

Fortgeschrittene funktionale Programmierung

LVA 185.A05, VU 2.0, ECTS 3.0
SS 2016

– Vorbesprechung –
(Stand: 01.03.2016)

Jens Knoop



Technische Universität Wien
Institut für Computersprachen



Course Objectives

...advanced concepts and principles of functional programming, applications and implementation issues of functional programming languages.

- ▶ Functional data structures and algorithms
- ▶ Combinator libraries and embedded domain-specific languages
- ▶ Programming with streams, programming with monads
- ▶ Testing and verification, equational reasoning
- ▶ Monadic and combinator parsing, pretty printing
- ▶ Functional vs. logical programming
- ▶ Parallelism in functional languages
- ▶ Functional reactive systems
- ▶ ...

Goals

- ▶ Overview and insight into advanced concepts of functional programming and their application in practice
- ▶ Profound understanding of the foundations of functional programming
- ▶ Insight in advantages and limitations of a purely functional style of programming

Accounts for

- ▶ Elective course (Wahlfach) within the Master program 066 937 [Software Engineering&Internet Computing](#) (3.0 ECTS)
- ▶ Elective course (Wahlfach) within the Master program 066 931 [Computational Intelligence](#) (3.0 ECTS)
- ▶ Elective course (Wahlfach) within the Master program 066 950 [Informatikdidaktik](#) (3.0 ECTS)
- ▶ Examination course (Prüfungsfach) towards the Erasmus-Mundus Master program 066 011 [DDP Computational Logic \(Erasmus-Mundus\)](#) (3.0 ECTS)

Prerequisites

- ▶ Completed Bachelor program
- ▶ Basic knowledge of the functional programming style as imparted e.g. in the course [LVA 185.A03 Funktionale Programmierung](#), VU 2.0, ECTS 3.0

Organization and Assessment

- ▶ Lectures (usually once a week)
- ▶ (Programming) assignments to be solved by teams of 2 (or 3) students (usually once a week)
- ▶ Final oral examination (assignments and course material)

Important Web Resources

- ▶ Haskell Homepage: www.haskell.org/
- ▶ Haskell Tutorial: www.haskell.org/tutorial/
- ▶ Hugs Interpreter: www.haskell.org/hugs

Recommended Reading: Basics

1. Jens Knoop. [Slides and companion material of the course LVA 185.A03 Funktionale Programmierung](#). Institute of Computer Languages, TU Vienna, 2015/2016.
2. Richard Bird. [Introduction to Functional Programming using Haskell](#). 2nd edition, Prentice-Hall, 1998.
3. Simon Thompson. [Haskell: The Craft of Functional Programming](#). 3rd edition, Addison-Wesley/Pearson, 2011.
4. Peter Pepper. [Funktionale Programmierung in OPAL, ML, Haskell und Gofer](#). 2. Auflage, Springer-V., 2003.
5. Peter Pepper, Petra Hofstedt. [Funktionale Programmierung](#). Springer-V., 2006.
6. ...

Recommended Reading: Advanced

1. Lectures on [Advanced Functional Programming](#). International Summer Schools 1995, 1996, 1998, 2002; published by Springer-V. as LNCS volumes 925, 1129, 1608, 2638.
2. Jeremy Gibbons, Oege de Moor. [The Fun of Programming](#). Palgrave Macmillan, 2003.
3. Chris Okasaki. [Purely Functional Data Structures](#). Cambridge University Press, 1999.
4. Simon L. Peyton Jones. [The Implementation of Functional Programming Languages](#). Prentice-Hall, 1987.
5. Andrew W. Appel. [Modern Compiler Implementation in ML](#). Cambridge University Press, 1998.
6. Ravi Sethi. [Programming Languages: Concepts and Constructs](#). 2nd edition, Addison-Wesley, 1995.
7. ...

Further Reading

Specific reading recommendations will be provided for each chapter on-the-fly of the course.

Registration, Accounts, and Passwords

- ▶ Registration:

- ▶ Via the electronic registration management system of AB E185.1 on or before 11 March 2016

- ▶ For further information visit the homepage of the course:

- www.complang.tuwien.ac.at/knoop/ffp185A05_ss2016.html

- ▶ Account creation (including account name and password):

- ▶ Automatically in the course of registration.

- ▶ Cancelling of registrations:

- ▶ On or before 31 March 2016; also via the electronic registration management system

Lectures, Assignments

- ▶ **Lectures (block style):** usually each Thursday from 4.15 p.m. to 5.45 p.m., seminar room on the ground floor of the Institutsgebäude at Argentinierstr. 8; first course meeting today on 3 March 2016.
- ▶ **Assignments:** Usually each Tuesday; starting on 8 March 2016; in total about 8 assignments.
- ▶ **Submissions:** Automatically collected and checked a week after publication at 3.00 p.m.; must be stored in the home directory of your group account.
- ▶ **Second submission after bug fixing:** Another week later.
- ▶ **Last but not least:** Assignments and lecture slides available on the homepage of the course.

Usage of Computers

- ▶ **Server:** `g0.complang.tuwien.ac.at`
- ▶ **Terminals for course usage:** Lab on the ground floor of the Institutsgebäude at Argentinierstr. 8
- ▶ **Usage of other computers** is encouraged (e.g. at home)
- ▶ **Required software:** Hugs (available free of charge)
- ▶ **Solutions of assignments** must be delivered on server `g0.complang.tuwien.ac.at`

Assessment

- ▶ Based on final examination and grades on assignments
- ▶ Positive grade only, if all parts are positive
- ▶ Final oral examination
- ▶ Points (pts) for solutions: max. 100 pts/assignment, about 8 assignments in total
- ▶ Minimum 50% in total of the points for an positive overall grade on assignments
- ▶ Half of the points for second deliveries of assignments

Information Sources / Questions and Problems

- ▶ Course homepage:

`www.complang.tuwien.ac.at/knoop/ffp185A05_ss2016.html`

- ▶ E-mail: `knoop@complang.tuwien.ac.at`

- ▶ Further team member:

Ulrich Neumerkel

A Perfect Add-On

...this term:

- ▶ Prof. Dr. Andreas Frank
Institut für Geoinformation und Kartographie

LVA 127.008 VU 2.0, ECTS 3.0

Haskell-Praxis: Programmieren mit der Funktionalen
Programmiersprache Haskell

Tue, 3.00 p.m. to 4.30 p.m.

Seminar room 127, 3rd floor, Gußhausenstr. 25-29

(The course will be held in English.)

Interested in Studying Abroad?

The Erasmus/LLP-Programme of the European Union offers a plenty of exciting opportunities, e.g.

- ▶ Linköping University, Sweden
- ▶ Aalto University, Finland
- ▶ The University of Copenhagen, Denmark
- ▶ Universität Halle-Wittenberg, Germany
- ▶ Universität Paderborn, Germany
- ▶ Universidad Politècnica de València, Spain
- ▶ ...

For further information please visit:

<http://www.complang.tuwien.ac.at/knoop/erasmus>

Ich wünsche Ihnen

...viel Erfolg bei dieser Lehrveranstaltung und dass Sie auch über die unmittelbare Veranstaltung hinaus davon profitieren!

Nicht zuletzt:

Vorlesung und Übung leben mit Ihnen! Ihre Rückmeldungen, Anregungen, Verbesserungsvorschläge sind willkommen!

Natürlich auch Hinweise, wenn Ihnen etwas gut gefallen hat!