



## Programming Languages – CS 496

### School of Engineering & Science

Meeting Times:  
Classroom Location:

Instructor:	Eduardo Bonelli
Contact Info:	GS 350, ebonelli@stevens.edu, 201-216-5261
Office Hours:	TBD
Course Web Address:	See Canvas
Prerequisite(s):	CS 385
Cross-listed with:	None

## COURSE DESCRIPTION

This course is an introduction to fundamental principles behind the design of programming languages. These principles allow us to plot languages in the ever growing universe of PLs and compare them or enhance them. Examples are how programs are represented, what scoping rules they follow, how they are executed, whether they are typed, how they manage parameters, etc. The approach we follow is that of implementing interpreters for toy languages that support these principles.

## LEARNING OBJECTIVES

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

- Induction and recursion - Implement recursive programs in a functional language to manipulate data structures such as lists and trees. Explain the relationship between inductively defined data types, recursive programs that process inputs of those data types, and inductive arguments about the correctness of those programs using induction over data types.
- Trees and abstract syntax - Model a labeled tree data structure, such as an abstract syntax tree, using algebraic datatypes. Implement a recursive program such as an interpreter, pretty-printer, parser, and typechecker for functional, imperative or object-oriented languages.
- Scoping - Implement static and dynamic scoping rules in programming languages, and use environments and closures to realize these scoping rules, where appropriate.

- Parameter passing - Implement parameter-passing mechanisms such as call-by-value, call-by-result, call-by-value-result, call-by-reference, call-by-name and call-by-need (lazy evaluation); be able to reason about the behavior of programs that use those mechanisms.
- Type systems - Define and implement type systems as inductive definitions, and reason about well-typedness of programs using those type systems.

## FORMAT AND STRUCTURE

This course is comprised of weekly two-and-a-half hour lectures.

## COURSE MATERIALS

Course notes:	Given out in class
Textbook(s):	Daniel P. Friedman & Mitchell Wand, Essentials of Programming Languages, Third edition, MIT Press, 2008, ISBN 978-0262062794
Other Readings:	Daniel P. Friedman & Matthias Felleisen, The Little Schemer, Fourth Edition, MIT Press, 1995, ISBN 978-0262560993

## COURSE REQUIREMENTS

<b>Attendance</b>	Students are required to attend all classes.
<b>Homework</b>	There will be five (5) homework (programming) assignments throughout this course. Code that does not compile will not be accepted. Policy for late submissions: 2 points off for every hour past the deadline. If urgent or unusual circumstances prohibit you from submitting a homework assignment in time, please e-mail the instructor.
<b>Quizzes</b>	Typically on Wednesdays. Quizzes will be graded for accuracy. If a student is absent (unexcused) on a day that a quiz is given s/he will receive an automatic 0 for that quiz.
<b>Exams</b>	There will be two exams in this course: a midterm covering the first half of the contents and the an endterm covering the second half. This course has no final exam.

## GRADING PROCEDURES

There are 100 possible points that a student can earn in this course. Percentages are listed below.

Homework	(35%)
Quizzes	(15%)
Special assignment 1	(25%)
Special assignment 2	(25%)

## ACADEMIC INTEGRITY

### Undergraduate Honor System

Enrollment into the undergraduate class of Stevens Institute of Technology signifies a student's commitment to the Honor System. Accordingly, the provisions of the Stevens Honor System apply to all undergraduate students in coursework and Honor Board proceedings. It is the responsibility of each student to become acquainted with and to uphold the ideals set forth in the Honor System Constitution. More information about the Honor System including the constitution, bylaws, investigative procedures, and the penalty matrix can be found online at <http://web.stevens.edu/honor/>

The following pledge shall be written in full and signed by every student on all submitted work (including, but not limited to, homework, projects, lab reports, code, quizzes and exams) that is assigned by the course instructor. No work shall be graded unless the pledge is written in full and signed.

"I pledge my honor that I have abided by the Stevens Honor System."

**Reporting Honor System Violations.** Students who believe a violation of the Honor System has been committed should report it within ten business days of the suspected violation. Students have the option to remain anonymous and can report violations online at [www.stevens.edu/honor](http://www.stevens.edu/honor).

## EXAM ROOM CONDITIONS

The following procedures apply to quizzes and exams for this course. As the instructor, I reserve the right to modify any conditions set forth below by printing revised Exam Room Conditions on the quiz or exam.

1. Students may use the following devices during quizzes and/or exams. Any electronic devices that are not mentioned in the list below are not permitted.

Device	Permitted?	
	Yes	No
Laptops		x
Cell Phones		x
Tablets		x
Smart Watches		x
Google Glass		x
Other (specify)		x

2. Students may use the following materials during quizzes and/or exams. Any materials that are not mentioned in the list below are not permitted.

Material	Permitted?	
	Yes	No
Handwritten Notes		x
Typed Notes Conditions: one 8*10 sheet (front and back) is permitted	x	
Textbooks		x
Readings		x

3. Students are/are *not* allowed to work with or talk to other students during quizzes and/or exams.

## LEARNING ACCOMODATIONS

Stevens Institute of Technology is dedicated to providing appropriate accommodations to students with documented disabilities. Student Counseling and Disability Services works with undergraduate and graduate students with learning disabilities, attention deficit-hyperactivity disorders, physical disabilities, sensory impairments, and psychiatric disorders in order to help students achieve their academic and personal potential. They facilitate equal access to the educational programs and opportunities offered at Stevens and coordinate reasonable accommodations for eligible students. These services are designed to encourage independence and self-advocacy with support from SCDS staff. The SCDS staff will facilitate the provision of accommodations on a case-by-case basis. These academic accommodations are provided at no cost to the student.

### Disability Services Confidentiality Policy

Student Disability Files are kept separate from academic files and are stored in a secure location within the office of Student Counseling, Psychological & Disability Services. The Family Educational Rights Privacy Act (FERPA, 20 U.S.C. 1232g; 34CFR, Part 99) regulates disclosure of disability documentation and records maintained by Stevens Disability Services. According to this act, prior written consent by

the student is required before our Disability Services office may release disability documentation or records to anyone. An exception is made in unusual circumstances, such as the case of health and safety emergencies.

For more information about Disability Services and the process to receive accommodations, visit <https://www.stevens.edu/sit/counseling/disability-services>. If you have any questions please contact: Lauren Poleyeff, Psy.M., LCSW - Disability Services Coordinator and Staff Clinician in Student Counseling and Disability Services at Stevens Institute of Technology at [lpoleyef@stevens.edu](mailto:lpoleyef@stevens.edu) or by phone (201) 216-8728.

## **INCLUSIVITY STATEMENT**

Stevens Institute of Technology believes that diversity and inclusiveness are essential to excellence in education and innovation. Our community represents a rich variety of backgrounds, experiences, demographics and perspectives and Stevens is committed to fostering a learning environment where every individual is respected and engaged. To facilitate a dynamic and inclusive educational experience, we ask all members of the community to:

- be open to the perspectives of others
- appreciate the uniqueness of their colleagues
- take advantage of the opportunity to learn from each other
- exchange experiences, values and beliefs
- communicate in a respectful manner
- be aware of individuals who are marginalized and involve them
- keep confidential discussions private

## **TENTATIVE COURSE SCHEDULE**

See schedule in Canvas.