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# CSC315 Programming Language Concepts

Professor. Leon Tabak

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## Calendar

	MON	TUE	WED	THU	FRI
<b>Week 1</b>	28	29	30	01	02
<b>Week 2</b>	05	06	07	08	09
<b>Week 3</b>	12	13	14	15	16
<b>Week 4</b>	19	20	21	22	23

## Our meeting times and places

My office is in Law 206C.

You may call me in my office at (319) 895 4294.

You may send me electronic mail at <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 laboratory in the mornings and in the classroom in the afternoons.

	Where	When
<b>Classroom</b>	Law Hall 109	1:15 p.m. to 2:30 p.m.
<b>Laboratory</b>	Law Hall 113	9 a.m. to 11 a.m.

## Textbooks

*Concepts of Programming Languages* [<http://www.pearsonhighered.com/sebesta/>] . Tenth Edition. Robert W. Sebesta. Addison-Wesley. Copyright © 2012. New York . 978-0-13-139531-2.

## 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. That'll be me some of the time, but it will be you some of the time too.

Did you bring a computer to class? Good. We will find ways to use your computer to accomplish the goals that we have set for ourselves in this course.

Now, please turn off the games. Close windows that are displaying news, electronic mail, and scores from the world of sports. Put the earbuds away.

- Please do not interrupt and distract the class by late entries, early departures, or by coming less than fully prepared to make your contribution to the class. If you anticipate a need to be absent or late, please notify me in advance of your anticipated absence. With all due respect to Admiral Grace Murray Hopper, excuses after the fact will not succeed.
- Tastes in music vary. Some people need more quiet than others in order to concentrate. I and your classmates would like to know that we, and not an MP3 player, have your attention when we speak to you. Keep these things in mind.
- Please refrain from bringing food or drink into the classroom or laboratory.
- Please refrain from the use of vulgar language.
- Please do not wear clothing or buttons that bear vulgar messages or images. Indeed, it is best to avoid wearing messages of any kind. Outside of the classroom, I will be happy to discuss with you any issue of the day. Inside of the classroom, it is rude to broadcast opinions unrelated to our subject because our work there does not allow anyone else to respond to your challenge (or to decline your invitation to debate).
- Please keep shoes on and hats off in the classroom. Leave your pajamas and bathrobe at home. Test the limits of social conventions if you must during the more than 80% of the week during which we shall be apart.

- Please demonstrate your love for your fellow man or woman with kind words and gracious gestures but delay other physical expressions of tenderness until our work is done and you have found a more private setting.

## 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 [<http://www.cornellcollege.edu/academic-support-and-advising/disabilities/academic-accommodation/index.shtml>].

Please also familiarize yourself with the college's statement on academic honesty [<http://www.cornellcollege.edu/registrar/pdf/Academic%20Honesty.pdf>] and its policies for dropping courses [<http://www.cornellcollege.edu/registrar/gb-resources-student/add-drop.shtml>]

## Goals

We will give special attention to three of Cornell College's Educational Priorities and Outcomes: [<http://www.cornellcollege.edu/registrar/academic-catalogue/index.html#p=8>]

- 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.

## Grades

Develop an application for the Web using the JavaScript, Python, or Ruby 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
	Project presentation 0. (Friday, October 2)	20
	Project presentation 1. (Friday, October 09)	20
	Project presentation 2. (Friday, October 16)	20
+	Project presentation 3. (Wednesday, October 21)	20
		100

## Daily schedule

### Monday, September 28

#### 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.

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### Tuesday, September 29

#### 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.

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## Wednesday, September 30

### 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* (on reserve in the library), by reading the help available in the DrScheme program, and by reading on the DrScheme [<http://www.plt-scheme.org>] 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.

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## Thursday, October 01

### Read.

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

### Discuss.

Professor Tabak will be in Chicago today. Please work with your classmates in the laboratory. Help one another with your projects. Discuss the assigned reading with one another.

Components of a compiler, parsing algorithms.

## Write.

Write answers for Problems 4 and 6 on page 200.

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## Friday, October 02

### 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.

Project presentation 0 due.

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## Monday, October 05

### 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* [<http://www.ruby-lang.org>]

### 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 the top.

## Tuesday, October 06

### 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.

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## Wednesday, October 07

### 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.

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## Thursday, October 08

### 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.

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## Friday, October 09

### 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.

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## Monday, October 12

### 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 [<http://www.scala-lang.org>].

## 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.

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## Tuesday, October 13

### 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.

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## Wednesday, October 14

### 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.



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## Thursday, October 15

### 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.

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## Friday, October 16

### 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.

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## Monday, October 19

### 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.

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## **Tuesday, October 20**

### **Read.**

There is no reading assignment today.

### **Discuss.**

Review and evaluate the course.

### **Write.**

There is no writing assignment today.

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## **Wednesday, October 21**

### **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.

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## **Thursday, October 22**

### **Read.**

There is no reading assignment today.

**Discuss.**

We will not meet today.

**Write.**

There is no writing assignment today.

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**Friday, October 23**

**Read.**

There is no reading assignment today.

**Discuss.**

We will not meet today.

**Write.**

There is no writing assignment today.

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