


Fall Term 2023 - Full Term · CSCI E-10b 1 ·  Print · Last updated Jul 21, 2023**Harvard Extension School**

HARVARD DIVISION OF CONTINUING EDUCATION

CSCI E-10b***Introduction to Computer Science***

Fall Term 2023

Course Information

CRN: 16971**Section Number:** 1**Format:** Online**Credit Status:** Undergraduate, Graduate, Noncredit**Credit Hours:** 4

Course Description: This course is a continuation of CSCI oriented programming using Java, one of the world's most popular. We begin with the implementation of abstract data types using encapsulation of procedures and data, inheritance hierarchies, and different object types. Other topics include string processing, ArrayLists, Vectors, and linked lists; streams and file I/O; recursive threads and event-driven programming; and graphical user classes. The course concludes with an introduction to RISC of compilers and operating systems. Programming exercises in a Linux environment. Students can count two of the following

E-10b, and CSCI E-50—toward a degree. They may not co

Instructor Information & Office Hours

Prerequisites: CSCI E-10a, or the equivalent experience in a
 Henry Leitner
 such as C, C++, or Java.

Preferred Pronouns: he, him

Email: leitner@g.harvard.edu

Phone: 617-495-9096

Office Hours:

by appointment

Section Meetings

Each student is expected to attend a semi-mandatory 60-75 week, beginning the week of September 11. During the first 4), we will hold an optional section meeting, primarily for stu elementary Java, including a brief introduction to writing Java javac. This initial meeting will probably take place via live we September 13 at 7:15 pm using Zoom. Check our website to Sections will be taught by David Habermehl, who will also s TA".

Course Goals / Learning Outcomes

In CSCI E-10b you will write larger and more complex progr (at least for the graduate-credit students) a significant origin problem sets will involve programming on a cloud-based Ur cs50.dev using the 1.8 (or greater) implementation of the Ja own personal computer for much of the course work, since

through the C++ (C++ and related topics, such as event-handling and GUIs) and covered also touch on such data structures as singly linked-lists and implement sets. The main emphasis of CSCI E-10b is on learning the principles of object-oriented programming (OOP), which includes the design and implementation of abstract data types (ADTs) such as stacks and queues. After a quick review of the structure or "architecture" of a typical digital computer, including recursive processes, inheritance mechanisms and interface to file and stream I/O. We then turn our attention to the design

Mode of Attendance & Participation Policy

There are no scheduled class meetings (except for a midterm will be conducted by Dr. Leitner, live via Zoom), as well as live pre-recorded videos of course content are available for you to keep up with posted weekly deadlines for assignments and

Graduate Credit Requirements

Additional required problems on the various homework assignments and project.

Grading & Grade Definitions

Graduate-credit students:

0% Skills Check

50% Problem Sets

15% Midterm - DUE: November 1 to November 2

10% Term Project - DUE: December 17

0% Skills Check

25% Final Exam - DUE: December 20 to December 21

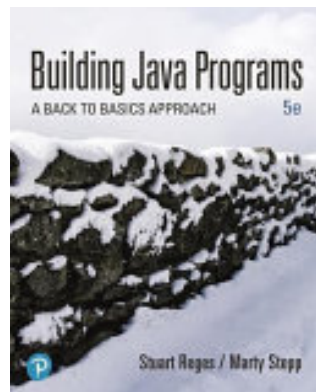
50% Problem Sets

17% Midterm - DUE: November 1 to November 2

30% Final Exam - DUE: December 20 to December 21

0% Graded Extra Credit

Course Materials



Building Java Programs

ISBN: 9780135471944

Authors: Stuart Reges, Marty Stepp

Introduces new concepts and syntax ensuring students are thoroughly prepared. Through the first four editions its back-to-basics approach has prepared students for the 5th Edition has been extensively updated with integration, improved loop coverage, studies, examples, updated collections, self-check and programming exercises, and programming projects.

Publisher: Pearson

Publication Date: 2019-01-01

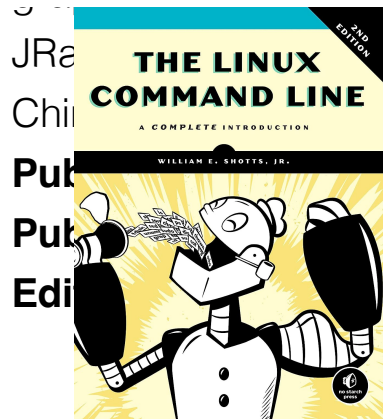
Edition: 5th

semi-required

MIPS Assembly Language Programming

ISBN: 978-0131420441

Authors: Robert I. Britton



The Linux Command Line (2nd Edition)

ISBN: 978-1593279523

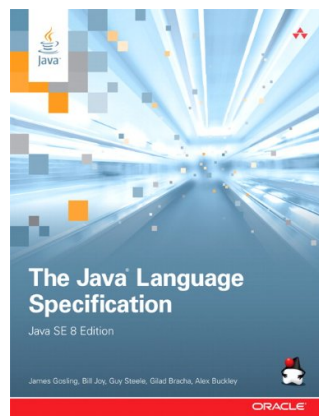
This book takes you from your very first steps to writing 22 full programs in Bash, the most popular shell. Along the way you'll learn the time-tested techniques of experienced, mouse-driven users: environment configuration, command-line editing, regular expressions, and more.

