

# Functional Programming in Scala

Scala is a JVM-based programming language that nicely blends object oriented and functional programming constructs. Scala is used today extensively on the server side as well as on many analytics frameworks such as Spark and Flink. This course will introduce you to Functional Programming in general and Scala programming in particular. As in my experience, to really learn a programming language you need to program a sufficiently complex application, this class will be divided into a series of lectures and a personal project through which you will develop a non-trivial application.

The course will be organised as follows:

## Lecture 1

- Scala Overview
- Programming Paradigms
  - Object Oriented Programming
  - Functional Programming

## Lecture 2

- The Scala Programming Language (Part I)
  - Expressions - Conditions - Iterations
  - Objects
  - Functions
  - Pattern Matching
  - Type Parametrisation - Implicit Conversions

## Lecture 3

- The Scala Programming Language (Part II)
  - Expressions
  - Conditions
  - Iterations

- Classes and Objects
- Functions and Closures
- Pattern Matching
- Type Parametrisation
- Implicit Conversions

## Lecture 4

- Functional Programming in Scala
  - List comprehension
  - For-Constructs
  - Folding, mapping, etc.
  - Monads
- Concurrent and Parallel Programming in Scala
  - Parallel Collections
  - Futures

## Programming Project

The programming project will be agreed with the students. A list of projects will be distributed before the first lecture. Students can also propose submit a proposal at **angelo.corsaro@esiee.fr** using as subject **“ESIEE — Scala Programming Project Proposal”**. Keep in mind that the project has a credit of 16 hours, thus the complexity should be sufficient to justify the credit. Projects are individual, in other terms not groups are allowed.

Some example project are:

- Regular Expression Matcher
- Parallel Fractal Generator
- Parallel N-Body Problem Solver

- Set Cover Solver
- Table Game Player:
  - Nine Men Morris
  - Tic-Tac Toe
  - Draughts
- (Parallel) Image Manipulation Algorithms (You have to propose and write the algorithm)
- Sound Processing Algorithms (You have to propose and write the algorithm)
- Parallel Block Chain Miner (Puzzle Solver)
- File Compressor / Decompressor — Invent your own or implement existing techniques

### ***Grading***

- Class Participation
- Individual Project