

CS104: Programming for Engineers

Calvin University

Fall 2022

Course Instructor: [Prof. Derek Schuurman](#)

Textbook: We will be using an online text from ZyBooks for readings, homework, and labs. The text can be subscribed to at learn.zybooks.com using the code: “CALVINCS104SchuurmanFall2022”

Course organization: Each week will include a lecture (Tuesdays) and a lab session which will be held in the Systems Lab (SB337). Lab monitors will be available to help and answer coding questions on Monday & Thursday evenings from 7–9pm in SB354 throughout the semester.

Catalog Description

An introduction to problem solving and program design for engineering students. Coverage includes algorithmic thinking, problem decomposition, types and expressions, functions and parameter passing, control structures, I/O, simple data structures, and classes (including the use of inheritance).

More Specifically

This course serves as an introduction to computer programming, an important skill in many areas of engineering. Computer programming requires careful thought and a great attention to detail but can be a creative and rewarding activity. Students will learn to design, code, debug, test, and document well-structured programs using the Python programming language. Weekly lectures will be supplemented with hands-on exercises in the lab and through additional practice exercises. Moreover, this course includes a brief introduction on how faith relates to computer technology.

Prerequisite: Mathematics 132 or 171, which may be taken concurrently.

Student Learning Objectives

Students successfully completing this course will demonstrate that they can:

- Convert an abstract problem into an executable series of statements in Python
- Use the basic control structures in Python, including for loops, while loops, and conditional statements
- Create useful and correct functions for abstraction of functionality
- Use common Python data types, including strings and lists
- Use object-oriented programming techniques, including member functions, data encapsulation, constructors, accessors and mutators
- Learn about ways that faith informs work in computer technology

Readings and Assignments: Each week has assigned readings and activities from the online textbook. Each weekly assignment is weighted equally. Students are required to complete each week’s readings and associated participation and challenge activities by Saturday at 11:59PM (unless otherwise specified). Only those participation and challenge activities completed on time will receive credit. However, even if they are completed late, students are encouraged to complete all the assignments for practice. *Students may discuss aspects of the assignments with each other, but everyone must do their own work!*

Labs: There will be weekly labs which should be completed in pairs. See the lab companion documents posted in Moodle for additional information about each lab. Due dates will be Mondays at 11:59PM. Labs that are submitted late will receive at most 75% full credit. Labs that are more than one week late will not receive credit, although students are still encouraged to complete them for practice.

I promise to provide structure, accountability, encouragement, and resources, but students will need to do their own work. Computer programming is a skill that is developed through *practice*. In addition to the homework and labs there will be links to additional practice materials on Moodle.

Grading: In addition to labs and online assignments there will be periodic low-stakes quizzes given at the start of lab times (see the schedule below). The lowest quiz grade will be dropped. There will also be two tests, and one final exam. Grading queries must be raised within one week of the grades being posted and no work will be accepted after the last day of classes.

Quizzes	10%
Labs	30%
Weekly Zybook participation and challenge activities	15%
Test 1	10%
Test 2	10%
Final exam	25%

Attendance: We don't grade on attendance. If you must miss a lab or a class for any reason, please let me know and then consult Moodle to access the materials you missed.

Laptop policy: One of the concepts introduced at the beginning of this course is that *technology is not neutral* – it embeds a bias. Consequently, technology in the classroom changes things. Studies suggest that [internet-enabled electronic devices in the classroom reduces student performance](#). Because of this, smartphones use will not be permitted during labs and lectures and use of laptops must be focused on taking notes and/or following class materials.

Course Outline: A *tentative* schedule for the course is shown below. The textbook material should be read since not all the material in each chapter can be covered in detail during lectures.

Week	Textbook	Topics	Labs	Assignments
Week 1 Aug. 29	1.1, 1.9 18.1	Introduction: A Christian perspective of computing Introduction to Python	Lab 1	Watch: Technology and the Biblical Story Assignment 1
Week 2 Sept. 5	1.2-1.6, 1.10 2.1-2.7	Variables, constants, input and output, types, type conversion, arithmetic expressions	Lab 2 Quiz 0	Assignment 2
Week 3 Sept. 12	2.8-2.10, 3.1-3.2 18.2	Modules, Turtle graphics, characters and unicode, strings, lists Technology and Creation	Quiz 1 Lab 3	Assignment 3
Week 4 Sept. 19	4.1-4.5 5.1-5.4	Branching and if-else statements, conditions, while loops	Quiz 2 Lab 4	Assignment 4
Week 5 Sept. 26	Review	POGIL exercise	Test #1	No assignment
Week 6 Oct. 3	5.5-5.10 18.3	For loops; break and continue statements Technology and the Fall	Lab 5	Assignment 5
Oct. 10	Fall break	No class	Lab 6 POGIL	
Week 7 Oct. 17	6.1-6.7, 6.9	Functions: parameters, arguments, local variables, return statement	Quiz 3 Lab 7	Assignment 6
Week 8 Oct. 24	7.1, 7.3-7.5 18.4	Strings: concatenation, slicing, comparison, string methods Redemption and Responsible Technology	Quiz 4 Lab 8	Assignment 7

Week 9 Oct. 31	Advising break	No class	Lab 9 POGIL	
Week 10 Nov. 7	8.1-8.7	Lists: operations, slices, methods, aliasing, tuples	Quiz 5 Lab 10	Assignment 8
Week 11 Nov. 14	Review	POGIL exercise	Test #2	No assignment
Week 12 Nov. 21	12.1-12.3 15.1-15.3	Files: reading, writing, and interacting with files Plotting with matplotlib	No Lab <i>Thanks- giving</i>	Assignment 9 (due date extended for holidays)
Week 13 Nov. 28	9.1-9.3, 9.5, 9.6, 9.8.1	Introduction to classes and object- oriented programming (OOP)	Quiz 6 Lab 11	Assignment 10
Week 14 Dec. 5	13.1-13.4 18.5	Object oriented programming, inheritance, and polymorphism Technology and the Future	No Lab	Assignment 11
Final Exam (see the Calvin fall exam schedule for your section)				

Communication outside of Class Times

Please contact me using Teams, which will be my preferred way of communication outside the classroom. Note that normally I am not available on Sundays. Important announcements will be sent via Calvin email, so students should check their Calvin email on a regular basis. See the times posted on Moodle for office hours.

Accommodations

Calvin University is committed to providing access to all students. If you are a student with a documented disability, please notify a disability coordinator in the Center for Student Success. If you have an accommodation memo, please come talk to me within the first two weeks of class. Tutors are available for all students by contacting the Center for Student Success or visiting <https://calvin.edu/go/tutor>.

Intellectual Property

A key academic virtue is honesty, and this also applies to the lectures, textbook, slides, handouts, audio/visual materials, or any other content produced by a faculty instructor. While students may reproduce course content to enhance their own learning, they may not share that content with audiences outside the course without the express permission of their faculty instructor. In particular, students may not share quiz, test, or exam content with other class sections.

Netiquette

When you engage your professor or fellow students online, remember there is an image-bearer of God at the other end of the communication. Respect the time of both your professor and fellow students through judicious use of electronic communications.

Hospitality

It is my intent that students from all backgrounds will be well served in this course. Join me in creating a class that respects everyone in it, including those with programming experience as well as those who are new to coding.