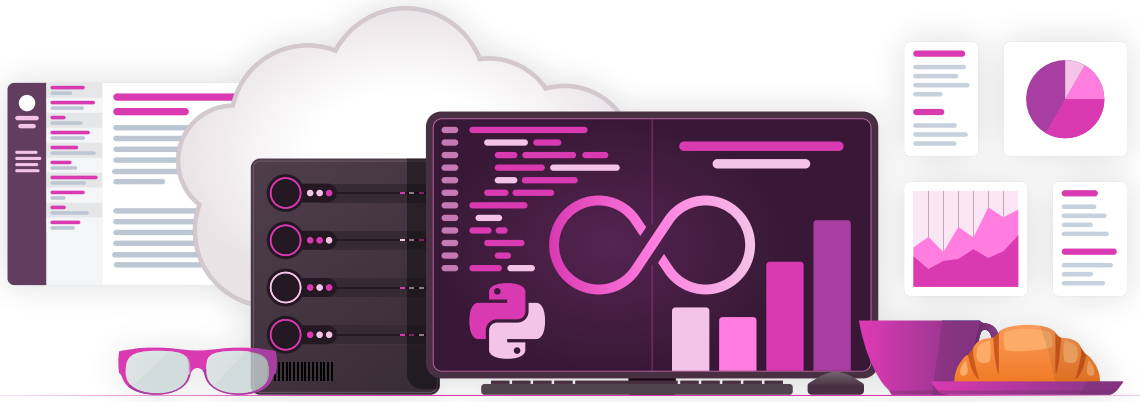
BOOTCAMP SYLLABUS



Back End, SQL, and DevOps with Python

Learn Python, data structures and algorithms
SQL, and DevOps

Last Updated: July 14, 2022

Overview

The three courses in this Bootcamp will cover the fundamentals of the **Python** programming language; the most popular database query language in the world: SQL; and introduce you to modern software engineering with DevOps.

You'll learn about **object-oriented programming**, **data structures**, and **algorithms**. Using the popular **PostgreSQL** database management system, you'll learn how to create powerful database queries and develop Python applications that connect to a database.

You'll get to know the **Agile** software development lifecycle; many **DevOps** tools and practices including **CI/CD** (continuous integration/continuous delivery), containerization with **Docker**, and deployment to cloud platforms such as **Google Cloud, Microsoft Azure**, and **AWS** (Amazon Web Service).

3 Courses

At a structured pace, with the support of a dedicated Instructor and classroom environment.

Project Portfolio

Develop a different personal project in each course that you can showcase in your portfolio at the end of the bootcamp.

Certificate

Showcase your accomplishment after each course and the end of the Bootcamp.

Python Fundamentals, Data Structures, and Algorithms

Commitment:
5 weeks of study,
10-20 hours/week

Python Language

Python syntax is simple to learn and the preferred language for beginners to start their journey into programming. Python is widely used to power complex applications, websites and data science related projects.

Data Structures

Data structures are the building blocks of all your coding projects, governing how data is organized, stored, and accessed. A data structure is a collection of data values, their relationships, and the functions or operations that can be applied to the data.

Algorithms

An algorithm is a set of instructions designed to perform a specific task. This can be a simple process, such as adding several numbers, or a complex operation, such as deciding the best route for a delivery truck.

About the Course

Python is one of the most popular programming languages in the world for back-end development as well as data science applications.

You'll learn about the fundamentals of programming using Python, then go on to learn different kinds of data structures using Python, as well as the programming approach called object-oriented programming.

You'll end this course by learning about the use of several common algorithms. At the end of each course week, you will complete an assignment in a workshop along with your instructor and cohort.

At the end, you will be able to

1. Code and run basic applications with the Python programming language.
2. Understand different data structures and when and how to use them.
3. Understand the difference between procedural and object-oriented programming.
4. Know how to use Big O notation to determine the complexity of an algorithm.
5. Use common searching and sorting algorithms.

WEEK 1

Bootcamp Kick-Off & Introduction to Python

In this module, you will first set up your development environment, including installing and learning to use the code editor Visual Studio Code, as well as the command line.

You will install Python and write your first lines of code. You will be introduced to programming concepts, including data types, variables, operators, conditionals, and while loops.

