

**Syllabus**  
**CSC315 Programming Language**  
**Concepts**  
**Professor Leon Tabak**  
**Block 2**  
**September 23, 2019 to October 16, 2019**

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## 1 Our meeting times and places

- My office is in West Science 211.
- You may call me in my office at (319) 895 4294.
- You may send me electronic mail at [l.tabak@ieee.org](mailto:l.tabak@ieee.org).
- I will be in my office and available to meet with you Monday through Friday from 3:00 p.m. until 3:30 p.m.
- We will all meet together in the classroom in the mornings and in the laboratory in the afternoons.

	<b>Where</b>	<b>When</b>
<b>Classroom</b>	West Science 200	9 a.m. to 11 a.m.
<b>Laboratory</b>	West Science 201	1 p.m. to 3 p.m.

## 2 Textbooks

- [Concepts of Programming Languages \(11<sup>th</sup> edition\)](#) Robert W. Sebesta, Pearson, New York, 2016, ISBN 978-0133943023

## 3 Other Resources

### 3.1 C

- [C tutorial from learn-c.org](#)
- [C tutorial from Cprogramming.com](#)
- [The GNU C Reference Manual](#)

## 3.2 JavaScript

- [Intro to JavaScript](#)
- [JavaScript Basics](#)
- [JavaScript Tutorial from w3schools.com](#)
- [Introduction to JavaScript from codecademy.com](#)
- [JavaScript tutorial from learn-js.org](#)

## 3.3 Scala

- [Getting Started from scala-lang.org](#)
- [Functional Programming Principles in Scala from coursera.org](#)
- [Functional Program Design in Scala from coursera.org](#)

## 3.4 Scheme

- [Structure and Interpretation of Computer Programs from the MIT Press](#)
- [Revised\(5\) Report on the Algorithmic Language Scheme](#)
- [Racket: solve problems, make languages](#)

# 4 Etiquette for the Classroom

Please show respect to your classmates, to me, and to the seriousness of our enterprise by exercising the following courtesies:

- Please give your attention to whomever is speaking. You cannot view unrelated pages on the Web and be part of our class' discussion at the same time.
- You learn from your classmates. Be generous in offering help to classmates in the laboratory. Take interest in your classmates' work. Encourage them. Compliment them for work that is well done. Give them a good audience when they stand at the front of the room to present their work. Show these courtesies to all of your classmates.
- Please do not interrupt the class by late entries or early departures. If you anticipate a need to be absent from all or part of one of our meetings, please notify me in advance of your anticipated absence.

- You may listen to music while working in the laboratory so long as you are still able to hear your name when called and you do not disturb neighbors.
- Please refrain from bringing food or drink into the classroom or laboratory. We can make reasonable exceptions for eating that is not noisy and foods that do not have strong smells.

Acceptable beverages and foods include water, tea, and granola bars. Bringing breakfast to class is not courteous.

Please clean up crumbs and spills. Please dispose of empty containers and leftovers.

- Please dress as you might for an employer in the software engineering industry. Please keep your shoes on. Wearing hoods, hats, or sunglasses (except when there is a medical reason for shielding the eyes) that hide your face is not courteous.
- Imagine that you are seeking employment. How will you present yourself to your prospective employer?

Imagine that you are now employed in a software engineering firm. How will you speak to your teammates, the head of your team, and your company's clients?

Imagine that your grandmother has purchased the company for which you work. She has joined you in the company's conference room to hear and see you walk through the code that you have written for the company (her company).

Are there some words that you will keep out of your vocabulary during this hour?

## 5 Policies

Cornell College is committed to providing equal educational opportunities to all students. If you have a documented learning disability and will need any accommodation in this course, you *must* request the accommodation(s) from the instructor of the course and no later than the third day of the term. Additional information about the policies and procedures for accommodation of learning disabilities is available on [Cornell College's Web site](#).

Please also familiarize yourself with the college's statement on [academic honesty](#) and its [policies for dropping courses](#).

## 6 Goals

We will give special attention to three of Cornell College's [Educational Priorities and Outcomes](#):

- Knowledge—you will learn how to describe a programming language, you will learn how programming languages have evolved, and you will learn a little about how programming languages are translated.
- Reasoning—you will learn how to compare programming languages.
- Citizenship—in this project-oriented course you will learn how to collaborate with classmates. You will learn with one another and from one another.

## 7 Grades

Written work will be due on each day of the term except for the first day and the last day. Electronic copies of your papers will be due at 9 a.m.

Experience presenting work to peers will be a central part of the course. Practice asking your teammates questions during their presentations, critiquing their decisions, and suggesting improvements to their code will also be an important part of your education during this term. We will schedule one day in each week of the term for you to present your work.

Develop an application for the Web using the JavaScript or Scala programming languages. Find and use appropriate libraries, frameworks, and development tools. Schedule and deliver a formal report on your progress in each week of the term.

A formal report has structure and purpose. It is developed through several drafts. It is edited and proofread. It is rehearsed.

