

ASU FINTECH BOOT CAMP

CURRICULUM OVERVIEW

“Banks are technology firms in disguise.” - Chris Skinner

Source: <https://thefinanser.com/2008/11/banks-are-techn.html/>

The field of finance is evolving. Financial services firms, insurance agencies and investment banks are all increasingly at the intersection of data and technology, harnessing algorithms, machine learning, big data and blockchain to conduct business.

The **24-week FinTech Boot Camp** is a challenging, part-time program that takes a multidisciplinary approach to attaining proficiency in finance, financial programming, data analysis and modern tools in cryptocurrency and blockchain.

Throughout the course, you'll gain experience with a host of popular tools and methods such as Python programming, financial libraries, machine learning algorithms, Solidity smart contracts, Ethereum and blockchain. You'll also learn how these concepts are leveraged within financial fields from financial planning to hedge funds, as well as best practices for using these skills to add value to your organization.

Is this program **right for you?**

Are you a creative, curious and ambitious professional looking to join the FinTech revolution? If so – or if any of the following describe your situation – enrolling in our FinTech Boot Camp could be a smart career move:

A technical professional, such as a developer, help desk technician or data analyst, who wants to transition into the financial sector and understand how to apply programming to finance.

A manager who wants to supercharge their skill set to better understand the financial side of their organization.

A financial professional who wants to attain a more technical skill set in the wake of their organization's digital transformation.

A tech enthusiast looking to get their foot in the door in the world of finance.

Skills gained

Learners will complete the program with a foundation in financial technology and analysis, including:*

Financial fundamentals

- Financial analysis
- Financial ratios
- Time-series analysis

Financial programming

- Amazon Web Services
- API interactions
- Matplotlib
- NoSQL
- Pandas
- Python

Machine learning applications in finance

- Algorithmic trading
- Financial modeling
- Forecasting
- k-nearest neighbors (kNN)
- Linear regression
- Logistic regression
- Random forests
- Scikit-learn
- Support vector machines (SVM)

Blockchain and cryptocurrency

- Consensus algorithms
- Cryptocurrency
- Distributed ledger
- Ethereum
- Ganache
- Smart contracts
- Solidity
- Transactions
- Truffle Suite
- Validation

*The material covered in this course is subject to change due to market demand.

Building on the **basics**

Financial institutions are increasingly becoming technology institutions that require not only financial knowledge, but deep technical knowledge as well.

That's why our curriculum is designed to provide you with a deep foundation on the core technical skills needed to succeed in the field. Throughout the program, you can expect to learn brand new skills and be challenged in completing difficult real-world problems to demonstrate your new abilities. By the program's end, you'll have a strong professional portfolio showcasing your work.



Real world application, **real jobs**

Our learners may be qualified for a wide range of roles, including:

Blockchain developer

Financial applications developer

Business intelligence analyst

Financial manager

Business risk analyst

FinTech regulatory associate

Cryptocurrency expert

Quantitative trader

Data analyst

Research analyst

Data scientist

Software engineer

Financial analyst

Systems business analyst

What learners will earn

By the time they complete the program, learners can expect to be able to:

Analyze market behavior using machine learning on historical datasets.

Employ financial analysis techniques to model, predict and forecast trends.

Apply modern financial technologies within the context of working at an investment bank, insurance agency or any player in the financial industry.

Learn to work with databases on the AWS cloud in the service of financial applications.

Build an Ethereum blockchain and understand how transactions are validated on a distributed ledger.

Leverage machine learning to determine lending preferences and how effectively a cluster of customers would produce interest.

Conduct time-series analysis in conjunction with assumptions and variances to develop financial forecasts, and analyze forecasts for accuracy.

Make API requests to pull financial data, and use a variety of Python packages to run financial analysis on large datasets.

Create a custom API with mock bank data and configure the API to allow incoming interactions.

Model future financial performance of a company using Python and financial fundamentals.

Design and implement smart contracts with the Solidity programming language.

Understand both uses and disadvantages of a variety of machine learning algorithms and their proper application within the field of finance.

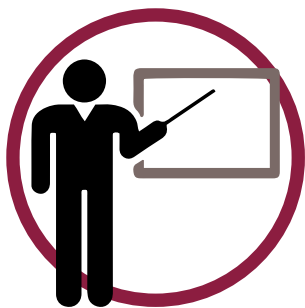
Determine the optimal predictors for market strategy and evaluate models for accuracy.



Course structure

Over the course of 24 weeks, you'll attend informative lectures, participate in a variety of individual and team exercises, and work independently in the classroom and at home. Homework assignments provide an opportunity to apply what you've learned and build on it. The goal is to give you a comprehensive learning experience and true insight into a "day in the life" of a FinTech professional.

Discussion



Instructor-led discussions cover the background, history and use new technologies or concepts.

Project work



You'll work on timed in-class exercises and projects individually and in teams to put classroom teachings into practice.

Portfolio projects



Your portfolio signals to employers that you are ready for primetime! You'll build a substantial portfolio of projects that demonstrate your abilities across a wide variety of technologies.



As they move up the learning curve, learners are likely to have questions around some of the concepts covered in class. We're here to help — through in-person and virtual office hours, as well as a dedicated #slack channel where you can get assistance from instructors, support staff and fellow learners. All work is done via GitHub, so you can create issues directly on your own projects for instructors to assist you in a truly asynchronous fashion. In addition to learning finance, financial programming and data analysis, you will have access to career services that'll help you prepare for technical roles after completing the program through activities such as:

Career content and practice sessions

One-on-one career coaching

Database of customizable tools and templates

- Creating an elevator pitch
- Developing a bio
- GitHub best practices
- Guidelines to building a portfolio
- Multiple technical resume templates

Online career events with industry professionals

Soft skills training



Meeting employer expectations

It's a fact: companies care about what a person can do, not what a person says they can do. For that reason, our curriculum teaches learners how to apply what they've learned to simulated and lab-based environments.