WEEK 2

For Loops and Functions

This module concentrates on Python for loops and functions. You'll start by learning how to use the Python for loop using the range() function.

Then you will learn about how to use functions in Python, including built-in functions, value-returning functions, and lambda functions.

You will learn about the concept of recursion and how to use it in a function.

Additionally, you will learn about Python packages and modules, and how to create them.

WEEK 3

Introduction to Data Structures

During this week, you will be introduced to the concept of data structures and what they mean in programming.

You will learn about the data structures in Python, including lists, tuples, strings, dictionaries, and sets, and how to create and use them.

You will practice common ways to manipulate data structures, including iterating through the values stored inside them, and adding and deleting data.

WEEK 4

Object-Oriented Programming and Data Structures

In this module, you will learn about the programming paradigm called object-oriented programming, which includes the concepts of objects, classes, instances, and inheritance.

With this knowledge, you'll continue on to learn about more concepts in data structures, including linked lists, stacks, and queues and how to implement and use them with Python.

WEEK 5

All About Algorithms

For the final module of this course, you will learn about the concept of algorithms in programming, and why they are important for improving the speed and efficacy of computations.

You will find out how to use Big O Notation to describe the complexity of an algorithm.

You'll learn about several of the most common algorithms: linear search, binary search, bubble sort, and quicksort, and how to implement them using Python.

SQL with Python

Commitment:
4 weeks of study, **10-20 hours/week**

PostgreSQL

PostgreSQL is a powerful, open source object-relational database system that uses and extends the SQL language combined with many features that safely store and scale the most complicated data workloads.

Docker

Docker is an open platform for developing, shipping, and running applications. Docker enables you to separate your applications from your infrastructure so you can deliver software quickly.

Flask

Flask is a web application framework designed to make getting started quick and easy, with the ability to scale up to complex applications.

About the Course

This course explores relational databases using PostgreSQL, a powerful open-source database management system based on SQL (Structured Query Language), which is the most popular database query language used in the world.

You will begin with an introduction to data modeling in a relational database, including the concepts of entities, attributes, and relationships; data integrity constraints; and more. You'll learn how to structure SQL queries, including CREATE, DELETE, and SELECT, as well as multi-table queries.

You'll also learn about database schema migrations, Object-Relational Mapping (ORM), Application Programming Interfaces (APIs), and the basic use of a Python framework named Flask to connect a Python application with a Postgres database. You'll round out your course by learning about database triggers, optimizations, and data visualization.

At the end, you will be able to

1. Understand the relational model for database management.
2. Know how to translate business requirements into an entity-relationship diagram.
3. Know how to translate an entity relationship diagram into a relational database architecture.
4. Understand how to use complex SQL queries to interact with a database.
5. Be able to create an application using Flask and Python and connect it to a PostgreSQL database.
6. Have experience working with containerization technology, namely Docker.
7. Be able to perform data migrations, set up triggers, optimize queries, create data visualizations, and more.

WEEK 1

Data Modeling and Database Technologies

You will begin your course with a brief overview of various types of databases, then focus specifically on relational databases, which are the most common.

You will learn about data modeling, including the concepts of entities, attributes, and relationships, and how to represent them in entity relationship diagrams.

You will go on to learn about data integrity constraints such as nullability and uniqueness, database tables, and how to create references between tables with primary and foreign keys.

After this, you will install PostgreSQL (commonly known as Postgres), using a Docker container.

You'll learn about the psql CLI (command line interface) as well as the pgAdmin GUI (graphical user interface) to interact with your Postgres database. Finally, you'll be introduced to SQL (Structured Query Language), the language used to interact with relational databases.

WEEK 2

Just SQL

You will focus on getting to know SQL in this module.

You will learn about the most commonly used SQL queries such as CREATE, INSERT, DELETE, and in particular, SELECT.

You will learn how to structure sophisticated SELECT queries using conditional expressions, aggregate functions such as COUNT() and AVG(), and clauses such as ORDER BY and GROUP BY.

