



Course and Examination Fact Sheet: Spring Semester 2021

8,275: Functional Programming with Applications

ECTS credits: 4

Overview examination/s

(binding regulations see below)

Decentral - examination paper written at home (individual) (50%)

Examination time: term time

Decentral - examination paper written at home (individual) (50%)

Examination time: term time

Attached courses

Timetable -- Language -- Lecturer

[8,275,1.00 Functional Programming with Applications](#) -- Englisch -- [Zahn Philipp](#)

Course information

Course prerequisites

Previous experience with general purpose programming languages is helpful but not mandatory as we build the course from first principles.

Learning objectives

Basic understanding key elements of functional programming

Ability to implement a small programming project

Course content

This course provides an introduction into functional programming. Most economists, as far as they are trained in programming, use to think about programming in an imperative, i.e. procedural, way. Functional programming provides us with a fresh and alternative view on what programs and processes are. Besides learning the necessary basics, this course aims to give such a new perspective. Depending on the application, programming in a functional style is actually more natural to the way we as economists use to think in terms of theory. We will illustrate this by considering three applications, one in probabilistic modelling, one in smart contract design, and one in auction design. Functional programming has also become an important tool in industry applications. Part of its appeal is the ability to provide high-level abstractions as well as high-quality (less buggy) code. The latter, for instance, is needed in blockchain applications. Depending on demand for the course and on availability we will also have guest lecturers from industry discussing the role of functional programming in their domain, what value you, as economists, can bring to the table, and what skills you need to master. Tentative syllabus: 0. Principles of functional programming: expressions, evaluations, functions, and types. 1. Type definitions and built-in types: numbers, characters, strings and lists. Basic operations on lists, including map, fold and filter, together with their algebraic properties. 2. Recursive definitions and structural induction. Infinite lists and their uses. 3. Further data structures: binary and general trees. 4. Application Smart contracts: Composing contracts 5. Application Probabilistic Programming: Automatic inference for probabilistic models 6. Application Auction Design: Robust design of complex auctions 7. (Optional if time permits: Automating theory - the open games engine)

Course structure

We will have weekly pre-recorded lectures and weekly live discussion sessions. The course will take place online for the whole semester.



Course literature

The course will not follow one textbook but rely on different sources that will be provided along the way. This also includes papers when we discuss applications.

Additional course information

In the case of the President's Board having to implement new directives due to the SARS-CoV-2 pandemic in SpS2021, the course information listed above will be changed as follows

- There are no changes necessary to the course information.

The examination information listed below would be changed as follows:

- There are no changes necessary to the examination information.

Examination information

Examination sub part/s

1. Examination sub part (1/2)

Examination time and form

Decentral - examination paper written at home (individual) (50%)

Examination time: term time

Remark

Take home exam

Examination-aid rule

Term papers

Term papers must be written without anyone else's help and in accordance with the known quotation standards, and they must contain a declaration of authorship which is a published template in StudentWeb.

The documentation of sources (quotations, bibliography) has to be done throughout and consistently in accordance with the chosen citation standard such as APA or MLA.

For papers in law, the legal standard is recommended (by way of example, cf. FORSTMOSER, P., OGOREK R. et SCHINDLER B., Juristisches Arbeiten: Eine Anleitung für Studierende, newest edition respectively, or according to the recommendations of the Law School).

The indications of the sources of information taken over verbatim or in paraphrase (quotations) must be integrated into texts in accordance with the precepts of the applicable quotation standard, while informative and bibliographical notes must be added as footnotes (recommendations and standards can be found, for example, in METZGER, C., Lern- und Arbeitsstrategien, newest edition respectively).

For any work written at the HSG, the indication of the page numbers is mandatory independent of the chosen citation standard. Where there are no page numbers in sources, precise references must be provided in a different way: titles of chapters or sections, section numbers, acts, scenes, verses, etc.

Supplementary aids

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Examination languages

Question language: English

Answer language: English



2. Examination sub part (2/2)

Examination time and form

Decentral - examination paper written at home (individual) (50%)

Examination time: term time

Remark

2 individual problem sets

Examination-aid rule

Term papers

Term papers must be written without anyone else's help and in accordance with the known quotation standards, and they must contain a declaration of authorship which is a published template in StudentWeb.

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Supplementary aids

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Examination languages

Question language: English

Answer language: English

Examination content

Lecture slides, programs discussed in the lectures, as well as papers discussed in the context of the applications

Examination relevant literature

Lecture slides, references reading material, and papers discussed in the context of the applications



Please note

Please note that only this fact sheet and the examination schedule published at the time of bidding are binding and takes precedence over other information, such as information on StudyNet (Canvas), on lecturers' websites and information in lectures etc.

Any references and links to third-party content within the fact sheet are only of a supplementary, informative nature and lie outside the area of responsibility of the University of St.Gallen.

Documents and materials are only relevant for central examinations if they are available by the end of the lecture period (CW21) at the latest. In the case of centrally organised mid-term examinations, the documents and materials up to CW 12 are relevant for testing.

Binding nature of the fact sheets:

- Course information as well as examination date (organised centrally/decentrally) and form of examination: from bidding start in CW 04 (Thursday, 28 January 2021);
- Examination information (regulations on aids, examination contents, examination literature) for decentralised examinations: in CW 12 (Monday, 22 March 2021);
- Examination information (regulations on aids, examination contents, examination literature) for centrally organised mid-term examinations: in CW 12 (Monday, 22 March 2021);
- Examination information (regulations on aids, examination contents, examination literature) for centrally organised examinations: two weeks before the end of the registration period in CW 14 (Thursday, 8 April 2021).