

Informatik

# MASTER SEMINAR

Program Analysis and Transformation



**IFS**

INSTITUTE FOR  
SOFTWARE

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Rapperswil, HS 2019

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**HSR**

HOCHSCHULE FÜR TECHNIK  
RAPPERSWIL

FHO Fachhochschule Ostschweiz

# Goals

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- **Learn scientific/research style of working**
  - Understand advanced software research topic
  - Put topic into context by incorporating additional sources
  - Evaluate applicability of research into tools and applications
  - Write your own report on a scientific topic
  - Explain such a topic to others in a paper and a presentation
  - Discuss with others about similar topics to increase understanding
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# Tasks expected

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- **Read provided research material**
- **Plan your work**
- **Research additional sources on topic and neighboring research results**
  - locate work groups on area
- **Write a scientific article of 10+ (<20) pages**
  - explain the topic of the paper selected
  - put it into the context of other work
  - evaluate it with respect to applicability for languages or tools
- **Present the results in a 20-25 min talk**
- **Discuss with peers (15-20 min for each presentation)**

# Workload expected

- **3 credits = 90 hours over semester**
- **kick-off 1 hour**
- **individual feedback with supervisor 3-6 hours**
  - Individual Milestones:
    - outline & structure of article
    - draft of article
    - final article + presentation draft
    - presentation day (all together)
- **presentation 45 min (talk + discussion)**
- **listening & discussion 6 x 45 min -> 4.5 hours**
- **reading, research, experiments, writing, presentation preparation: ca. 80 hours**
  - If not much experience, some extra reading time might be required...

# Requirements on your report

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- **Independent writing of a report of about 10-20 pages**
- **Complete set of references to all consulted literature**
- **Correct citations**
  
- **Font size: 12pt (or a little less if 2 columns)**
  - prefer Latex article A4 (2 column) layout
- **Language: English**
- **Correct spelling and grammar**
  - too many errors on a single page: fail!

# Requirements on presentation

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- **Your talk:**

- Talk about 15-20, discussion 25 minutes
- Focus on the audience
- Slides:
  - less than 12 lines of text
  - useful examples (first)!
  - English
- Finish in time
- Ask for questions
- Elaborate on previous questions

# Evaluation

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- **no credits (exclusion from seminar)**
  - if 2nd feedback after rework is below standard set
  - in case of plagiarism
- **20 % working style**
  - planning, research, progress
- **30% research paper**
  - language, content, structure
- **30% presentation**
  - structure, language, presentation, answers to questions
- **20% participation in discussion**
  - relating topic to own research work

# Milestones & Schedule

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- **13.09.2019(today)**
  - kick-off, topic selection and assignment
- **individual feedback dates (latest)**
  - 11. October: outline reviewed
  - 15. November: article draft reviewed
  - 20. December: article finished and uploaded to wiki and presentation draft reviewed
- **Final presentation day**
  - XX. January 2020: presentation day



# Thinks to look out for

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- **Look for secondary sources beyond the book**
- **Cite all sources correctly**
- **If citing literally from other sources use quotes and provide source reference**
  - plagiarism is a no no!
    - we will check!
- **Explain topic with your own words**
  - first you need to understand
- **Do not hesitate to ask your supervisor when you need help**
- **Try to apply with an experiment (time permitting)**

# Type Systems: $\Gamma \vdash e : T$

- **Benjamin Pierce**

- Untyped Lambda Calculus
- Simply-Typed Lambda Calculus
- Subtyping
- Recursive Types
- Polymorphism
- Curry-Howard Isomorphism
- Refinement Types
- Dependent Types
- Hindley-Milner Type Inference

$e$	$=$	$x$	variable
		$e_1 e_2$	application
		$\lambda x . e$	abstraction
		$\text{let } x = e_1 \text{ in } e_2$	

$$\frac{\Gamma \vdash \text{exp}_1 : \tau_1 \dots \Gamma \vdash \text{exp}_n : \tau_n}{\Gamma \vdash \text{exp} : \tau}$$

- **Introduction: Luca Cardelli**

# Your Choices

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- **Matthias Gabriel**
- **Jonas Waelter**
- **Stefano Balestra**
- **Katarzyna Nowak**