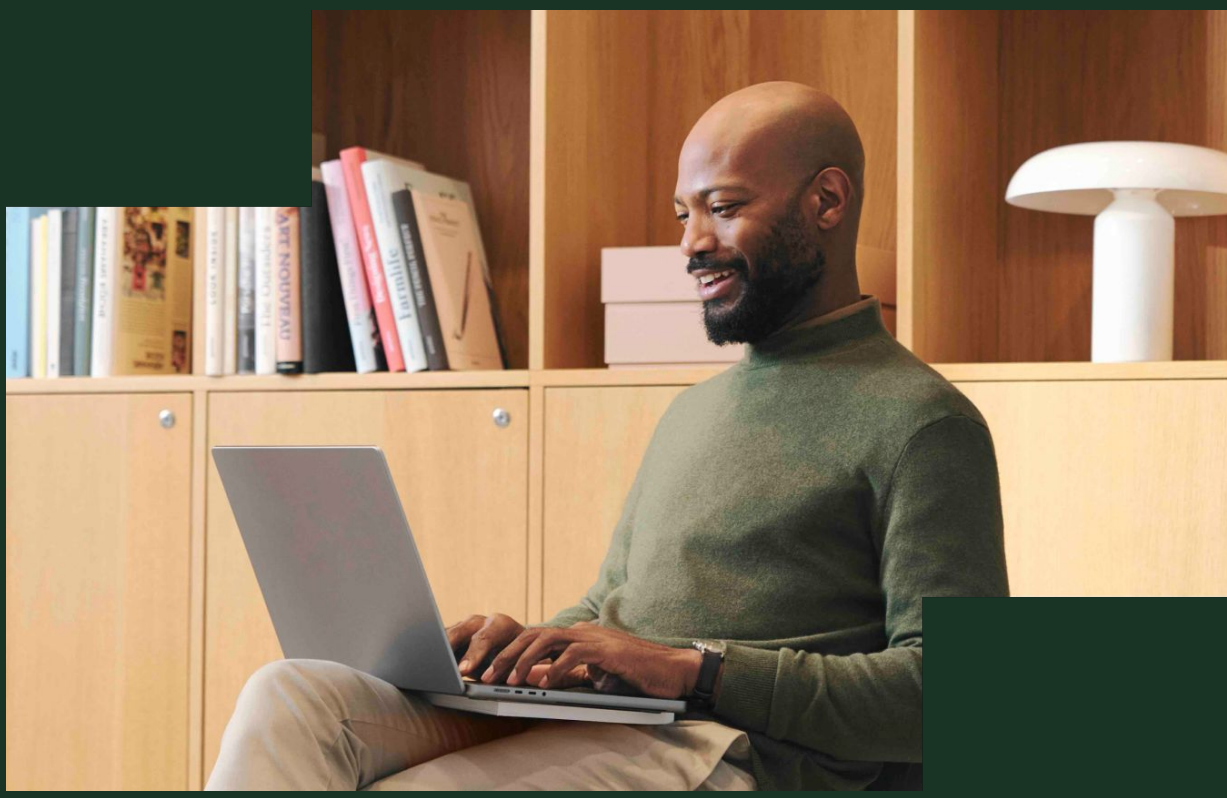


Software Engineering

Master the art of coding. Transform your ideas into elegant solutions and robust applications. Become the architect of tomorrow's digital innovations.

Remote Full time 8 months

Program *principles*

Fundamentals First

Programming languages and technologies change frequently. Fundamentals don't. Our approach is not to quickly cover many frameworks simply for the sake of adding lines to your CV. Rather, we concentrate on providing a thorough and deep-rooted understanding of the core principles of programming and technology. With these fundamental skills, you'll be better equipped to smoothly adapt and shift to emerging technologies.

Hands On

The best way to learn to code is by doing. In our program, you will write *a lot* of code. Once a week, an instructor will review your code, providing personalized feedback. Through this continuous cycle of practice and feedback, you effectively evolve into a proficient programmer.

Personal Pace

Each student learns at their own style and pace. Our default pace is relatively slow, to ensure all students have time to practice and absorb the fundamentals. For those who wish to move faster, we offer a fast-track option.

Industry-Relevant Curriculum

As part of our ongoing market research and monitoring of open job listings, we regularly consult with team leaders and recruiters to identify opportunities and better understand industry needs and emerging trends. This ensures our syllabus is in a state of continuous iteration and evolution.

