods and/or resources	1 project to be carried out on your own, enabling you to learn about sockets by implementing an existing protocol, and a more substantial project to be carried out in a group, where the protocol has to be invented and documented.
Evaluation methods	Projects are assessed automatically to validate the skills associated with the module.
Name(s) of person(s) in charge	Jérémy ANDREY & Gildas VINSON
Bibliography/webography	• http://manpagesfr.free.fr/man/man2/socket.2.html • https://www.cnetfrance.fr/news/le-monde-est-plus-connecte-que-jamais-495-milliards-de-personnes-utilisent-internet-en-2022-39946508.htm

[B-OOP-400] Object-oriented programming

8 ECTS	**Object-oriented programming**		
Duration in hours	Course : 2	TP/TD : 19	Project : 130
ECUE prerequisites	Fundamentals of object-oriented programming (B-PDG-300)		
Objectives of the ECUE	• Application of object-oriented programming concepts discovered in the previous module. • Group work methodology.		
ECUE content (Main points)	Through 3 projects, acquire or reinforce the following concepts: • Interfaces, abstract classes, polymorphism. • Encapsulation. Constructing and solving graphs.		
Teaching methods and/or resources	3 projects using object-oriented programming concepts: • 1 introductory session to the project • 1 design follow-up • 1 implementation follow-up • 1 defense		
Evaluation methods	Identification of student skills based on project presentations.		
Name(s) of person(s) in charge	Guillaume DEVOILLE & Mattéo VOLPI		
Bibliography/webography	• https://isocpp.org/		

[B-PMP-400] Project management

3 ECTS	Project management		
Duration in hours	Course : 1	TP/TD : 5	Project : 50
ECUE prerequisites	Know the basics of managing short single and small group projects.		
Objectives of the ECUE	• Deepen your knowledge of project and group management. • Developing test policies • Collaborate within a team, sharing values and pooling knowledge, resources, tools and skills with a view to production. • Work independently. • Take the initiative. • Manage a project (design, steering, team coordination, implementation and management, evaluation, dissemination) that can mobilize multidisciplinary skills within a collaborative framework. • Deploy IT applications, manage test phases and upgrades.		
ECUE content (Main points covered)	• Work methodology • Group conflict management • Task management tools • Unit testing • Integration tests		
Teaching methods and/or resources	Oral presentations by the students, in which they explain the project management methods used in the concrete case of their project (from another E.U.). Feedback and advice from teaching staff and peers.		
Evaluation methods	Evaluation of organizational quality reviews.		
Name(s) of person(s) in charge	Gildas VINSON		
Bibliography/webography	• https://asana.com/fr/resources/it-project-management • https://learn.microsoft.com/fr-fr/visualstudio/test/unit-test-basics?view=vs-2022		

[B-PSU-400] Unix Prog - Instrumentation

7 ECTS	Unix Prog - Instrumentation		
Duration in hours	Course : 2	TP/TD : 13	Project : 110
ECUE prerequisites	Knowledge of C programming		
Objectives of the ECUE	Discover how an ELF file works and the operating principles of a debugger		
ECUE content (Main points covered)	• Find out what information can be retrieved from an ELF file • Discerning kernel space from user space • Find out what information can be retrieved from a process • Exploring the concept of system calls in greater depth		

	• Learn how to trace program execution • Learn to decode x86-64 binary instructions
Teaching methods and/or resources	3 projects, each designed to introduce new concepts: • Retrieving symbols and information from an ELF file • Creation of a system call tracer for ELF files • Creation of a function call tracer for ELF files
Evaluation methods	Automated project testing
Name(s) of person(s) in charge	Jonathan NAU
Bibliography/ webography	• https://www.intel.com/content/www/us/en/developer/articles/technical/intel-sdm.html

