Mechanized Meta-Theory for Programming Languages
CSCI-799
Term 20165
Handout 1
January 24, 2016

Syllabus

General Information

Instructor: Matthew Fluet
E-mail: mtf@cs.rit.edu
Office hours: Tu 11:00am – 12:00pm; GOL-3555
We 11:00am – 12:00pm; GOL-3555
Th 11:00am – 12:00pm; GOL-3555
or by appointment

Meetings: TuTh 12:30pm – 1:45pm; GOL-3576 (Breakout Room 3); Week 1
TuTh 8:00am – 9:15am; GOL-3576 (Breakout Room 3)
and Tu 12:30pm – 1:45pm; GOL-3000
and Th 12:30pm – 1:45pm; GOL-3672 (Breakout Room 4); Week 2 – 15

Website: http://www.cs.rit.edu/~mtf/teaching/20165/mmt
http://mycourses.rit.edu

Course Description

Much current research in programming languages is being done with the aid of automated
proof assistants such as Coq, Isabelle/HOL, Twelf, Agda, NuPRL. This Independent Study will
primarily focus on the Coq proof assistant and follow the “Software Foundations” course/text
developed by Prof. Benjamin Pierce (UPenn) during the first half of the semester and will also
examine other tools and research literature describing the importance of formalized PL research
during the second half of the semester.

Prerequisites

• CSCI-740 Programming Language Theory
• or permission of instructor

Topics

• Software Foundations
  – Part I: Foundations
    * Functional programming
• Constructive logic
• Inductive definitions and proof techniques for informal and formal proof
• The Coq proof assistant
  – Part II: Basics
    • Operational semantics
    • Semantics of the imperative WHILE language
  – Part III: Type systems
    • Simply typed λ-calculus
    • Type safety
    • Subtyping
    • Dependently typed programming
• Research Papers

Grades

Grades will be assigned based on the following grading scheme:

<table>
<thead>
<tr>
<th>Homework Assignments:</th>
<th>50.0%</th>
</tr>
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<tbody>
<tr>
<td>Discussion Leader:</td>
<td>20.0%</td>
</tr>
<tr>
<td>Project:</td>
<td>30.0%</td>
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</table>

Final letter grades will be assigned based on the following grading scale:

<table>
<thead>
<tr>
<th>Letter grade</th>
<th>Numeric grade</th>
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</thead>
<tbody>
<tr>
<td>A</td>
<td>(93, ∞)</td>
</tr>
<tr>
<td>A−</td>
<td>[90, 93)</td>
</tr>
<tr>
<td>B+</td>
<td>(87, 90)</td>
</tr>
<tr>
<td>B</td>
<td>(83, 87)</td>
</tr>
<tr>
<td>B−</td>
<td>(80, 83)</td>
</tr>
<tr>
<td>C+</td>
<td>[77, 80)</td>
</tr>
<tr>
<td>C</td>
<td>(73, 77)</td>
</tr>
<tr>
<td>C−</td>
<td>[70, 73)</td>
</tr>
<tr>
<td>D+</td>
<td>(65, 70)</td>
</tr>
<tr>
<td>D</td>
<td>[60, 65)</td>
</tr>
<tr>
<td>F</td>
<td>[0, 60)</td>
</tr>
</tbody>
</table>
Text Books

Required:
Title: Software Foundations (v4.1)
Author: Benjamin C. Pierce, et. al.
Website: http://www.cis.upenn.edu/~bcpierce/sf/

Suggested:
Title: Types and Programming Languages
Author: Benjamin C. Pierce
Publisher: The MIT Press
ISBN: 978-0262162098
Website: http://www.cis.upenn.edu/~bcpierce/tapl/
E-book (RIT Library): http://albert.rit.edu/record=b1889507~S3

Title: Certified Programming with Dependent Types
Author: Adam Chlipala
Publisher: The MIT Press
ISBN: 978-0262026659
Website: http://adam.chlipala.net/cpdt/

Title: Interactive Theorem Proving and Program Development
Author: Yves Bertot and Pierre Castéran
Publisher: Springer-Verlag
ISBN: 978-3540208549
Website: http://www.labri.fr/perso/casteran/CoqArt/

Course Policies

Academic Integrity

As with all courses, the RIT Honor Code and RIT Academic Honesty Policy apply. See the Department of Computer Science’s statement on academic integrity for more details.

In this course, all submitted work must be your own work (i.e., written or programmed by you alone, unless explicitly stated otherwise) and must include acknowledgments of any collaborators or sources (other than course text books or handouts) used to produce your submission.

You are encouraged to discuss course material with other students. Discussion of assignments is also allowed, but sharing solutions or code is not allowed.

Common Course Policies

See the Department of Computer Science’s Common Course Policies for more details about rescheduling an exam, course withdrawal, disability services, and academic integrity.
Disclaimer

I reserve the right to make any changes to the syllabus as I deem necessary throughout the course. Minor changes, such as assignment due dates, will be announced orally during class and posted on the course mailing list and home page. Major changes, such as grading percentages, will additionally be provided in writing.

Acknowledgements

Portions of this course material based upon similar courses offered at University of Pennsylvania (Benjamin Pierce, Steve Zdancewic), George Washington University (Michael Clarkson).