Although presentations are due on the last day of each week, there will not be time for all students to present on the same day. You are responsible for making sure that we have time to hear your reports. You might have to deliver your report on a Wednesday to meet a Friday deadline.

Make use of tools for documenting and testing your code. Find and conform to guidelines for good style. Track, record, and share your progress using a version control system.

Be prepared every day to show code that you have written, notes that you have taken, or resources (e.g., tutorials, references, tools, and examples) that you have found. This will be part of our daily work.

Experience presenting work to peers will be a central part of the course. Practice

asking your teammates questions during their presentations, critiquing their decisions, and suggesting improvements to their code will also be an important part of your education during this term. This will be part of our daily work.

There will be a midterm examination and a final examination. Your scores will be counted as part of your daily work.

Activity	Points
Daily work	20
Graded exercise 1 (Friday, 27 September 2019)	20
Graded exercise 2 (Friday, 04 October 2019)	20
Graded exercise 3 (Friday, 11 October 2019)	20
+ Graded exercise 4 (Wednesday, 16 October 2019)	20
	100

## 8 Calendar

	Mon	Tue	Wed	Thu	Fri
<b>Week 0</b>	23	24	25	26	27
<b>Week 1</b>	30	01	02	03	04
<b>Week 2</b>	07	08	09	10	11
<b>Week 3</b>	14	15	16	17	18

## 9 Schedule

### 9.1 Week 0

#### 9.1.1 Monday, 23 September 2019

**Read:** Read Chapter 1 on pages 1–34 (34 pages) in *Concepts of Programming Languages*.

Learn a little about the C programming language by reading one of many tutorials for the C programming language that you can find on the Web.

**Discuss:** Reasons to study programming languages, applications of programming, qualities of programming languages, influences on the design of programming languages (including the advances in computer engineering and software

engineering).

**Write:** Write answers for Problems 3, 4, and 5 on page 33.

**Return to calendar.**

### 9.1.2 Tuesday, 24 September 2019

**Read:** Read Chapter 2 on pages 35–111 (77 pages) in *Concepts of Programming Languages*.

**Discuss:** Survey of the history of programming languages. Interpreted and compiled languages. Imperative, object-oriented, functional, and logic programming languages. Scripting and markup languages.

**Write:** Write an answer for Problem 20 on page 110.

**Return to calendar.**

### 9.1.3 Wednesday, 25 September 2019

**Read:** Read Chapter 3 on pages 113–166 (54 pages) in *Concepts of Programming Languages*.

Learn a little about the Scheme programming language by reading in *The Structure and Interpretation of Computer Programs*, by reading the help available in the Racket program, and by reading on the [Racket](#) Web site.

**Discuss:** Formal languages, generation and recognition of languages, Backus-Naur Form (a language for describing languages), introduction to parsing, methods of describing the semantics of a language (operational, denotational, and axiomatic).

**Write:** Write answers for Problems 6, 10, 12, and 24 on pages 163–166.

**Return to calendar.**

#### 9.1.4 Thursday, 26 September 2019

Attend the convocation in King Chapel at 11:15 a.m. Jodi Schafer, senior director of the Berry Career Institute, will speak on *Perseverance and Grit: Finding Success One Triumph at a Time*.

**Read:** Read Chapter 4 on pages 167–201 (35 pages) in *Concepts of Programming Languages*.

**Discuss:** Components of a compiler, parsing algorithms.

**Write:** Write answers for Problems 4 and 6 on page 200.

**Return to calendar.**

#### 9.1.5 Friday, 27 September 2019

**Read:** Read Chapter 5 on pages 203–241 (39 pages) in *Concepts of Programming Languages*.

**Discuss:** Attributes of variables—names, types, values, addresses, scopes, lifetimes—and the binding of attributes to variables (how and when are the attributes of a variable determined?).

**Write:** Write answers to Problems 6 and 8 on pages 236–238.

**Return to calendar.**

## 9.2 Week 1

### 9.2.1 Monday, 30 September 2019

**Read:** Read Chapter 6 on pages 243–316 (74 pages) in *Concepts of Programming Languages*.

Learn a little about the Ruby programming language by reading on [Ruby, A Programmer's Best Friend](#).

**Discuss:** Data types, type checking, initialization of variables, allocation and release of memory, garbage collection,

**Write:** Write answers to Problems 8, 10, and 11 on page 314.

**Return to calendar.**

### 9.2.2 Tuesday, 01 October 2019

The Society for Technical Communications will present a program titled *Career Chats with Writers* in Thomas Commons. Dinner will begin at 6 p.m. The program will begin at 7 p.m.

**Read:** Read Chapter 7 on pages 317–346 (30 pages) in *Concepts of Programming Languages*.

**Discuss:** Operators, expressions, overloading of operators, conversion between types, short-circuit evaluations.

**Write:** Write answers to Problems 13 and 20 on pages 344–345.

**Return to calendar.**

### 9.2.3 Wednesday, 02 October 2019

**Read:** Read Chapter 8 on pages 347–385 (39 pages) in *Concepts of Programming Languages*.

**Discuss:** Statements—constructs for instructing the computer to choose from among alternative actions or to repeat actions.