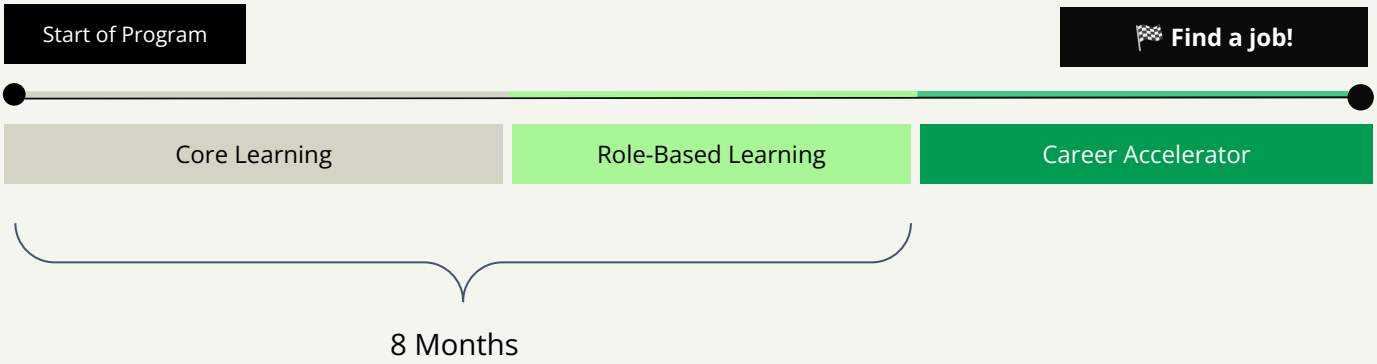
Expert Mentors

You'll regularly meet with your private mentor. Our mentors are industry professionals who will provide tutoring in programming, support your learning habits, and guide your journey into software engineering.

Role Based Learning

During the first few months, we'll assess your strengths and assign you a learning track tailored to your designated role in the industry. In the final phase of your learning, you'll master the skills and create a project specifically for that role.

Program *structure*



Core Learning

The first six learning units make up our core curriculum - the absolute essentials that every developer should have. If you take the fast track, you will be able to complete this phase in four months.

Role-Based Learning

After assessing your strengths, abilities and passions during Core Learning, we will choose - together with you - a learning track tailored to your designated entry role in the industry. During this part of your learning, you'll master the most up-to-date technologies and create your first real portfolio project.
During this phase, you will also work on your career readiness - Optimizing your Resume, LinkedIn and GitHub profiles and practicing your interviewing skills.

Career Accelerator

During the Career Accelerator, you will be actively looking for your first full-time role in the industry. We will be with you in every step of the way - making sure you apply to the right jobs, helping you with interview prepping for *every* interview and keep polishing your skills and portfolio projects.
For most students, The Career Accelerator will take place after the official duration of the program (8 months). If you are able to go at a faster pace, you'll be able to start the Career Accelerator sooner.

Program *highlights*

Career Track

All throughout the program, we will spend time preparing you for job searching in the field of Software Engineering. We'll work on your "elevator pitch", build extensive online profile including Resume and LinkedIn and GitHub profiles, and prepare you for the tech interview process.

Group Hackathons

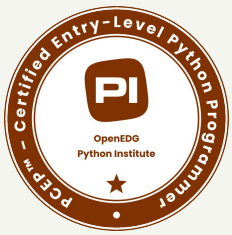
Every few months, we pause our regular schedule to host a special event where we work in groups on real-life projects. During these events, we learn how to work as a team, divide responsibilities, and also remind ourselves that programming is not only educational but also a lot of fun!

Interview Preparation

Master your industry technical proficiency and your personal interviewing skills through taking part in live mock-interview simulations and receiving insightful, personal feedback from industry experts.

Industry Certifications

Within the advanced stages of our program, you'll have the opportunity to attain additional certificates with our dedicated mentor guidance, support, and preparation.



PCEP™ – Certified Entry-Level Python Programmer (optional)

PCAP™ – Certified Associate Python Programmer (optional)

AWS Certified Cloud Practitioner (optional)

ISTQB® Certified Tester Foundation Level (optional)

Table of contents

SE 101

Tech Fundamentals

During the first unit of our program, we will lay the groundwork with the essential fundamentals needed for any tech career. You will become familiar with your operating system, learn the basics of programming with Python, develop algorithmic thinking, and complete your first projects. Another major focus of this unit is learning how to learn. We will discuss how to establish effective learning habits and hear from industry experts and Masterschool graduates about their journeys to new careers.