The curriculum emphasizes in-depth exploratory labs, ranging from building algorithms for detecting fraud to creating applications that interface with the Ethereum network. Learners will use personal laptops to practice the skills and abilities included in this course.



Sample projects

The interview question (Python and time series analysis)

Description: Before an interview for your dream job as a financial analyst at a storied medical devices company, you're posed a simple request: forecast our stock position over the next six months, along with relevant financial measures, and bring your results and method to the interview. You panic but immediately remember that the skills you have learned should enable you to pull, clean and manipulate the relevant data, so you can present it in an effective manner.

Skills

- APIs
- JSON
- NumPy
- Pandas
- Python
- PyViz
- SciPy
- Time series analysis

Objectives

- Learn to conduct time-series analysis in conjunction with assumptions and in variances to develop a forecast for a six-month period.
- Learn to make requests to the Quandl API to pull financial data in JSON format for cleansing, munging and manipulation.
- Use Python packages like NumPy and SciPy to run financial analysis on the data you retrieve.

Risky business (APIs and financial modeling)

Description: One of the most important aspects of financial decisioning is the ability to evaluate and manage risk. For analysts, this is a critical part of the job description and requires a strong understanding of finance and statistics. Furthermore, the ability to script in Python is a helpful skill to run bulk analysis efficiently. In this exercise, you'll assume the role of an analyst tasked with evaluating risk and return for a diverse portfolio with exposure in numerous sectors.

Skills

- APIs
- Financial modeling
- Pandas
- Python
- Statistics

Objectives

- Conduct rigorous statistical methods on financial data from a wide variety of industry sectors.
- Enforce financial and statistical concepts fundamental to evaluating and managing risk.
- Understand what constitutes risk, how to forecast risk and how to hedge against risk within a market portfolio.

Projects **continued...**

Sharpen your FAANGs (machine learning and trading algorithms)

Description: You're managing a technology portfolio led by the heavy hitters in the tech world, the FAANG stocks (Facebook, Apple, Amazon, Netflix, Google). After some consideration, you decide you would like to provide a prediction of value for the set of stocks this time next year. While you have a good understanding of machine learning algorithms, you're unsure of which algorithm will do the job most effectively, so you decide to use a small handful to do the job. Of course, without a shred of accuracy clients won't trust your models, so you'll have to evaluate and optimize your models as well.

Skills

- Algorithmic trading
- APIs
- JSON
- Machine learning
- Pandas
- Python

Objectives

- Use Python, Pandas, data cleansing, munging, manipulation and API requests to convert an immense amount of data into the proper format for evaluation.
- Use several different machine learning algorithms to form your prediction model, and evaluate and optimize your model.

Trading bot (algorithmic trading)

Description: You've just determined a winning stock market trading strategy. The problem? It requires you to make trades *extremely* precisely – with little room for error. Fortunately for you, this class will teach you to program and build your own algorithmic trading bot – capable of responding to incoming market data in real-time.

Skills

- Algorithmic trading
- Machine learning
- Numpy
- Pandas
- Python
- Quantopian API

Objectives

- Run analysis to determine the quality of your trading bot's performance.
- Utilize Python, Pandas and a variety of APIs to interpret data streams and market events, and respond with trade activities.

Fraud watch

(cloud and machine learning)

Description: The cost of insurance fraud is estimated to be more than \$40 billion a year, and while you aren't going to catch all of it, you have been tasked with developing a complex system for detecting fraud using the cloud and machine learning. By the end of this activity, you'll be making a recommendation for the path forward with a system you devise.

Skills

- AWS Redshift
- Machine learning
- Python

Objectives

- Harness the power of the cloud to efficiently comb through and manipulate large data sets.
- Use machine learning clustering and classification algorithms on your data to develop a fraud detection application.

The new cryptocurrency in town

(blockchain and cryptocurrency)

Description: Blockchain and its applications within the financial industry are growing fast. In an effort to capitalize on the newfound craze, you decide to develop your own cryptocurrency, YouCoin! In this activity, you'll develop your own Ethereum blockchain using Solidity and object-oriented programming.

Skills

- Ethereum blockchain
- Ganache
- Solidity
- Truffle Suite

Objectives

- Develop a cryptocurrency to validate the blockchain.
- Learn how to build a blockchain using nodes and consensus algorithms.
- Script a smart contract using the Solidity programming language.

Course Curriculum by module

Module	Description	What You'll Learn
Learning Module: Intro to FinTech	Learners begin with an introduction to the FinTech landscape.	<ul style="list-style-type: none">» Financial statement analysis» FinTech landscape
Learning Module: Financial Programming	Dive into programming with a popular language in the financial landscape – Python! Participants will learn Python and advanced Python-based financial libraries.	<ul style="list-style-type: none">» Command line» Databases and APIs» Financial modeling» Financial packages» Forecasting» Git» JSON» NumPy» Pandas» Python programming» PyViz» SciPy» Time series analysis
Learning Module: Machine Learning Applications in Finance	Learners will explore how financial services and FinTech institutions are using machine learning, the cloud and databases to leverage information.	<ul style="list-style-type: none">» Algorithmic trading» Classification and regression tree (CART)» k-means clustering» Linear regression» Logistic regression» Neural networks» Scikit-learn
Learning Module: Blockchain and Cryptocurrency	Participants will learn how to create smart contracts with Solidity and how to build their very own cryptocurrency.	<ul style="list-style-type: none">» Consensus algorithms» Cryptocurrency» Distributed ledger» Ethereum blockchain» Ganache» Mining» Smart contracts» Solidity» Transactions» Truffle Suite» Validation