[B-SEC-400] Cyber security

3 ECTS	**Cyber security**		
Duration in hours	Course : 1	TP/TD : 4	Project : 45
ECUE prerequisites	Basic knowledge of cyber security (B-SEC-200)		
Objectives of the ECUE	Discover advanced hacking, enumeration and privilege elevation techniques.		
ECUE content (Main points)	• Command injection • SQL injection • SSTI (Server Side Template Injection) operation • SUID vulnerability exploitation • Exploiting vulnerabilities Capabilities • Exploitation of CVEs (Common Vulnerabilities Exposures)		
Teaching methods and/or resources	• Attack on vulnerable virtual machines made available to students by the school, each focusing on different types of vulnerability. • Capture The Flag project to be carried out in pairs		
Evaluation methods	Assessment is based on the flags found (each linked to a module skill). The assessment is completed by an oral presentation in which students present their methodology and the application of acquired skills.		
Name(s) of person(s) in charge	Théo CAMPOS		
Bibliography/webography	• https://tryhackme.com/ • https://www.root-me.org/fr/Capture-The-Flag/		

[B-YEP-400] Year-end project Zappy

7 ECTS	**[B-YEP-400] Year-end project Zappy**		
Duration in hours	Course : 1	TP/TD : 8	Project : 120
ECUE prerequisites	• C++ object-oriented programming		

	• Knowledge of C programming • C/C++ network implementation skills • Basic skills in using a graphics library (SFML)
Objectives of the ECUE	Apply the year's key concepts to a substantial project
ECUE content (Main points)	• Programming a graphical interface in C++ using SFML • C server capable of managing multiple clients • Implementing game logic • Development of small artificial intelligences capable of coordinating to win the game • Teamwork
Teaching methods and/or resources	A major project at the end of the second year (called "Zappy"), bringing together all the essential points of the year.
Evaluation methods	Assessment of the various skills via a defense and an oral presentation in keynote format
Name(s) of person(s) in charge	Jonathan NAU
Bibliography/webography	• https://fr.wikipedia.org/wiki/Zaphod_Beeblebrox

Semester 5 Modules

[B-AIA-500] Artificial intelligence

4 ECTS	**Artificial intelligence**		
Duration in hours	Course : 2	TP/TD : 8	Project : 65
ECUE prerequisites	Create programs and implement algorithms.		
Objectives of the ECUE	• Discover game theory • Deepen your knowledge of A.I.		
ECUE content (Main points covered)	• Game theory • Min/max and alpha-beta pruning • Technical constraints (memory, speed)		
Teaching methods and/or resources	Creation of a program capable of playing gomoku ninuki against humans and other artificial intelligences in groups.		
Evaluation methods	Evaluation via automated tests.		
Name(s) of person(s) in charge	Jérémy ANDREY		
Bibliography/webography	• https://www.jeu-de-go.com/gomoku-ninuki.html • https://www.economie.gouv.fr/facileco/john-nash • https://www.universalis.fr/encyclopedie/theorie-des-jeux/		

[B-CNA-500] Computer Numerical Analysis

4 ECTS	**Computer Numerical Analysis**		
Duration in hours	Course : 3	TP/TD : 15	Project : 70
ECUE prerequisites	Knowledge of programming and basic algorithms		

Objectives of the ECUE	Implement some advanced tools and algorithms used for scientific calculations
ECUE content (Main points covered)	• Cryptography • Neural network
Teaching methods and/or resources	2 projects tackling two different themes through the use of digital and mathematical tools.
Evaluation methods	Each project is evaluated at a
Name(s) of person(s) in charge	Ilias GROSY
Bibliography/webography	

[B-CPP-500] Advanced C++

9 ECTS	**Advanced C++**		
Duration in hours	Course : 2	TP/TD : 8	Project : 165
ECUE prerequisites	Knowledge of object-oriented programming, proficiency in C++ language		
Objectives of the ECUE	Development of a multiplayer game engine, and implementation of a game using this engine		
ECUE content (Main points covered)	• Network programming • Software architecture • Software engineering (dependency management, cross-platform, source code management, etc.) • Technical documentation		
Teaching methods and/or resources	• Discovery of ECS architecture through a TD • In "project mode" for the course of the module • Intermediary points to validate project progress		
Evaluation methods	Evaluation of a minimum implementation after one month, then evaluation of the whole project after 2 months of development.		
Name(s) of person(s) in charge	Gabriel CADET & Gabriel CUVILLIER		
Bibliography/webography	• *Game Engine Architecture - Jason Gregory - ISBN-13: 9781138035454* • https://fabiensanglard.net/quake3/index.php		

