Course description

General information		
Course leader	**Marc PLANARD**	
Course title	**Functional Programming**	
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	11
	Number of hours (L+E+S)	239 (3+0+236)

1. COURSE DESCRIPTION

   1.1. Course objectives

The module "Functional Programming" focuses on functional programming and the parsing, more specifically in Haskell. It introduces the notions of compilation and the language theory.

   1.2. Conditions for enrolment in the course

- Be able to program in Haskell.

   1.3. Expected learning outcomes of the course

LO1: Compare Haskell strengths and weaknesses for a given set of requirements.

LO2: Create a solution by using different design patterns specific to functional programming.

LO3: Create a solution with parser using applicative functors or monads.

LO4: Evaluate an environment parsing interpreter.

LO5: Explain how a compiler works.

LO6: Implement a solution using a LLVM bindings for Haskell.

LO7: Explain the LLVM compiler infrastructure.

LO8: Create a solution by using type inference.

   1.4. Course content

By using the different design patterns, specific to functional programming, the students understand how a parser and an interpreter work.

The module consists of three projects:
1. Program a calculator which is capable to evaluate the arithmetic expressions and which includes a parser, sufficiently generic, to be reused for the next projects.

2. Program a Lisp interpreter.

For this project, the language used will be simpler to parse but requires focusing on the program evaluation.

3. Program a compiler for the Kaleidoscope language.

The objective of this project is to implement a parser for a language with a more complex grammar and to compile an executable binary.

1.5. Teaching delivery modes:	☐ lectures ☒ seminars and workshops ☐ exercises ☐ remote learning ☐ field work ☒ independent work ☐ multimedia and network ☒ laboratory ☒ mentoring ☐ other _____
1.6. Comments	Epitech pedagogy is based on the project-based learning approach which consists of learning by doing. Therefore, it requires the students to be autonomous in his work and to being 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	
Project	100 %	Continuous assessment of knowledge		Student report		Practical work	

Portfolio							

1.9. Assessment and evaluation of student work during classes and the final exam

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

Every grade of the projects is independent from each other, dividing in three projects.

- Project HAL – 2 ECTS
- Project Functional evalExpr – 2 ECTS
- Project KOAK – 6 ECTS

All the three 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

1.10. Required reading (at the moment of submitting the joint study programme report)

Paul Graham. 'The Roots of Lisp', May 2001. http://www.paulgraham.com/rootsoflisp.html (for project 2. Program a Lisp Interpreter.

1.11. Additional reading (at the moment of submitting the joint study programme report)

1.12. Number of copies of required reading in relation to the number of students who currently attend a course

Title	Number of copies	Number of students

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.