You will learn about ways to SELECT from multiple tables, including set operations like UNION and INTERSECT; how to combine rows from multiple tables using JOIN; and how to use nested

WEEK 3

Database Migrations & Application Development

In this module, you will first learn how to use database schema migrations to manage changes to the structure of a database, as well as perform rollbacks to a previous state.

You will also learn how to transform existing data values in a process known as data migration.

Next, you will be introduced to Object-Relational Mapping (ORM), a technique used to abstract raw SQL statements into object-oriented Python.

Finally, you will learn about the concepts of CRUD (Create, Read, Update, & Delete) and APIs (Application Programming Interfaces) in the context of back-end development by creating a simple Python/Flask app that interacts with a Postgres database.

WEEK 4

Database Triggers, Optimization, and Visualization

In the final week of this course, you will learn more advanced database features including event-based triggers.

You will also learn about database optimization techniques and best practices such as handling the n+1 query antipattern, recognizing table set exclusivity, and creating table indexes to keep database queries efficient and performant.

Finally, you will be introduced to data visualization using popular Python graphing libraries, a valuable skill for statistical analysis and application performance monitoring.

Modern Software Engineering with DevOps

Commitment:
4 weeks of study
10-20 hours/week

Docker

Docker is used to package software into standardized units for development and deployment called containers. By using OS-level virtualization, containers provide consistent and portable environments for running applications anywhere, including on cloud platforms.

CI/CD

Continuous integration (CI) and continuous delivery (CD) embody a culture, set of operating principles, and collection of practices that enable application development teams to deliver code changes more frequently and reliably.

DevOps

DevOps is the combination of cultural philosophies, practices, and tools that increases an organization's ability to deliver applications and services at high velocity.

Amazon AWS

Amazon Web Services is a subsidiary of Amazon providing on-demand cloud computing platforms and APIs to individuals, companies, and governments, on a metered pay-as-you-go basis.

Microsoft Azure

Microsoft Azure is a cloud computing service created by Microsoft for building, testing, deploying, and managing applications and services through Microsoft-managed data centers.

Google Cloud

Google Cloud is a suite of cloud computing services that runs on the same infrastructure that Google uses internally for its end-user products, such as Google Search, Gmail, file storage, and YouTube.

About the Course

This course focuses on teaching the tools and practices of modern software development, in particular those under the umbrella of DevOps, which combines the traditionally separated domains of software development and IT operations.

You will learn about concepts such as the Agile, Waterfall, and other software development methodologies, the Agile software development lifecycle, containerization with Docker, container orchestration with Kubernetes, serverless functions, cloud computing, CI/CD (continuous integration/ continuous delivery), version control with Git, and automated testing with pytest.

At the end, you will be able to

1. Understand the fundamental principles of software development methodologies and lifecycle, and of DevOps in particular.
2. Create CI/CD pipelines with the Microsoft Azure, Google Cloud, and AWS cloud platforms, as well as GitHub Actions.
3. Deploy Python apps using the Django framework to the cloud.
4. Understand how to create and run unit and integration tests using pytest.
5. Use Git, Docker, Kubernetes, and other standard DevOps tools.
6. Understand advanced DevOps topics including packaging, logging, and more.

WEEK 1

Introduction to Software Development

This module introduces you to software development methodologies, including Waterfall, Agile, Scrum, Kanban, and DevOps.

You will learn about the software development lifecycle, from the creation of the initial software requirements to deployment and post-implementation review.

You will be introduced to the concept of collaborative team development using the version control system called Git.

You will learn about the high-level design of the Python framework called Django and its use of the MVT architecture pattern, related to the popular MVC pattern.

You will be introduced to the containerization technology called Docker, and you will be shown how to use it to create a Docker image from an application, then use the image to run the application inside a container. You will also learn about Docker Compose, a tool to manage multiple Docker containers.

WEEK 2

More Docker, Cloud Computing, and AWS

You will continue to learn more about Docker this week, beginning with learning to use both public and private registries for Docker image repositories, including Docker Hub. You will learn about persisting data through Docker volumes and bind mounts, managing container ports, and more.

This week, you will begin learning about cloud computing technologies, including the concept of serverless technologies such as Function as a Service (FaaS). You will be introduced to Amazon Web Services (AWS), and you'll deploy a serverless function using the AWS Lambda platform.

