

Advanced Programming Language Principles Section 01

CS 252

Fall 2024 3 Unit(s) 08/21/2024 to 12/09/2024 Modified 08/20/2024

Contact Information

Prof. Thomas H Austin

Email: thomas.austin@sjsu.edu

Office Hours

Mondays, 3-4pm (in-person).

Thursdays, 10-11am (Zoom only. <https://sjsu.zoom.us/j/3796767168?pwd=SzNVOE4zSTNyNHNgR1RhNIJ6cDAwUT09> (<https://sjsu.zoom.us/j/3796767168?pwd=SzNVOE4zSTNyNHNgR1RhNIJ6cDAwUT09>)).

Other times by appointment

See <http://www.cs.sjsu.edu/~austin/office-hours-updates.txt>
(<http://www.cs.sjsu.edu/~austin/office-hours-updates.txt>) for cancelled/rescheduled hours.

Course Information

Monday, Wednesday, 1:30 PM to 2:45 PM, MacQuarrie Hall 222

Course Description and Requisites

Language design and paradigms, including concepts underlying functional, logic, object-oriented and parallel paradigms. Theoretical foundations, including lambda calculus, denotational and axiomatic semantics. Proofs of program correctness. Programming projects emphasizing different aspects of language design.

Prerequisite(s): CS 152 and Graduate standing. Allowed Declared Major: Computer Science, Bioinformatics, Data Science. Or instructor consent.

* Classroom Protocols

Please show up to class on time. If students arriving late becomes a problem, I will start classes with pop quizzes.

Course materials such as syllabus, handouts, notes, assignment instructions, etc. can be found on my faculty web page at <http://www.cs.sjsu.edu/~austin/cs252-fall24/> (<http://www.cs.sjsu.edu/~austin/cs252-fall24/>) and on Canvas Learning Management System course login website at <http://sjsu.instructure.com> (<http://sjsu.instructure.com>).

You are responsible for regularly checking with the messaging system through Canvas to learn of any updates.

☰ Program Information

Diversity Statement - At SJSU, it is important to create a safe learning environment where we can explore, learn, and grow together. We strive to build a diverse, equitable, inclusive culture that values, encourages, and supports students from all backgrounds and experiences.

📶 Course Learning Outcomes (CLOs)

Upon successful completion of this course, students will be able to:

1. Read and write operational semantics
2. Read and write formal type systems
3. Write moderately sized Haskell applications
4. Read and review research papers in the field of programming languages

📖 Course Materials

Learn You a Haskell for Great Good

Author: Miran Lipovaca

Availability: Online

Available at <https://learnyouahaskell.github.io/> (<https://learnyouahaskell.github.io/>).

Eloquent JavaScript

Author: Marijn Haverbeke

Edition: 4th

Availability: Online

Available at <https://eloquentjavascript.net/> (<https://eloquentjavascript.net/>).

More references TBD.

☰ Course Requirements and Assignments

This class will involve 5 significant programming assignments, a midterm & a final (no notes), and a final project & presentation. Lastly, there will be labs for most days of class.

Exams and homework must be done individually. If two students turn in overly similar code, both get a zero, and both may be reported for plagiarism.

For the class project, you may work alone or with a partner at your discretion. Note that more will be expected of your project if you have a partner.

Labs are graded complete/incomplete. As long as you attempt and submit the lab, you will get full credit. For labs, you may work with others if you wish. Be forewarned, exam questions are often similar to lab questions. If you do not understand your lab solution, you are not likely to succeed on the exams.

✓ Grading Information

30% -- Homework assignments

20% -- Midterm

20% -- Final

20% -- Project

10% -- Participation (labs and pop-quizzes)

Assignments are due by 11:59 PM Pacific Time on the specified day. Late homework assignments will not be accepted.

Nominal grading scale:

Percentage	Grade
92 and above	A
90 - 91	A-
88 - 89	B+
82 - 87	B
80 - 81	B-
78 - 79	C+
72 - 77	C
70 - 71	C-

68 - 69	D+
62 - 67	D
60 - 61	D-
59 and below	F

University Policies

Per [University Policy S16-9 \(PDF\)](http://www.sjsu.edu/senate/docs/S16-9.pdf) (<http://www.sjsu.edu/senate/docs/S16-9.pdf>), relevant university policy concerning all courses, such as student responsibilities, academic integrity, accommodations, dropping and adding, consent for recording of class, etc. and available student services (e.g. learning assistance, counseling, and other resources) are listed on the [Syllabus Information](https://www.sjsu.edu/curriculum/courses/syllabus-info.php) (<https://www.sjsu.edu/curriculum/courses/syllabus-info.php>) web page. Make sure to visit this page to review and be aware of these university policies and resources.

Course Schedule

The final exam is December 13, 12:15-2:15pm.

For the official class schedule, please see Canvas.

Tentative schedule by class session:

1. Course introduction
2. Introduction to Haskell
3. LaTeX
4. Big-step operational semantics
5. Higher order functions
6. Small-step operational semantics
7. Algebraic data types, kinds, and type classes
8. Functors
9. Applicative functors
10. Monads
11. Parser generators
12. Midterm review session
13. **Midterm**
14. Lambda calculus
15. Introduction to JavaScript
16. Event-based programming
17. JSLint and TypeScript
18. Type systems
19. Metaprogramming and JavaScript object proxies
20. Simply typed lambda calculus

21. Virtual machine lab
22. Introduction to Ruby
23. Ruby meta programming
24. Rust
25. Ethereum Solidity
26. Inform 7
27. Project presentations
28. Project presentations
29. Final review session