[G-CUS-500] KYT/CAT-Algorithms

1 ECTS	**KYT/CAT-Algorithms**		
Duration in hours	Course : 1	TP/TD : 3	Project : 20
ECUE prerequisites	No		

Objectives of the ECUE	Discover concepts, great names and important dates around the theme of algorithms
ECUE content (Main points covered)	• Theoretical discovery of data structures • The big names in algorithms • Different paradigms • Asymptotic comparison • Algorithmic complexity
Teaching methods and/or resources	Independent learning on a corpus of provided resources
Evaluation methods	3 Q.C.M.
Name(s) of person(s) in charge	Jonathan NAU
Bibliography/ webography	• https://en.wikipedia.org/wiki/Donald_Knuth • https://www.101computing.net/heuristic-approaches-to-problem-solving/ • https://www.pnas.org/doi/pdf/10.1073/pnas.1418680112

[G-CUS-501] KYT/CAT-Video games

1 ECTS	**KYT/CAT-Video games**		
Duration in hours	Course : 1	TP/TD : 3	Project : 20
ECUE prerequisites	No		
Objectives of the ECUE	Discover the concepts, great names and important dates around the theme of video games		
ECUE content (Main points covered)	• The professions behind video games • Working conditions in the video game industry • How a "game loop" works • The societal challenges of video games		
Teaching methods and/or resources	Independent learning on a corpus of provided resources		
Evaluation methods	3 Q.C.M.		
Name(s) of person(s) in charge	Jonathan NAU		
Bibliography/ webography	• http://snjv.org/wp-content/uploads/2021/09/Barometre-SNJV-2021-1.pdf • https://www.theguardian.com/technology/2018/oct/11/tech-gender-problem-amazon-facebook-bias-women		

[B-DEV-500] Application development

9 ECTS	**Application development**		
Duration in hours	Course : 2	TP/TD : 8	Project : 165
ECUE prerequisites	Programming knowledge		

Objectives of the ECUE	See a complete project management cycle, from the research phase to the Minimum Viable Product and final implementation.
ECUE content (Main points covered)	• Exploring languages and technologies • Project planning • Using REST APIs • Oauth2 • Software engineering (dependency management, cross-platform, source code management, etc.) • Technical documentation
Teaching methods and/or resources	A 5-student group project divided into 3 phases: • Planning • Minimum Viable Product • Final product
Evaluation methods	• 3 presentations, each concluding a phase of the project. • The first will assess the group's ability to plan and choose its technology stack, as well as its ability to set up a form of work organization. • The second focuses on the realization of a Minimum Viable Product and the updating of the initial plan to reflect the reality of progress and the students' ability to analyze and step back from the difference between what was initially planned and what has been achieved to date. • The last evaluates the technical aspect of the final project and the students' ability to make a post-mortem of one of their projects (both technically and in terms of group organization). • All the students in a group take part in the defense and are questioned to ensure that the whole group has acquired (or not) the necessary skills.
Name(s) of person(s) in charge	Jonathan NAU
Bibliography/webography	• https://ifttt.com/ • https://fr.smartsheet.com/content/it-project-plan

[B-DOP-500] Advanced DevOps

4 ECTS	**Advanced DevOps**		
Duration in hours	Course : 1	TP/TD : 10	Project : 65
ECUE prerequisites	Familiarity with docker and docker-compose and automation via ansible (B-DOP-200 and B-DOP-400 recommended)		
Objectives of the ECUE	Continued learning of DevOps practices and joint application of the 4 concepts and technologies seen above.		
ECUE content (Main points)	• Orchestration with Kubernetes • Use Docker, Jenkins, Ansible, and Kubernetes in a single project		