Finally, you will learn how to deploy an application using Docker to AWS, using an AWS Elastic Compute Cloud server instance.

WEEK 3

CI/CD, Testing, and Google Cloud

This week will begin with an introduction to the DevOps best-practice concept of CI/CD, which stands for Continuous Integration/Continuous Delivery (or Deployment). You will learn about why and how CI/CD is used in DevOps, and you'll learn about CI/CD tools including GitHub Actions.

You will learn about the concept of testing in software development, with a focus on unit and integration testing. You will learn how to use the Pytest tool for testing Python software such as Django applications, including concepts such as asserts and test fixtures. You will learn how to automate running tests using GitHub Actions.

Continuing your education on cloud platforms, you will learn about Google Cloud this week. You will learn how to deploy serverless functions using Google Cloud Functions, and other Google Cloud services to deploy a Django application in a Docker container and a SQL server.

WEEK 4

Advanced DevOps, Kubernetes, and Azure

You will begin the final week of your course by learning about package management in Python, including how to create a Python package for distribution, and how to set up a CI/CD pipeline using GitHub Actions to publish the package. You will also learn about useful Linux and network tools to monitor and interact with processes from the command line on Linux-based servers.

Building on what you have learned previously about Docker, you will learn about the concept of container orchestration. You will be introduced to Kubernetes, the popular container orchestration technology used to deploy and manage containers across multiple machines on the cloud.

Finally, you will learn to use Microsoft Azure to deploy a serverless function, then the Azure Kubernetes Service to deploy and manage a Django application on the Azure Cloud using a Kubernetes "cluster".

Project Portfolio

Commitment: Self-driven or in groups, 4-8 hours/week for the duration of the bootcamp.

About the Project Portfolio

This Bootcamp offers a structured path for you to develop a fully functional and feature rich project portfolio.

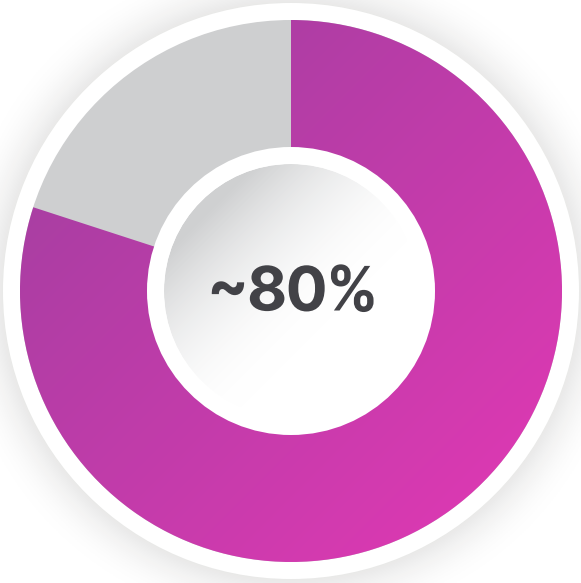
You will be asked to start with identifying the project you would like to build in each course, and will quickly move to a prototyping phase.

With every new course, you will create a new project, and finally deploy it to a cloud platform.

You will be invited to work in groups and offered a weekly rhythm to progress.

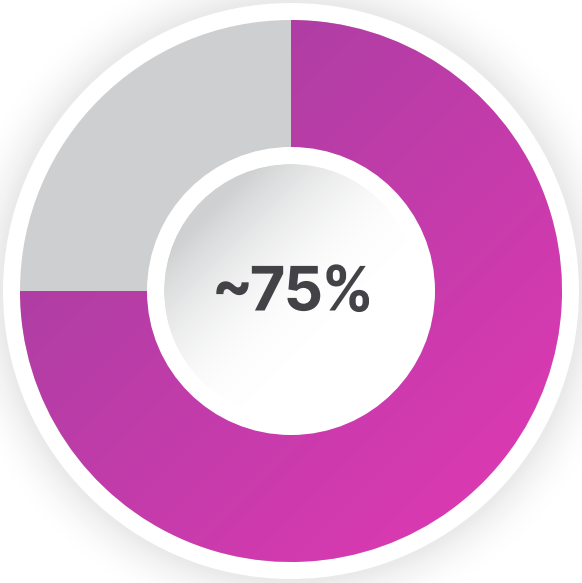
Authentic, trustworthy graduate outcomes

So you can have fair expectations.
Data is **updated daily online** from our graduate survey responses.