Publisher: No Starch Press

Publication Date: 2019

Edition: 2nd

The book is available for a free PDF at <http://linuxcommand.org/tlcl.php>



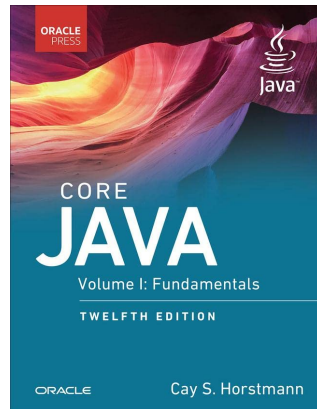
Java Language Specification, Java SE 8 Edition

ISBN: 978-0133900699

Authors: James Gosling, Bill Joy, Guy Steele, Gilad Bracha, Alex Buckley
Written by the inventors of the technology, The Java Language Specification, Java SE 8 Edition is the definitive reference for the Java programming language.

The book provides complete, accurate information about the Java programming language. It fully describes the language added in Java SE 8, including lambda expressions, type annotations, and default methods. The book also includes detailed information about the practical behavior of compilers.

Publisher: Addison-Wesley Professional



Publication Date: 2014
ISBN: 978-0137673629

Authors: Cay Horstmann

This first of two volumes offers in-depth programming, including object-oriented collections, lambda expressions, concurrency programming. Classic material for those who need it. This edition's switch enhancements, records, package sealed classes, and more.

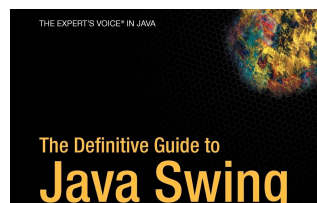
- Master foundational techniques for writing superior Java code
- Leverage the power of interfaces and inner classes
- Harden programs through effective debugging
- Write safer, more reusable code
- Build cross-platform GUIs with

Publisher: Oracle Press

Publication Date: 2021

Edition: 12th

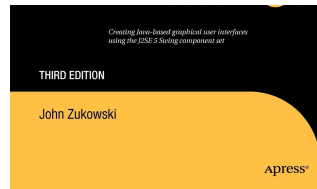
Supplementary reading



The Definitive Guide to Java Swing

ISBN: 978-1590594476

Authors: John Zukowski

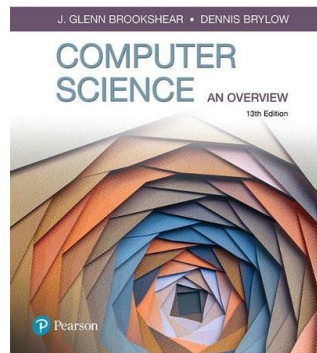


The book by Zukowski also provides book with two outlines and distill an overview of Swing architecture, GUI Model-View-Controller architecture, Components, and Swing menus and choices and more.

Publisher: Apress

Publication Date: 2005

Edition: 3rd



Computer Science: An Overview

ISBN: 978-0134875460

Authors: Glenn Brookshear and D

Provides a bottom-up, concrete-to-can build upon to see the relevance computer science courses. Its core language are accessible to students encouraging a practical and realistic

More than 1,000 questions and exercises and Social Issues questions reinforce

Publisher: Pearson

Publication Date: 2018

Edition: 13th

supplementary reading

Academic Integrity Policy

You are responsible for understanding Harvard Extension School's [Academic Integrity Policy](#) and how to use course resources available. Violations of

[integrity](#) and how to use sources responsibly. Violations of academic integrity by another student or any other source is a form of academic dishonesty and is taken seriously. Visit [Using Sources Effectively and Responsibly](#) at [Sources](#) to review important information on academic citation.

Writing code is similar to academic writing in that when you use code or examples found online or in texts, this is not the case in a program substantially from the work of another. **Writing Code.** While it may be common practice in non-academic settings to copy code produced as coursework by other students, this is not the case in a program substantially from the work of another. Paraphrasing without proper citation is just as dishonest as copying code. A program can be considered plagiarized even if it was written by you in a previous term; nor may you provide work for other students. Any line of the source.

Accessibility Services Policy

The Division of Continuing Education (DCE) is committed to providing a high-quality educational experience for all members of the community. The [Accessibility Services Office \(ASO\)](#) is responsible for providing accommodations to students with disabilities. Students must request accommodations through the ASO. Instructors cannot grant accommodations without ASO approval. It is imperative to be in touch with the ASO as early as possible in the provision of accommodation.

DCE takes student privacy seriously. Any medical documents or information sent to the ASO if a substantial accommodation is required. If you have a medical condition, illness, notify your instructor and/or TA but do not include a request, accept, or review doctor's notes or other medical documents. For more information, email accessibility@extension.harvard.edu.

