# Course description

| General information | |
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| Course leader | **Jonathan NAU** |
| Course title | **Advanced C++** |
| Study programme | **Title of Expert in Information Technology** |
| Course status | **Joint Study Program** |
| Year | 1 |

| Number of credits and mode of teaching delivery | ECTS student workload coefficient | 10 |
|---|---|---|
| | Number of hours (L+E+S) | 239 (3+0+236) |

## 1. COURSE DESCRIPTION

### 1.1. Course objectives

The module 'Advanced C++' focuses on the architecture of the C++ program.
Through various projects, the objective is for the students to build and to run the same programs on the Unix as well as on the Windows systems.

### 1.2. Conditions for enrolment in the course

- Be able to program in C++.
- Know the basics of Object-oriented programming.

### 1.3. Expected learning outcomes of the course

LO1: Compare the differences between the various operating systems in C++ context.
LO2: Identify key attributes of the various operating systems in C++ context.
LO3: Create a solution using shared libraries in various operating systems.
LO4: Create a solution by using sockets in various operating systems.
LO5: Create a solution by using threads in various operating systems.
LO6: Create all parts of a UML class diagram, which is indiscriminately used by all object languages.
LO7: Design and consume an API.
LO8: Build an efficient software architecture based on requirements.
LO9: Use the appropriate package manager.

Optional if the students use its own library:
Find and read Windows information: MSDN.
Use and configure Visual Studio, Microsoft's IDE.
Use Visual Studio's debugger.

### 1.4. Course content

Advanced C++ consists of three distinct projects with different objectives. All the projects are to be worked in groups.

- Make a VOIP client/server program – Babel (2 ECTS)
- Make a copy of the R-Type game to handle a multi-player mode– R-Type (3 ECTS)

- Make a full modular web server – ZIA (6 ECTS)

Via the three projects, the students learn about the use of C++ programming language in an industry context.  The philosophical difference between Unix and Windows is, thus, introduced through creating or using the software abstractions which allow natively portable programs to be developed on all systems. The abstractions focus on a key concept, which is the core element of this module: Application Programming Interfaces (API). These elements are used in Object-oriented programming, related to any programming languages.

| 1.5. Teaching delivery modes: | ☐ lectures<br>☒ seminars and workshops<br>☐ exercises<br>☐ remote learning<br>☐ field work | ☒ independent work<br>☐ multimedia and network<br>☐ laboratory<br>☒ mentoring<br>☐ other _____ |
|---|---|---|
| 1.6. Comments | | Epitech pedagogy is based on the project-based learning approach which consists of mainly learning by doing. Therefore, it requires the students to be autonomous in his work with the help of his peers and to be supervised by the academic staff. |

### 1.7. Student obligations

STUDENT ATTENDANCE
Class attendance is mandatory in the percentage prescribed by the Studies and examination regulations.

PASSING EXAM
Each groups of students must submit their results to the teachers and give an oral presentation based on their results. The results are reviewed by the academic staff during an oral examination. A justification of the project work can be explained by the students.

### 1.8. Monitoring[1] student work

| Class attendance | | Activity during class | | Seminar paper | | Experimental work | |
|---|---|---|---|---|---|---|---|
| Written exam | | Oral exam | | Essay | | Research | |

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[1] IMPORTANT NOTES: Next to each method of monitoring student work it is necessary to insert an adequate share of each activity in ECTS credits, so the total number of ECTS credits corresponds to the credit value of the course.  You can use empty fields for additional activities.

| | | Continuous assessment of knowledge | | Student report | | Practical work | |
|---|---|---|---|---|---|---|---|---|
| Project | 100 % | | | | | | |
| Portfolio | | | | | | | |

The students are assessed on the results of the three projects.

The grades of each projects are independent from each other and the total of ECTS for the module is equal to 11 ECTS, dividing into 3 different projects:

- Project Babel - 2 ECTS
- Project R-Type - 3 ECTS
- Project ZIA - 6 ECTS

All the projects are done in groups. The students are assessed on the number of the features implemented and the quality of the implementation.

For the three projects, the students are evaluated on the oral exam on the project (100%), called "review" – with a presentation, demonstration, and a code review, in front of the supervisor.

CONCRETE REVIEW OF EVALUATION METHODS

The maximum number of points that a student can earn in a course is 100. Grades are calculated according to the following criteria table within which the distribution of passing grades in terms of the number of points is applied.

| Points | Grade |
|---|---|
| 0,00 - 50,00 | (E) unsatisfactory |
| 50,01 - 58,00 | (D) sufficient |
| 58,01 - 75,00 | (C) good |
| 75,01 - 92,00 | (B) very good |
| 92,01 - 100,00 | (A) excellent |

The method of accumulating points is determined in this course in accordance with the elements of scoring as follows:

| Criterion | Maximum points |
|---|---|
| Project | 100 |
| TOTAL | 100 |

| 1.11. Additional reading (at the moment of submitting the joint study programme report) |
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| 1.12. Number of copies of required reading in relation to the number of students who currently attend a course ||| 
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| *Title* | *Number of copies* | *Number of students* |
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*1.13. Methods of quality monitoring that ensure the acquisition of knowledge, skills and competencies.*

The content of each modules is continuously revised to teach the students on the most up-to-date notions and concepts of IT. Indeed, the range of skills and knowledge in this sector is constantly getting broader, with a larger perspective of working in many different fields.

To ensure the quality of the teaching, a Steering Committee supervises the Quality Management System. The evolution of the teaching content is revised and validated by the Development Council. The teachers as well as the administration staff are evaluated by the students themselves. Finally, the teaching content is analysed and determined by evaluating the skills during the internships, by the partner companies.