INFO0054-1
Programmation Fonctionnelle

Chapter 00: Introduction

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Disclaimer for students in English-taught MSc programs

You have been made aware that this course is taught in French before enrolling in the program. As a MSc student, you are supposed to be capable of studying this BSc subject in an independent manner.

I am willing to accommodate your needs within reason.

- **I will not provide private lessons to students in MSc programs.**
- Most sections follow the book. Any additional material will be as self-contained as possible.
- Exercises and solutions will be made available on eCampus.
- You will be provided English versions of tests and exams.
- We can arrange meetings that are short and to the point.
    - Preferably with all the international students (i.e., organize yourselves).
    - One 1-hour meeting will be organized for the project.
    - If you have not consulted the material before asking questions, I will deem this as an attempt to private tutoring and end the meeting.

Disclaimer for students in English-taught MSc programs

- Students who are not proficient in French and are enrolled in English-taught programs must send me an email as soon as possible.
  - No later than the 20th of October 2022 (or at most one week before the first test).

- Students who fail to notify me in time are assumed to be following this course in French. These students will be provided French versions of tests, exams, ... and there will be no opportunity to retake those later.

- You are welcome to stay for Chapter 0, which will be presented in English.

Course organization

- Course material and book are in English.
- Classes are taught in French.

- 2 tests during the year, each counting towards 10% of the final grade.
- 1 project counting towards 30% of the final grade.
- 1 written exam, counting towards 50% of the final grade.
- You grade is computed as follows:

$$grade = round\left(\frac{test_1 + test_2 + (3 \times project) + (5 \times exam)}{10}\right)$$

- I use eCampus announcements to communicate with students.
  - Checking eCampus is your responsibility.

Congratulations!

https://www.pexels.com/nl-nl/foto/twee-bruine-en-beige-cavia-s-1093126/

- This is the first year that the course on functional programming (FP) will be taught using Scala as the programming language.

- FP is a way of thinking about problems (i.e., a programming paradigm). We will discover why and how FP is important concept for computer science, data engineering,…

- While fundamental concepts will be described and taught, the emphasis of this course is on understanding and applying these concepts.

Course objectives

The objectives of this course are:

- To understand the concept FP.
- To recognize and explain the differences between FP and other paradigms.
- To understand and explain the advantages of FP and its importance in CS.
- To apply the course content in the design and development of software to solve complex problems using FP and FP languages.
- To become acquainted with a language designed for FP.

Course content in terms of topics

- This is an introductory course on functional programming (FP).
  - Some topics that we will cover will be developed further in other courses.
  - Some topics may be covered or applied in other courses.

- Topics in alphabetical order:
  - Algebraic Data Types: Numbers, Tuples, Lists, …
  - Concurrent Programming (*)
  - Equational Reasoning
  - Functors
  - Fusion laws
  - Higher-order functions
  - Monads
  - Monoids
  - Parser combinators
  - Scala
  - Type classes

Covered

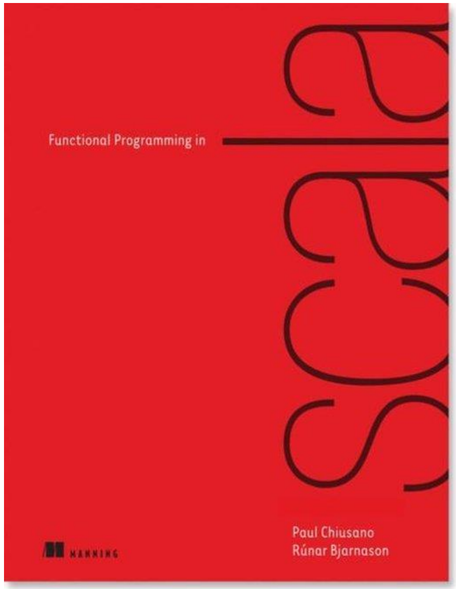
Described and applied

Not covered

(*) sometimes mentioned

Course material

- Paul Chiusano and Runar Bjarnason. **Functional Programming in Scala, 2nd edition**. Manning Publications. https://livebook.manning.com/book/functional-programming-in-scala-second-edition



- Slides in English, available on eCampus.
    - Additional (recommended) sources will be referenced in the slides and made available on eCampus.

- Exercises (with solutions), available on eCampus.

Tests

- Two tests via eCampus, which means you can take those tests at home.
  - You are welcome to take those tests in class, but you will need to bring your own computer.

- Tests will be made available for the afternoon the class takes place, but you have at most two hours to take the test.

- Be careful:
  - The clock starts ticking once you start the test.
  - If you start one hour before the deadline, you only have one hour.

- A "bogus" test will be made available on eCampus.

Project

- The project is to be conducted in groups of three students.
  - Please organize yourselves or you will be put in random groups.
  - Three groups of two students will end up becoming two groups of three.

- The project is a mandatory learning activity.
  - Not submitting a project will result in an Absence for this course.
  - Be warned: empty files, source code with only names, etc. are not considered as a submission and will lead to an A as well.