Job Skills Rate

~80% of graduates are applying their tech skills in their jobs or on side projects after 9 months.



Graduation Rate

~75% of students graduate

Career Services

You'll receive unmatched career support after you graduate so you can focus on your learning today.

About the Project Portfolio

Once you graduate from a Nucamp Bootcamp, we'll connect you with a Career Coach to guide you through the job search process. Our Career Coaches are also Nucamp Instructors who have the expertise and knowledge to help with your career preparation. You'll receive ongoing best practices, answers to common questions, and a valuable one-on-one coaching session to help you land the job that's right for you.

Establish a winning career search plan by joining the Career Development program

Nucamp graduates have access to a Career Development Course that guide them in the job-seeking process, with activities and assignments to help get on track toward a career in development.

Get hands-on Career Preparation so that recruiters can see the best of what you offer

Your Career Coach will review your resume and GitHub profile and provide feedback so that recruiters can more easily find you and connect your relevant skills to their needs. Coaches will also help you prepare for interviews so that you can present your best and they will review your portfolio projects to help highlight your best skills.

Get exclusive access to a nationwide Job Board tailored to Nucamp graduates

Every month we reach out to 1,000+ companies to gather junior developer positions that are a good fit for Nucamp Graduates. In addition to working with large companies, we've expanded the list of opportunities by also including small-to-medium sized companies who have exciting jobs in smaller cities.

Land your dream job with a free month of LinkedIn Premium

With over 20 Million job listings, LinkedIn Premium helps you get noticed by potential employers, get connected to managers and recruiters, and get an edge with career search insights. You'll also get access to LinkedIn Learning so you can expand your professional skills further.

Stay connected with Nucamp Alumni on LinkedIn

Once you graduate from a Nucamp bootcamp, you are invited to an exclusive LinkedIn Alumni group where you can connect with other graduates and start building your own professional network. Nucamp alumni are a vibrant community that are actively engaged in helping each

Keep your skills sharp with Lifetime Access to Course Content and Community

Can't remember exactly how to implement a specific function or do you just need some more practice? Review specific course subjects or take a course all over again so you can keep your skills sharp. Enrolling in a Nucamp bootcamp gives you lifetime access to course content and the community at no extra cost.

Stand out from other job seekers by participating in a Nucamp Hackathon

Nucamp has collaborated with MintBean to provide Nucamp graduates an opportunity to participate in an online Hackathon every month. Join a hackathon to sharpen your skills and demonstrate to recruiters that you can solve real world coding challenges.

Establish a winning career search plan

Soon after you graduate, you'll receive a employment survey in your email. Once you complete the survey, your career services program will be activated and you can take our 6-week career development course.

Pay $0/month for 4 months with a Fair Student Agreement

Don't give up **15%** of your future salary. Nucamp FSA is the smarter way to join a coding bootcamp.

Write a new chapter in your life story, just like they did

Nucamp Coding Bootcamps provide the **knowledge** and the **structure** to help you switch into a coding career. We're talking to people just like you, every week, who are making the change.

Lori Haffelt
Clearwater, FL

Previous Job:
Retired Nuclear Medicine Tech

Current Job:
Bootcamp Instructor,
Nucamp

Stephanie Raymos
Sacramento, CA

Previous Job:
Affiliate Marketer

Current Job:
Software Engineer,
RL Liquidators

Zach Ballard
Knoxville, TN

Previous Job:
High School Biology Teacher

Current Job:
E-Learning & Development Specialist,
Purdue Global University

Hayat Mohammed
Dallas, TX

Previous Job:
Sales and Management

Current Job:
Web Developer & Funnel Expert,
Oshi Web Solutions

Mecca Adams
Chesapeake, VA

Previous Job:
TV Producer

Current Job:
Software Analyst,
Snap Inc., DoD Agency

Nic Addelia
Des Moines, IA

Previous Job:
High School Band Director

Current Job:
Software Engineering
Principal Financial Group