

Programming Paradigms Section 03

CS 152

Spring 2024 3 Unit(s) 01/24/2024 to 05/13/2024 Modified 01/19/2024

Contact Information

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Office Hours

Tuesday, Thursday, 11:00 AM to 12:00 PM

Please join the Zoom Link : <https://sjsu.zoom.us/j/3796767168?pwd=SzNVOE4zSTNyNHNgR1RhNIJ6cDAwUT09> (<https://sjsu.zoom.us/j/3796767168?pwd=SzNVOE4zSTNyNHNgR1RhNIJ6cDAwUT09>).

Course Description and Requisites

Programming language syntax and semantics. Data types and type checking. Scope, bindings, and environments. Functional and logic programming paradigms, and comparison to other paradigms. Extensive coverage of a functional language.

Prerequisite: CS 151 or CMPE 135 (with a grade of "C-" or better); Allowed Majors: Computer Science or Software Engineering; or instructor consent.

Letter Graded

Classroom Protocols

Bring your laptop to class.

Communication with the instructor

Students are requested to use the provided email to contact the instructor. The instructor does not write messages after normal business hours, on weekends or holidays.

Reviewing code for the homework and technical trouble-shooting should be done during the office hours. Never send your entire code for an assignment to the instructor. The instructor will not fix all the bugs in your code.

Classroom Protocol

Course material developed by the instructor is the intellectual property of the instructor. Students can not publicly share or upload instructor generated material for this course such as exam questions, lecture notes, hands-on exercises or homework solutions without instructor permission.

Attendance

Attendance is recommended, but it is not mandatory, except for exam dates. Cell phone use is prohibited. Punctuality is appreciated.

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:

- Have a basic knowledge of the history of programming languages.
- Have a basic knowledge of the procedural, object-oriented, functional, and logic programming paradigms.
- Understand the roles of interpreters, compilers, and virtual machines.
- Critique the design of a programming language.
- Read and produce context-free grammars.
- Write recursive-descent parsers for simple languages, by hand or with a parser generator.
- Understand variable scoping and lifetimes.
- Write interpreters for simple languages that involve arithmetic expressions, bindings of values to names, and function calls.
- Understand type systems.
- Understand the implementation of procedure calls and stack frames.
- Produce programs in a functional programming language in excess of 200 LOC.

Course Materials

Required materials: We will use a variety of online resources, including:

- "Learn You a Haskell for Great Good", available at <http://learnyouahaskell.com/>
(<http://learnyouahaskell.com/>)

- "Eloquent JavaScript", available at <http://eloquentjavascript.net> (<http://eloquentjavascript.net>)
- More references TBD, assigned in Canvas

Course Requirements and Assignments

SJSU classes are designed such that in order to be successful, it is expected that students will spend a minimum of forty-five hours for each unit of credit (normally three hours per unit per week), including preparing for class, participating in course activities, completing assignments, and so on. More details about student workload can be found in [University Policy S12-3](http://www.sjsu.edu/senate/docs/S12-3.pdf) (<http://www.sjsu.edu/senate/docs/S12-3.pdf>) at <http://www.sjsu.edu/senate/docs/S12-3.pdf> (<http://www.sjsu.edu/senate/docs/S12-3.pdf>).

Homework assignments consist of 2 programming assignments in Haskell, one in JavaScript, and one in Prolog. There is also a group project building an interpreter using ANTLR and Java.

There is a final and a midterm.

In-class labs are used as the basis for your participation grade. Any question in the lab is fair game for the exams.

See [Canvas](http://sjsu.instructure.com/) (<http://sjsu.instructure.com/>) at <http://sjsu.instructure.com/> (<http://sjsu.instructure.com/>) for more details.

"Success in this course is based on the expectation that students will spend, for each unit of credit, a minimum of 45 hours over the length of the course (normally three hours per unit per week) for instruction, preparation/studying, or course related activities, including but not limited to internships, labs, and clinical practica. Other course structures will have equivalent workload expectations as described in the syllabus."

Final Examination or Evaluation

The final exam is worth 20% of the total grade for the class. It is a written exam. Paper will be provided. Bring something to write with.

Grading Information

Determination of Grades

- 30% -- Homework assignments (individual)
- 20% -- Class project (team)
- 20% -- Midterm
- 20% -- Final
- 10% -- Participation (labs and drills)

Assignments are due by 11:59 PM Pacific Time on the specified day.

Late homework assignments will not be accepted.

Nominal grading scale:

Extra-credits assignments

No extra-credit assignments are planned; However, the instructor may assign extra-credit assignments at his discretion with fair notice.

Breakdown

Grade	Range	Notes
A	92 and above	
A-	90 - 91	
B+	88 - 89	
B	82 - 87	
B-	80 - 81	
C+	78 - 79	
C	72 - 77	
C-	70 - 71	
D+	68 - 69	
D	62 - 67	
D-	60 - 61	
F	59 and below	

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

Please note that the schedule is subject to change with fair notice, which will be posted through [Canvas \(https://sjsu.instructure.com\)](https://sjsu.instructure.com) at <https://sjsu.instructure.com> (<https://sjsu.instructure.com>).

When	Topic	Notes
01/25	Course Introduction	
01/29	Introduction to Haskell	
02/01	Syntax & Semantics, and Language Design Criteria	
02/06	Higher order functions - Part 1	
02/08	Higher order functions - Part 2	
02/13	Operational semantics	
02/15	Algebraic Data Types, Kinds, & Typeclasses	
02/20	Functors	
02/22	Applicative Functors	
02/27	Monads	
02/29	Haskell Review	
03/05	JavaScript	
03/07	Event-based programming	
03/12	Scoping in JavaScript, JSLint, and TypeScript	
03/14	ECMAScript 6 and metaobject protocols	
03/19	Review for midterm	
03/21	**MIDTERM EXAM**	
03/26	ANTLR & Syntax	
03/28	Prolog	
04/02	**Spring Recess**	
04/04	**Spring Recess**	
04/09	Resolution and unification, the cut operator	
04/11	Lists in Prolog and debugging Prolog	

When	Topic	Notes
04/16	Ruby	
04/18	Ruby blocks	
04/23	Virtual Machines	
04/25	Dynamic code evaluation, taint analysis, and information flow analysis	
04/30	Virtual Machines	
05/02	LaTeX and domain specific languages	
05/07	Python and IDE plugins	
05/09	Final Review	
05/17/2024 7:15 AM - 9:30 AM	Finals	