

San José State University
Computer Science Department
CS 152, Programming Language Paradigms, Fall 2015

Course and Contact Information

Instructor:	Thomas H. Austin
Office Location:	MacQuarrie Hall 216
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Office Hours:	Monday, Thursday 2:00-3:00, or by appointment.
Class Days/Time:	Section 3 – Monday/Wednesday 10:30am – 11:45am. Section 4 – Monday/Wednesday 12:00pm – 1:15pm. Section 5 – Monday/Wednesday 3:00pm – 4:15pm.
Classroom:	MacQuarrie Hall 222 (sections 3 & 4) MacQuarrie Hall 225 (section 5)
Prerequisites:	CS 151 or CMPE 135 (with a grade of "C-" or better)

Course Description

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.

Learning Outcomes

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

1. SLO 1 *Understand programming language design.*
2. SLO 2 *Achieve competence in a functional programming language.*

Course Learning Outcomes (CLO)

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

1. CLO 1 *Have a basic knowledge of the history of programming languages.*
2. CLO 2 *Have a basic knowledge of the procedural, object-oriented, functional, and logic programming paradigms.*
3. CLO 3 *Understand the roles of interpreters, compilers, and virtual machines.*
4. CLO 4 *Critique the design of a programming language.*
5. CLO 5 *Read and produce context-free grammars.*

6. *CLO 6 Write recursive-descent parsers for simple languages, by hand or with a parser generator.*
7. *CLO 7 Understand variable scoping and lifetimes.*
8. *CLO 8 Write interpreters for simple languages that involve arithmetic expressions, bindings of values to names, and function calls.*
9. *CLO 9 Understand type systems.*
10. *CLO 10 Understand the implementation of procedure calls and stack frames.*
11. *CLO 11 Produce programs in a functional programming language in excess of 200 LOC.*

Required Texts/Readings

Textbook

Dorai Sitaram, "[Teach Yourself Scheme in Fixnum Days](http://www.ccs.neu.edu/home/dorai/t-y-scheme/t-y-scheme.html)" at <http://www.ccs.neu.edu/home/dorai/t-y-scheme/t-y-scheme.html>.

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) at <http://www.sjsu.edu/senate/docs/S12-3.pdf>.

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

There is a final and a midterm.

In-class labs are graded complete/incomplete, and 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/) at <http://sjsu.instructure.com/> for more details.

NOTE that [University policy F69-24](http://www.sjsu.edu/senate/docs/F69-24.pdf) at <http://www.sjsu.edu/senate/docs/F69-24.pdf> states that “Students should attend all meetings of their classes, not only because they are responsible for material discussed therein, but because active participation is frequently essential to insure maximum benefit for all members of the class. Attendance per se shall not be used as a criterion for grading.”

Grading Policy

1. 30% -- Homework assignments (individual)
2. 20% -- Class project (team)
3. 20% -- Midterm
4. 20% -- Final
5. 10% -- Participation (labs)

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

Note that “All students have the right, within a reasonable time, to know their academic scores, to review their grade-dependent work, and to be provided with explanations for the determination of their course grades.” See [University Policy F13-1](http://www.sjsu.edu/senate/docs/F13-1.pdf) at <http://www.sjsu.edu/senate/docs/F13-1.pdf> for more details.

Classroom Protocol

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

University Policies

General Expectations, Rights and Responsibilities of the Student

As members of the academic community, students accept both the rights and responsibilities incumbent upon all members of the institution. Students are encouraged to familiarize themselves with SJSU’s policies and practices pertaining to the procedures to follow if and when questions or concerns about a class arises. See [University Policy S90–5](http://www.sjsu.edu/senate/docs/S90-5.pdf) at <http://www.sjsu.edu/senate/docs/S90-5.pdf>. More detailed information on a variety of related topics is available in the [SJSU catalog](http://info.sjsu.edu/web-dbgen/narr/catalog/rec-12234.12506.html), at <http://info.sjsu.edu/web-dbgen/narr/catalog/rec-12234.12506.html>. In general, it is recommended that students begin by seeking clarification or discussing concerns with their instructor. If such conversation is not possible, or if it does not serve to address the issue, it is recommended that the student contact the Department Chair as a next step.