Publishing or Distributing Course Materials Policy

Students may not post, publish, sell, or otherwise publicly distribute course materials without the written permission of the course instructor. Such materials include the following: lecture notes, lecture slides, video, or audio recordings, assignments, exams, sets, examinations, other students' work, and answer keys.

distribute course materials without written permission, whether answers or otherwise, may be subject to disciplinary action, withdraw. Further, students may not make video or audio recordings without written permission of the instructor.

Course Schedule

Week 1: September 5 to September 8

- Programming language, Java, and Object-Oriented Programming
- Basic Programming Concepts, Identifiers, Strings, Unicode
- Control Flow in Java
- Primitive Data Types
- Single-Dimensional and Two Dimensional Arrays

Week 2: September 11 to September 15

- Class `java.lang.String` and `java.lang.StringBuilder`, Other String Classes
- Enumerated Types
- Autoboxing, Variable Length Arguments
- Indefinite Arguments Solution
- The New "For Each" Loop
- Keyboard Input, Scanner Class

Week 3: September 18 to September 22

- Scanner Class and Regular Expressions
- Formatted Output Using `printf`
- Simple Recursive Methods
- Recursion in Koch Snowflake
- When to Use Recursion

- Numbers as Character Strings
- Tower of Hanoi Example
- Binary Search Algorithm Done Recursively
- Classes and Objects Revisited

Week 4: The Movie Class and Symphony Class September 25 to September 29

- What Goes in a Class Definition?
- Non Base-10 Number Systems
- Inheritance and Abstract Classes
- Extending an Abstract Class, Shadowing, the Class C
- Abstract Classes

Week 5: October 2 to October 6

- Review of Objects and Abstract Classes
- Abstract Methods
- 'Final' Variable
- Scoping Visibility
- Placing a Piece on a Chessboard
- Constructors and Inheritance: the Super Constructor
- File Input and Output, Drive Storage, Using Java.io

Week 6: October 9 to October 13

- Review: File I/O and the Main Method
- Files and Directories Example
- Useful Methods of File Objects

- Useful methods of File Objects
- Read URL
- FileSystemCrawl Challenge
- Input tokens
- Reading Files, File Paths
- File Input Challenge
- Exceptions and the Throws Clause
- Closing a File
- Easy File I/O
- Error Handling: Throwing and Catching Exceptions
- SubtleError Challenge

Week 7: October 16 to October 20

- Catching Multiple Exceptions
- Creating Your Own Exceptions
- [Un]checked exception
- PRIMITIVE text file input
- DataInputStream and DataOutputStream
- Array Difficulties: Inserting, Growing
- ArrayLists, Methods and Demo
- Using Vectors

Week 8: October 23 to October 27

- Catching Multiple Exceptions
- Creating Your Own Exceptions
- [Un]checked exception
- PRIMITIVE text file input

Week 9: October 30 to November 3

- DataInputStream and DataOutputStream
- Array Difficulties: Inserting, Growing
- Practice Midterm Review, live Zoom meeting on October 31
- ArrayLists: Methods and Demo
- Actual Midterm Exam (open-book), November 1-2
- Using Vectors

Week 10: November 6 to November 10

- java.awt.BorderLayout and other Layout Managers
- Partial Class Hierarchy, Color Class, Swing Component
- Event-Driven Programming:
 - Event-Listener Examples
 - Window Events
 - java.awt.event Classes, Anonymous Inner Class
 - Mouse Events
- The Graphics Object: Drawing a Circle, Painting Canvas

Week 11: November 13 to November 17

- Fonts, Testing a Theorem with Graphics
- JSlider Controls, JScrollPane, JTextArea, JFileChooser
- Simulation
- The Queue Class
- Animation
- Menus

- GUI Examples Using Games
- Hangman: A Guessing Application

Week 12: November 20 to November 24

Week 13: November 27 to December 1

- Sets, Set Class, Set Operations
- Limitations of Arrays, Revisited.
- Set Intersections and Unions
- Linked-Lists
- Re-Implementing the Queue Data Structure with a Link

...and the beginning of Unit 8:

- Computer Architecture: Managing Complexity
- Machine Architecture: MIPS Processor Family
- Number Systems
- Binary Arithmetic
- Signed Integers in Binary
- Hexadecimal, Data Sizes
- MIPS Registers

Week 14: December 4 to December 8

- MIPS Registers
- Two Instructions in MIPS
- MIPS Programming with QtSpim
- More Basic Instructions

- Examples of Directives
- Addressing Memory and ABS
- Branch Instructions and Decision-Making Examples
- Fetch/Execute Cycle and Subroutines: Euclid's Algorithm
- Setting Break Points to Examine Code Execution
- Subroutine Linkage

Week 15: December 11 to December 15

- Pointers and Offset/Displacement Addressing for LOA
- Converting a String to a Number and Debugging
- Register Conventions
- Caller-Callee Protocol
- Computing the Fibonacci Sequence in MIPS
- Assembly to Machine Language
- RISC vs. CISC
- Pipelining
- Interpreter Compiler
- Grammars

Week 16: December 18 to December 22

- Practice Final Exam Review, live Zoom meeting on Dec 19
- Actual Final Exam (open-book), December 20-21

Final Exam

Final exam will be a 2-hour online, open-book affair.



English (United States) ▼

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