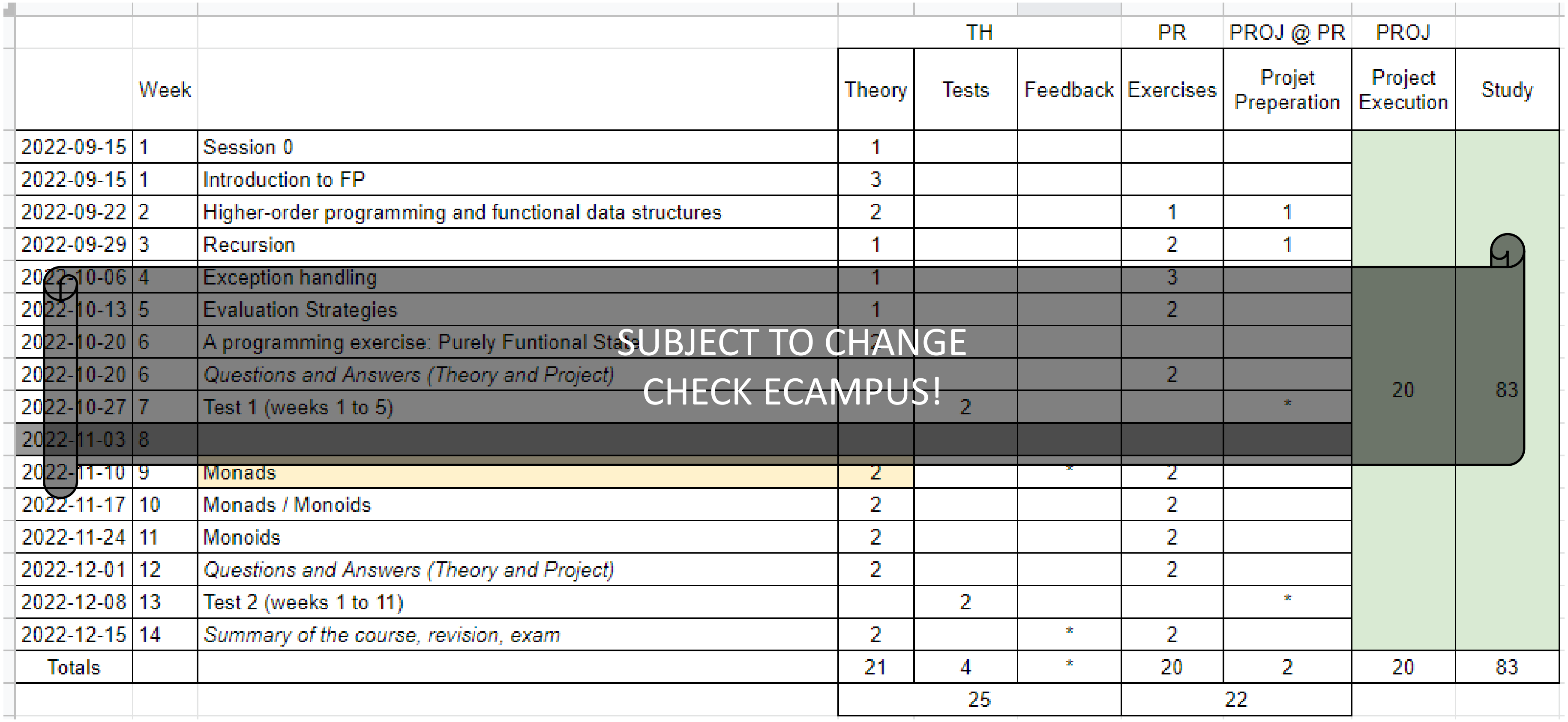
- Peer-assessment – within a group, all members are expected to evaluate their peers.
  - Peer-assessment has no direct impact on the project's grade but will be used to confirm suspicions. I.e., confirm that someone has not contributed to the project.
  - Do not wait until the very last minute to start working on the project, and do not wait until the very last minute to report problems.

- The topic of this year's project will be described next week.
  - There will be room for extra credit. I.e., it is possible to obtain more than 20/20, which will be carried over. But extra credit requires extra work.

Exam

- As this is a "new" course, there are no previous exams available (yet). Questions that are representative for the exam will be made available in due time.

Planning and effort



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	Week		Theory	Tests	Feedback	Exercises	Projet Preperation	Project Execution	Study
2022-09-15	1	Session 0	1					20	83
2022-09-15	1	Introduction to FP	3						
2022-09-22	2	Higher-order programming and functional data structures	2			1	1		
2022-09-29	3	Recursion	1			2	1		
2022-10-06	4	Exception handling	1			3			
2022-10-13	5	Evaluation Strategies	1			2			
2022-10-20	6	A programming exercise: Purely Funtional Sta	2						
2022-10-20	6	*Questions and Answers (Theory and Project)*				2			
2022-10-27	7	Test 1 (weeks 1 to 5)		2			*		
2022-11-03	8								
2022-11-10	9	Monads	2		*	2			
2022-11-17	10	Monads / Monoids	2			2			
2022-11-24	11	Monoids	2			2			
2022-12-01	12	*Questions and Answers (Theory and Project)*	2			2			
2022-12-08	13	Test 2 (weeks 1 to 11)		2			*		
2022-12-15	14	*Summary of the course, revision, exam*	2		*	2			
Totals			21	4	*	20	2	20	83
				25			22		

SUBJECT TO CHANGE
CHECK ECAMPUS!

- Planning may be subject to change – check eCampus for updates.
- Tests planned on 2022-10-27 and 2022-12-08
- Deadline project: 2022-12-02

Acknowledgements

Prof. Em. Pascal Gribomont, François Rozet

Please send me your feedback (typos, corrections, constructive feedback, ...).

If you give me your consent, your name will feature here!