CSE341: Programming Languages, Winter 2013

All Course Info Contact Info Course Materials Homeworks Exams Software Books+

Course Information

Syllabus
Academic-Integrity Policy
Challenge-Problem Policy
Relation to Coursera Course

Gradebook

Lecture: Monday, Wednesday, Friday 12:30-1:20 CMU 120
Section AA: Thursday 12:30-1:20, EEB 105
Section AB: Thursday 1:30-2:20, EEB 105

Office Hours:
Dan Grossman, Allen Center 574, Thursdays 10:45-11:45 + appointments + try coming by *(please visit!)*
Sunjay Cauligi, Allen Center 002 (basement lab), Fridays 2:30-3:30
Eric Mullen, Allen Center 220, Thursdays 2:30-3:30
Cody Schroeder, Allen Center 218, Wednesdays 11:00-12:00
Rachel Sobel, Allen Center 022 (basement lab), Mondays 2:30-3:30
Sean Wu, Allen Center 220, Tuesdays 12:00-1:00

Contact Information

Course Email List (mandatory): You should receive email sent to the course mailing list regularly, roughly at least once a day. Any important announcements will be sent to this list.

Course staff:
All staff: **cse341-staff@cs.washington.edu**
Instructor: Dan Grossman, djg and then at and then cs.washington.edu
TA: Sunjay Cauligi sunjayc then at and then cs.washington.edu
TA: Eric Mullen emullen then at and then cs.washington.edu
TA: Cody Schroeder codys then at and then cs.washington.edu
TA: Rachel Sobel rs then at and then cs.washington.edu
TA: Sean Wu wujsean then at and then cs.washington.edu

Email sent to cse341-staff@cs.washington.edu will reach the instructor and all the TAs. For questions multiple staff members can answer, we encourage you to use this email so that you get a quicker reply and the whole staff is aware of points of confusion.

Course Discussion Board (optional)

Anonymous Feedback (goes only to the instructor)

Course Materials

Material in the future naturally subject to change in terms of coverage or schedule

Unit 1: ML Functions, Tuples, Lists, and More Reading Notes Videos
L1. Jan 7-9: Course Mechanics, ML Variable Bindings slides: pptx pdf pdf6up code: sml
L2. Jan 9: Functions, Pairs, Lists slides: pptx pdf pdf6up code: sml
S1. Jan 10: Emacs, SML Mode, Shadowing, Error Messages slides: pdf pdf4up code: errors.sml solutions.sml
L3. Jan 11: Local Bindings, Options, Benefits of No Mutation slides: pptx pdf pdf6up code: sml

Unit 2: Datatypes, Pattern Matching, Tail Recursion, and More Reading Notes Videos
L4. Jan 14: Records, Datatypes, Case Expressions slides: pptx pdf pdf6up code: sml
L5. Jan 16: More Datatypes and Pattern Matching slides: pptx pdf pdf6up code: sml
S2. Jan 17: Type Synonyms, Polymorphism, & More slides: pptx pdf code: synonyms.sml generics.sml equality.sml fun_patterns.sml
L6. Jan 18: Nested Pattern-Matching, Exceptions, Tail Recursion slides: pptx pdf pdf6up code: sml
Tail recursion moved to Jan 23 after the Jan 21 holiday

Unit 3: First-Class Functions and Closures Reading Notes Videos
L7. Jan 23: First-Class Functions slides: pptx pdf pdf6up code: sml
S3. Jan 24: Standard-Library Docs, Unnecessary Function Wrapping, Map, & More slides: pdf pdf4up code: sec3.sml higher-order.sml
L8. Jan 25: Lexical Scope and Function Closures slides: pptx pdf pdf6up code: sml
L9. Jan 28: Function-Closure Idioms slides: pptx pdf pdf6up code: sml

Unit 4: ML Modules, Type Inference, Equivalence, & More Reading Notes Videos
L10. Jan 30: ML Modules slides: pptx pdf pdf6up code: sml
S4. Jan 31: Mutual Recursion, More Currying, More Modules slides: pptx pdf code: all_pairs.sml bank.sml mutual_rec.sml
L11. Feb 1: Type Inference slides: pptx pdf pdf6up code: sml
L12. Feb 4: Equivalence slides: pptx pdf pdf6up

Course-Motivation Interlude, Feb 4-6 slides pdf pdf6up Videos

Unit 5: Racket, Delaying Evaluation, Memoization, Macros Reading Notes Videos
L13. Feb 6-11: Racket Introduction slides: pptx pdf pdf6up code: rkt
S5. Feb 7 <Midterm Review for Midterm on Feb 8>
L14. Feb 13: Thunks, Laziness, Streams, Memoization slides: pptx pdf pdf6up code: rkt
Some of the material in L14 is covered in S6 instead
S6. Feb 14: More streams, memoization, etc. slides: pdf pdf6up code: sec6.rkt streams.rkt
L15. Feb 15: Macros slides: pptx pdf pdf6up code: rkt

Unit 6: Structs, Implementing Languages, Static vs. Dynamic Typing Reading Notes Videos
L16. Feb 15-20: Datatype-Style Programming With Lists or Structs slides: pptx pdf pdf6up code: rkt sml
L17. Feb 20-22: Implementing Languages Including Closures slides: pptx pdf pdf6up code: rkt
Some of the material in L17 is covered in S7 instead
S7. Legal ASTs, Macros as Functions, and More slides: pdf
L18. Feb 22-25: Static vs. Dynamic Typing slides: pptx pdf pdf6up code: rkt sml

