

# Introduction to Julia Programming for Data Science and Scientific Computing

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## Lectures

Lectures will be weekly (every Wednesday), from 6 November to 29 January from 16:30 to 18:00. Each lecture will be divided into two: theory and exercises. In the first half of the course, the lecturers will teach Julia the basics. In the second half of the course, participants who wish to do so will be asked to choose an advanced topic that they will present.

## Credits

3 CFU (20 hours).

## Prerequisites

Basic knowledge of programming.

## Objectives

The objective of this course is to provide students with a foundational understanding of the Julia programming language. By the end of the course, students will be able to efficiently use Julia to solve computational problems in different areas.

## Course Overview

This **reading course** introduces students to Julia, a high-performance programming language designed for technical computing, data science, and machine learning. It covers the fundamentals of Julia, focusing on its syntax, core features, and powerful libraries, emphasising practical applications in data analysis, numerical computation, and visualization. By the end of the course, participants will gain a strong understanding of how to leverage Julia's speed and expressiveness for scientific and computational tasks.

## Course Structure

1. Introduction to Julia:
  - Overview of Julia and its ecosystem;
  - Basic syntax: variables, types, functions;
  - Control flow and data structures;
  - Working with Julia environment.
2. Data Manipulation and Visualization:
  - Introduction to DataFrames.jl: loading, cleaning, and exploring datasets (optional),
  - Creating visualizations with Plots.jl and Makie.jl.
3. Numerical and Scientific Computing:
  - Arrays, matrices, and linear algebra in Julia;

- Solving differential equations;
  - Machine learning with Flux.jl and MLJ.jl;
  - Overview of GaussianRandomField.jl library for generating datasets.
4. Advanced Topics in Julia (TBA, based on the participants interest)

## Readings and Resources

- Primary Text: official Julia documentation;
- Exercises at Julia's platform *Exercism.org*;