Concepts covered

- Python Fundamentals - Learn the basics of programming, including syntax, data types, and simple operations.
- Algorithmic Thinking - Develop problem-solving and logic-building skills using algorithms.
- Looping - Learn how to create repetition in your code using for loops.
- Intro to HTML + CSS - We'll introduce the basic building blocks of web pages.
- Strings and Lists - Learn about two sequential data types in Python.
- Functions - Creating reusable code blocks and understanding how functions work.

SE 102

Intermediate Python

In this unit, we will take a deep dive into the Python programming language. We will learn about new data structures, loops, and focus on how to break down a big problem into smaller units using functions. During this Unit we will create our offline workspace with PyCharm and learn how to use the Python Interactive Shell effectively.

Concepts covered

- Working with Offline IDE: Learn to set up PyCharm and utilize an Integrated Development Environment for efficient coding and project management.
- Python Interpreter: Understand how to use the Python interpreter for executing scripts and experimenting with code snippets.
- Debugging: Master various debugging techniques using IDE tools and alternative methods to troubleshoot code effectively.
- Importing Modules: Learn to enhance functionality by importing and utilizing both built-in and third-party Python modules.
- Main and Functions: Understand the best practices for structuring code, separating logic into functions, and writing a coherent main function.
- Complex Types - Learn about more complex data types like dictionaries, tuples, and sets for sophisticated data handling.
- Loops: Explore the concepts and applications of while loops and nested loop structures for complex iterative operations.

SE 103

Advanced Python

In this unit, we'll focus on taking the next step from writing small algorithms to creating entire programs. We will introduce best practices for creating clean and well-documented code. You'll learn how to write resilient code with exception handling, and how to use Python to work with files and create complex data structures.

Concepts covered

- Coding Standards: Learn best practices for writing clean, readable code and effective documentation for maintainability and collaboration.
- Exception Handling: Master techniques to handle and manage exceptions in Python for robust and error-resistant programming.
- Nested Structures in Python: Understand the intricacies of nested data structures like lists of dictionaries, and how to manipulate them effectively.
- Working with Files: Gain skills in file handling, reading, and writing data to files in Python for data persistence and manipulation.

SE 104

Intro to Web

In this unit, we will learn how the web works, focusing on the three basic building blocks: the HTTP protocol, HTML, and CSS. Next, we'll learn how to use Python to retrieve data from online sources and APIs, analyze it, and extract the interesting parts. We will also cover source control with Git, which is essential for collaborating on and managing code today.

Concepts covered

- HTML + CSS - Dive deeper to HTML and CSS, the basics of web page structure and styling.
- Internet & HTTP : Explore the foundations of web technology and HTTP communications.
- JSON - Understand JSON format for data representation and exchange.
- API - Learn how to use APIs for dynamic and interactive applications.
- Version Control - Learn to track and manage code changes to collaborate effectively in software development using Git.
- Unit Testing with - Learn robust testing methodologies using pytest.

Technologies

- [x] Chrome Developer Tools
- [x] Postman
- [x] Requests module
- [x] Git commands
- [x] GitHub
- [x] Pytest

SE 105

OOP and Back-end apps

In this unit, we'll introduce the programming paradigm of Object Oriented Programming. Then, we'll create our very first web application. We'll learn about Flask, a widely used back-end framework in Python, and use it to build a CRUD (Create, Read, Update, Delete) application. Using HTML Templating, we'll create the front-end part of our web app.

Concepts covered

- Object Oriented Programming - Fundamentals of OOP paradigm, including its four foundational pillars.
- Properties and Magic Methods - Explore Python's special methods for custom behavior data objects.
- Web servers with Flask - Set up and manage web servers using the Flask framework.
- CRUD - Master the basics of data handling: Create, Read, Update, Delete in web apps.
- Flask routing and templating - Explore URL routing and HTML templating with Flask.
- Creating an API - Develop skills to build and deploy APIs using Flask.

Technologies

- ☑ Flask
- ☑ Jinja
- ☑ CSR and SSR
- ☑ REST API's

SE 106

Databases

In this unit, we'll learn how to create and work with databases. We'll start by learning the basics of Relational Database Design and SQL. Then, we'll learn how to design a database and query it using Python. Finally, we'll learn how to connect a web application to a database.