Unit 7: Ruby, Object-Oriented Programming, Subclassing Reading Notes Videos
L19. Feb 27: Introduction to Ruby and OOP slides: pptx pdf pdf6up code: lec19_silly.rb lec19_example.rb
S8. Ruby arrays, hashes, ranges, blocks, and more slides (See also material posted with L20.)
Some of the material in L20 is covered in S8 instead
L20. Mar 1-4: Arrays & Such, Blocks & Procs, Inheritance & Overriding slides: pptx pdf pdf6up code: rb
L21. Mar 4-6: Dynamic Dispatch Precisely, and Manually in Racket slides: pptx pdf pdf6up code: rb sml rkt

Unit 8: Program Decomposition, Mixins, Subtyping, and More Reading Notes Videos
L22. Mar 6-8: OOP vs. Functional Decomposition; Adding Operators & Variants; Double-Dispatch
slides: pptx pdf pdf6up code stage A: sml rb java code stage B: sml rb java code stage C: sml rb java
S9. Mar 7: Double-Dispatch, Expression Problem, Mixins, and Visitors slides: pdf pdf6up code: janken.rb janken.sml helpers.sml mixins.rb visitor.rb visitor.sml
L23. Mar 8: Multiple Inheritance, Mixins, Interfaces, Abstract Methods slides: pptx pdf pdf6up code: rb
L24. Mar 11-13: Subtyping slides: pptx pdf pdf6up

L25. Mar 13: Subtyping for OOP; Comparing/Combining Generics and Subtyping slides: pptx pdf pdf6up
S10. Mar 14: Review, Especially Subtyping slides: pdf counter-examples

L26. Mar 15: Course Victory Lap slides: pptx pdf pdf6up

Homework Assignments

Homework 0: on-line survey worth 0 points, "due" Wednesday January 9

Dropbox for homework turn-in

Homework 1 due Wednesday January 16, 11PM
Homework 2 due Friday January 25, 11PM provided code provided tests
Homework 3 due Monday February 4, 11PM provided code
Homework 4 due Tuesday February 19, 11PM provided code provided tests
sample image files: dan.jpg curry.jpg dog.jpg dog2.jpg
Homework 5 due Wednesday February 27, 11PM provided code provided tests
Homework 6 due Thursday March 7, 11PM
hw6graphics.rb hw6provided.rb hw6runner.rb hw6assignment.rb
Homework 7 due Friday March 15, 11PM
hw7.sml hw7.rb hw7testsprovided.sml hw7testsprovided.rb

Exams

Midterm: Friday February 8, in class unsolved solved
Sample midterms:
Fall 2011 unsolved solved
Spring 2011 unsolved solved
Spring 2008 unsolved solved
Winter 2008 unsolved solved

Final: Thursday March 21, 8:30-10:20 unsolved solved
Sample finals:
Fall 2011 unsolved solved
Spring 2011 unsolved solved
Spring 2008 unsolved solved
Winter 2008 unsolved solved

Software Installation and Use

Instructions for SML and Emacs, which is everything you need for the first half of the course.
Videos showing the software installation on Windows

Instructions for Racket and DrRacket

Instructions for Ruby and irb

Textbooks and Other Resources

While the other materials on this page (lectures, sections, homeworks, installation instructions, videos) are designed to provide what you need for the course, the books/guides provide alternate explanations and additional details. We will not follow them closely, but you may still find them valuable. Suggestions for additional links are welcome.

Elements of ML Programming, ML'97 Edition, Jeffrey D. Ullman, 1998.

Check the errata page to avoid bugs.
Approximately Chapters 2, 3.1-3.4, 5.1-5.5 (skip 5.2.5, 5.3.4, 5.4.4), 6.1-6.2, 7.1, 8.2, 8.5.5 overlap with the course material.

The Racket Guide
Approximately Chapters 1-4.9.1 (skip 2.4.1-2.4.3, 3.5-3.12, 4.4.3, 4.4.4, 4.6.5), 5.1, 5.2, 6.1-6.5 (skip 6.3), 16.1-16.1.4 overlap with the course material. We might cover some of 7.1, 7.2, 15.1.

Programming Ruby 1.9: The Pragmatic Programmers' Guide (Facets of Ruby), Dave Thomas et al, 2009.
Check the errata page to avoid bugs.
Overlap with the course material is very roughly Chapter 1 through 9 except Chapter 7.

We will be using Ruby 1.9. While there are significant differences between 1.8 and 1.9 in the language, a 1.8 version of the book is still a fine resource if that's the one you happen to have.

In addition to the texts above, there are many useful online resources for the languages we are using. In particular, effective use of any language involves leveraging existing libraries, which requires more library documentation than any class should cover. There are also many tutorials and guides that you may find useful.

Additional SML resources:
- www.smlnj.org (links to many things, including the next three resources)
- user's guide
- standard-library documentation
- tutorials, books, and documentation

Additional Racket resources:
- racket-lang.org, particularly the Documentation and Learning tabs

Additional Ruby resources:
- ruby-doc.org, including links for the library documentation and various books. You can even buy the t-shirt.
- Ruby home page
- list compiled by Stuart Reges for Spring 2010's CSE341, including lecture slides

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