CS-452	Foundations of software			
	Degrapho Sébaction			

Doeraene Sepastien		
Cursus	Sem.	Туре
Computer science minor	Н	Opt.
Computer science	MA1, MA3	Opt.
Cybersecurity	MA1, MA3	Opt.

Summary

The course introduces the foundations on which programs and programming languages are built. It introduces syntax, types and semantics as building blocks that together define the properties of a program part or a language. Students will learn how to apply these concepts in their reasoning.

Content

- simple types, lambda-calculus
- normalization, references, exceptions
- subtyping
- recursive types
- polymorphism
- advanced features of the Scala type system

Keywords

lambda-calculus, type systems

Learning Prerequisites

Recommended courses Advanced topics in programming, Compiler construction

Important concepts to start the course Functional programming Basic knowledge of formal languages

Learning Outcomes

- By the end of the course, the student must be able to:
 - Argue design decisions of programming languages
 - Assess / Evaluate soundness of type systems
 - Design programming language semantics and typing rules
 - · Verify progress and preservation in type systems
 - Work out / Determine operational equivalences
 - Carry out projects of 2-3 weeks duration
 - · Distinguish valid from invalid proofs



14

4 weekly 2 weekly

2 weekly

Weeks

Hours

Lecture Exercises

Number of positions

• Implement type systems and operational semantics

Transversal skills

- Assess progress against the plan, and adapt the plan as appropriate.
- Evaluate one's own performance in the team, receive and respond appropriately to feedback.
- Identify the different roles that are involved in well-functioning teams and assume different roles, including leadership roles.
- Manage priorities.

Teaching methods

Ex cathedra, practical exercises

Assessment methods

Final written exam during the exam session (60%) Projects and homeworks by groups during the semester (40%)

Resources

Moodle Link

• https://go.epfl.ch/CS-452