Concepts covered

- Intro to Databases - Fundamental concepts, uses, and exploration of different types of database systems.
- Relational Databases Basics - Understand the structure and principles of relational databases.
- SQL - Learn SQL language for database querying and management.
- ORM - Utilize SQLAlchemy for Object-Relational Mapping in Python applications.

Technologies

- [x] SQL
- [x] SQLite
- [x] SQLAlchemy

Role-Based Learning

During the next two units, you will master your personal learning track aimed at equipping you with the best experience to start interviewing for your designated entry role in the industry. This phase is about stepping out into the real world, where you'll create and deploy a real project and get ready to showcase your skills in interviews.

What you will achieve during Role-Based Learning

- ☑ **Mastery learning** - We will build upon your tech and programming fundamentals, and learn only the necessary and most up to date technologies in-demand today.
- ☑ **Your first Portfolio Project** - This part will be project led. The main goal is to experiment and create a real world project that you can later showcase in your profile and talk about in job interviews.
- ☑ **Career readiness** - During those two units, you will also spend time polishing your career profile - Resume, LinkedIn and GitHub profile. You will practice your interviewing skills - how to answer questions and how to present yourself to future employers.

Role-Based Learning (SE 107-109)

Back-End Engineering

Master the art of creating robust and secure APIs that handle big data. Create and deploy your own server-side project online, implementing database, authentication, data validation and testing. This track prepares you for various back-end positions in the market, making sure you work.

Concepts covered

- Flask API
- PostgreSQL
- Data Validation
- Input sanitization
- Cloud Deployment
- Cron jobs
- Server side tests

Technologies

- ☑ Flask API
- ☑ PostgreSQL
- ☑ JWT authentication
- ☑ GitHub Actions

Role-Based Learning (SE 107-109)

AI Engineering

Gain hands-on experience in the emerging field of Generative AI, mastering the integration of AI models with Python. Showcase your expertise by building and deploying an AI-powered back-end project, incorporating API integration with AI models, databases, and data preprocessing.

Concepts covered

- Fundamentals of AI and LLMs
- Prompt Engineering
- API Integration with AI Models such as ChatGPT and Gemini.
- Data Preprocessing and Embedding
- Persistent Context Management
- Working with Structured Output

Technologies

- ☑ OpenAI API
- ☑ Langchain
- ☑ Various LLMs
- ☑ Tokens Optimizations
- ☑ Texts Embeddings
- ☑ Streams

Role-Based Learning (SE 107-109)

Test Automation

Gain expertise in creating comprehensive and efficient testing solutions. Learn for the ISTQB certificate and understand the Fundamentals of Testing. Develop and implement automated testing solutions with Python using Selenium.

Concepts covered

- Fundamentals of Testing
- Functional Testing
- Test planning

Technologies

- [x] Selenium
- [x] DOM & XPath
- [x] pytest
- [x] GitHub Actions

Certificates

ISTQB® Certified Tester Foundation Level

Role-Based Learning (SE 107-109)

Front-End Engineering

Develop dynamic and responsive user interfaces using JavaScript and React. Use the most up-to-date technologies in web development. Create and deploy your own project, showcasing your ability to build professional-grade websites as a key part of your resume.

* This track will only be available for students who can keep up with the pack of our fast track.

Concepts covered

- JavaScript - DOM Manipulation, Async JS
- TypeScript
- Advances CSS (responsive design, media queries)
- Component Driven Development
- React
- Routing
- Styling Frameworks
- State Management

Technologies

- [x] JavaScript
- [x] TypeScript
- [x] React
- [x] Tailwind CSS

Career Acceleration to land your first *Software Engineering* role, and beyond.

During the Career Accelerator, you will actively search for your first full-time Software Engineering role. Our career advisors and interview prep specialists will be available to assist you at any time, helping you prepare for every interview and home assignment. Simultaneously, you'll continue to develop your skills and enhance your portfolio. Our only goal is to help you start your career as early as possible.

Career Guidance	We'll continue sharpening your "elevator pitch", help you adjust your resume for every job, create a job hunting strategy and monitor your activity in the job market.
Mastery Learning	Continuous mastery training to keep sharpening your skills and expanding your experience in the role you choose. You'll also add new parts to your portfolio project.
Interview Preparation	Master your industry technical proficiency and your personal interviewing skills through taking part in live mock-interview simulations and receiving insightful, personal feedback from industry experts.
Job Search Toolkit	Be a pro candidate by tracking your opportunities in real time, manage your various applications to make sure you never miss a chance.

Masterschool