**Write:** Write answers to Problems 2 and 7 on page 382.

**Return to calendar.**

#### 9.2.4 Thursday, 03 October 2019

**Read:** Read Chapter 9 on pages 387–440 (54 pages) in *Concepts of Programming Languages*.

**Discuss:** Kinds of subprograms, methods of passing parameters to subprograms, overloading of subprograms.

**Write:** Write an answer to Problem 5 on page 438.

**Return to calendar.**

#### 9.2.5 Friday, 04 October 2019

**Read:** Read Chapter 10 on pages 441–471 (31 pages) in *Concepts of Programming Languages*.

**Discuss:** Mechanisms for calling subprograms, creating local variables, returning control and computed values to the caller.

**Write:** You will work with your classmates to answer the questions on the mid-term examination. You will be free to use books and on-line resources. You will earn full credit on the mid-term examination if you participate fully in the exercise.

Project presentation 1 due.

**Return to calendar.**

### 9.3 Week 2

#### 9.3.1 Monday, 07 October 2019

**Read:** Read Chapter 11 on pages 473–522 (50 pages) in *Concepts of Programming Languages*.

Learn a little about the Scala programming language by reading on [Scala](#).

**Discuss:** Support for abstract data types—encapsulation, information hiding, templates and generics (parameterized abstract data types), constructors and destructors, namespaces and packages.

**Write:** Write answers to Problems 16 and 17 on page 519.

**Return to calendar.**

### 9.3.2 Tuesday, 08 October 2019

**Read:** Read Chapter 12 on pages 523–574 (52 pages) in *Concepts of Programming Languages*.

**Discuss:** Object-oriented programming with several different languages.

- Inheritance and polymorphism.
- Multiple inheritance.
- Allocation and deallocation of memory for objects.
- Dynamic binding.

**Write:** Write answers to Problems 24 and 26 on page 573.

**Return to calendar.**

### 9.3.3 Wednesday, 09 October 2019

**Read:** Read Chapter 13 on pages 575–628 (54 pages) in *Concepts of Programming Languages*.

**Discuss:** Concurrency, support for concurrency at several levels in hardware and software, problems that can arise with concurrent processing (race conditions, deadlock, starvation), mechanisms for synchronizing concurrent processes (semaphores, monitors, message passing), support of concurrency in several languages (including threads in Java).

**Write:** Write answers to Problems 7 and 8 on page 628.

**Return to calendar.**

#### 9.3.4 Thursday, 10 October 2019

The class will meet from 9:00 a.m. to 9:45 a.m. today. Professor Tabak will depart at 9:45 a.m. He will lead a workshop in Pompano Beach, Florida for teachers of Advanced Placement courses.

**Read:** Read Chapter 14 on pages 629–669 (41 pages) in *Concepts of Programming Languages*.

**Discuss:** Classes that model exceptions and events. Exception handlers and event listeners.

**Write:** Write an answer to Problem 13 on page 668.

**Return to calendar.**

#### 9.3.5 Friday, 11 October 2019

Professor Tabak will be in Florida on this day.

**Read:** Read Chapter 15 on pages 671–725 (55 pages) in *Concepts of Programming Languages*.

**Discuss:** Functional programming and functional languages.

- Church’s lambda calculus (theoretical foundation).
- reasons for favoring functional programming.
- abstraction, application, and composition of functions.
- recursion and tail recursion.
- symbols, atoms, lists, and S-expressions.
- LISP, Scheme, and more recently developed languages.

**Write:** Write answers to Problems 8 and 9 on pages 723–724.

Project presentation 2 due.

**Return to calendar.**

## 9.4 Week 3

### 9.4.1 Monday, 14 October 2019

**Read:** Read Chapter 16 on pages 727–761 (35 pages) in *Concepts of Programming Languages*.

**Discuss:** Predicate calculus, unification and resolution, logic programming and its applications, the Prolog language.

**Write:** Write an answer to Problem 5 on page 759.

**Return to calendar.**

### 9.4.2 Tuesday, 15 October 2019

**Read:** There is no reading assignment today.

**Discuss:** Review and evaluate the course.

**Write:** There is no writing assignment today.

**Return to calendar.**

### 9.4.3 Wednesday, 16 October 2019

**Read:** There is no reading assignment today.

**Discuss:** Solutions to problems on the final examination.

**Write:** You will work with your classmates to answer the questions on the final examination. You will be free to use books and on-line resources. You will earn full credit on the final examination if you participate fully in the exercise.

Project presentation 3 due.

**Return to calendar.**

#### 9.4.4 Thursday, 17 October 2019

**Block Break** We will not meet today.

There is no work due today.

**Return to calendar.**

#### 9.4.5 Friday, 18 October 2019

**Block Break** We will not meet today.

There is no work due today.

**Return to calendar.**