Dropping and Adding

Students are responsible for understanding the policies and procedures about add/drop, grade forgiveness, etc. Refer to the current semester’s [Catalog Policies](http://info.sjsu.edu/static/catalog/policies.html) section at <http://info.sjsu.edu/static/catalog/policies.html>. Add/drop deadlines can be found on the current academic year calendars document on the [Academic Calendars webpage](http://www.sjsu.edu/provost/services/academic_calendars/) at http://www.sjsu.edu/provost/services/academic_calendars/. The [Late Drop Policy](#) is available at

<http://www.sjsu.edu/aars/policies/latedrops/policy/>. Students should be aware of the current deadlines and penalties for dropping classes.

Information about the latest changes and news is available at the [Advising Hub](http://www.sjsu.edu/advising/) at <http://www.sjsu.edu/advising/>.

Consent for Recording of Class and Public Sharing of Instructor Material

[University Policy S12-7](http://www.sjsu.edu/senate/docs/S12-7.pdf), <http://www.sjsu.edu/senate/docs/S12-7.pdf>, requires students to obtain instructor's permission to record the course and the following items to be included in the syllabus:

- “Common courtesy and professional behavior dictate that you notify someone when you are recording him/her. You must obtain the instructor's permission to make audio or video recordings in this class. Such permission allows the recordings to be used for your private, study purposes only. The recordings are the intellectual property of the instructor; you have not been given any rights to reproduce or distribute the material.”
 - It is suggested that the greensheet include the instructor's process for granting permission, whether in writing or orally and whether for the whole semester or on a class by class basis.
 - In classes where active participation of students or guests may be on the recording, permission of those students or guests should be obtained as well.
- “Course material developed by the instructor is the intellectual property of the instructor and cannot be shared publicly without his/her approval. You may not publicly share or upload instructor generated material for this course such as exam questions, lecture notes, or homework solutions without instructor consent.”

Academic integrity

Your commitment, as a student, to learning is evidenced by your enrollment at San Jose State University. The [University Academic Integrity Policy S07-2](http://www.sjsu.edu/senate/docs/S07-2.pdf) at <http://www.sjsu.edu/senate/docs/S07-2.pdf> requires you to be honest in all your academic course work. Faculty members are required to report all infractions to the office of Student Conduct and Ethical Development. The [Student Conduct and Ethical Development website](http://www.sjsu.edu/studentconduct/) is available at <http://www.sjsu.edu/studentconduct/>.

Campus Policy in Compliance with the American Disabilities Act

If you need course adaptations or accommodations because of a disability, or if you need to make special arrangements in case the building must be evacuated, please make an appointment with me as soon as possible, or see me during office hours. [Presidential Directive 97-03](http://www.sjsu.edu/president/docs/directives/PD_1997-03.pdf) at http://www.sjsu.edu/president/docs/directives/PD_1997-03.pdf requires that students with disabilities requesting accommodations must register with the [Accessible Education Center](http://www.sjsu.edu/aec) (AEC) at <http://www.sjsu.edu/aec> to establish a record of their disability.

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

Course Schedule

Week	Date	Topics, Readings, Assignments, Deadlines
1	8/24	Course introduction
1	8/26	Scheme
2	8/31	Syntax & Semantics, and Language Design Criteria
2	9/2	Higher order functions
3	9/7	Labor day (no class)
3	9/9	Operational semantics
4	9/14	Closures and scoping
4	9/16	Macros
5	9/21	Programming contracts
5	9/23	JavaScript
6	9/28	Scoping in JavaScript
6	9/30	Event-based programming
7	10/5	JavaScript object proxies
7	10/7	JSLint & TypeScript
8	10/12	Review for midterm
8	10/14	Midterm exam
9	10/19	Prolog
9	10/21	Resolution and unification, and the cut operator
10	10/26	Lists in Prolog and debugging Prolog
10	10/28	ANTLR & Syntax
11	11/2	Ruby
11	11/4	Ruby blocks
12	11/9	Dynamic code evaluation, taint analysis, and information flow analysis
12	11/11	Veteran's day (no class)
13	11/16	Virtual Machines
13	11/18	LaTeX and domain specific languages
14	11/23	Rust

Week	Date	Topics, Readings, Assignments, Deadlines
14	11/25	Inform 7
15	11/30	AspectJ and Eclipse plugins
15	12/2	Advanced Java features, wrap-up
16	12/7	Review for final
Final Exam	Varies by section	Section 3: 12/15 - 9:45 – noon in MH 222 Section 4: 12/10 - 9:45 – noon in MH 222 Section 5: 12/15 – 12:15 – 2:30 in MH 225