Teaching methods and/or resources	2 group projects, the first exploring orchestration via Kubernetes, and the second applying all the skills explored in the DevOps courses to a real-life project.
Evaluation methods	• The first project is evaluated via automated tests, and the second via a presentation. • The module concludes with a review in which students demonstrate their understanding of specific principles.
Name(s) of person(s) in charge	Hugo PEREZ
Bibliography/webography	• https://kubernetes.io/

[B-FUN-500] Functional Programming

9 ECTS	**Functional Programming**		
Duration in hours	Course : 2	TP/TD : 8	Project : 165
ECUE prerequisites	Functional programming in Haskell (B-FUN-400)		
Objectives of the ECUE	Syntax analysis, interpretation and compilation in Haskell		
ECUE content (Main points covered)	• Syntax analysis using top-down recursion and combinators. • Techniques for implementing this parser in Haskell. • Syntax analysis of symbolic expressions (LISP) • Abstract syntax tree • Interpretation by syntax tree traversal • Stack-machine virtual machine • Compilation		
Teaching methods and/or resources	• Implementation of a LISP interpreter using environment passing and syntax tree traversal, in Haskell. • Implementation of a combinatorial parsing library in Haskell. • Implementing a compiler • Virtual machine implementation (optional)		
Evaluation methods	Intermediate and final defense		
Name(s) of person(s) in charge	Marc PLANARD and Gabriel TOUBLANC		
Bibliography/webography	• http://languagelog.ldc.upenn.edu/myl/llog/jmc.pdf • https://www.aosabook.org/en/500L/a-python-interpreter-written-in-python.html		

[B-SEC-500] Advanced Security

4 ECTS	**Advanced Security**		
Duration in hours	Course : 1	TP/TD : 4	Project : 70
ECUE prerequisites	UE B-SEC-200 and B-SEC-400 are recommended.		
Objectives of the ECUE	Discover advanced notions of hacking, enumeration and elevation of privileges.		
ECUE content	• Command injection		

(Main points covered)	• SQL injection • SSTI (Server Side Template Injection) operation • SUID vulnerability exploitation • Exploiting vulnerabilities Capabilities • Exploitation of CVEs (Common Vulnerabilities Exposures) • Exploiting vulnerabilities with SSH Tunneling • Exploiting vulnerabilities using reverse port forwarding
Teaching methods and/or resources	Attack on vulnerable virtual machines made available to students by the school, each focusing on different types of vulnerability.
Evaluation methods	Assessment is based on the flags found (each linked to a module skill). The assessment is completed by an oral presentation in which students present their methodology and the application of acquired skills.
Name(s) of person(s) in charge	Gabriel TOUBLANC & Julien CHASSARD
Bibliography/webography	• https://book.hacktricks.xyz/generic-methodologies-and-resources/tunneling-and-port-forwarding

[B-SVR-500] Survivor seminar

5 ECTS	**Survivor Seminar**		
Duration in hours	Course : 2	TP/TD : 3	Project : 95
ECUE prerequisites	Solid programming skills.		
Objectives of the ECUE	• Talking with customers to meet their needs • Adapting to any situation		
ECUE content (Main points)	• Know how to communicate professionally • Developing a project within constraints • Anticipating the unpredictable • Saying "no		
Teaching methods and/or resources	A two-week project using web technologies, but with a lot going on that requires constant adaptation.		
Evaluation methods	Evaluation is based on 2 presentations on the progress of the functionalities, and a keynote analyzing the group's adaptability and professionalism.		
Name(s) of person(s) in charge	Jonathan Nau		
Bibliography/webography	• https://www.myconnecting.fr/articles/adaptabilite-professionnelle-soft-skill/#:~:text=La%20meilleure%20fa%C3%A7on%20de%20s,s adapt%20%C3%A0%20the%20situation.		