

# CPF: A New Era

Become a Super Quant with Reproducible, Production-Grade Skills

Dr. Yves J. Hilpisch

The Python Quants GmbH

CPF Program



# The World Our Programs Prepare You For

## On the one hand

- Darkening outlook for many white-collar roles as automation pressure rises.
- Entry-level and junior opportunities shrinking in traditional analyst and developer tracks.
- Rapid advances in GenAI, agents, and automation compressing mid-skill tasks into software.

## On the other hand

- Companies investing billions in AI infrastructure, data platforms, and crypto rails.
- Experienced professionals with production-grade skills see outsized productivity and compensation.
- As capital spending on technology grows, true experts capture a disproportionate share of the value.

## What this means for you

The gap between generic credentials and real capabilities is widening: recent “safe bets” such as CS or finance degrees no longer guarantee durable opportunities when AI innovation cycles outpace academic cycles. The practical way to stay on the right side of this shift is focused upskilling and mastery of key technologies like Python, AI, and crypto — the core dimensions our programs are built around.

# How This Session Works

- You will learn about the specifics and common features of the CPF, TAE, and TCE programs.
- The focus is on what you get, who benefits most, and how to choose the right program (or bundle).
- The session highlights the fully revamped Core Track of the CPF and what our programs share in terms of approach and learning experience.

## Our Programs Are for You ...

... if you are excited about quantitative finance and algorithmic trading, enthusiastic about the potential of AI, and curious about crypto technologies — and want a coherent path that links CPF, TAE, and TCE.

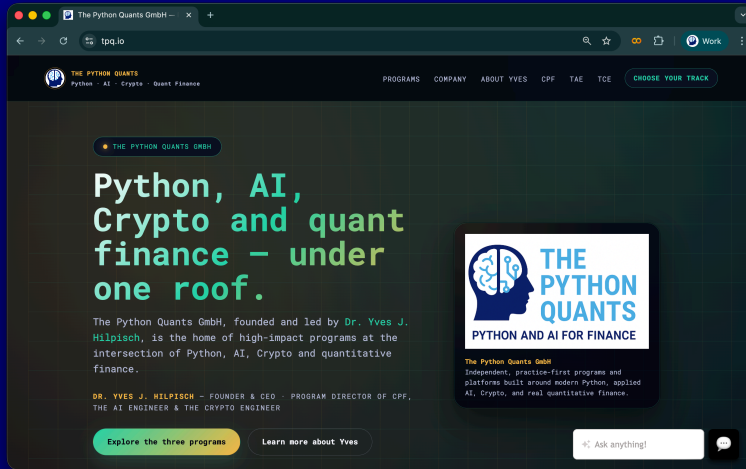
# Agenda

- 1 The Python Quants (TPQ)
- 2 Three Programs in Comparison
- 3 Certificate in Python for Finance (CPF)
- 4 The AI Engineer (TAE)
- 5 The Crypto Engineer (TCE)
- 6 Common Features (Across Programs)



# The Python Quants (TPQ)

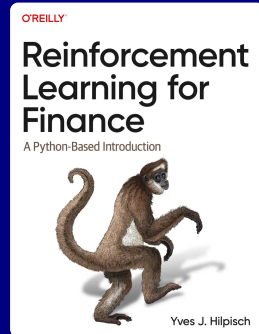
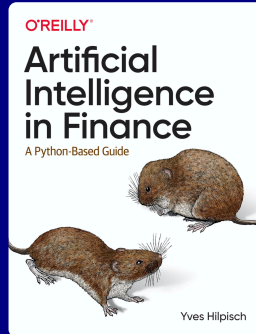
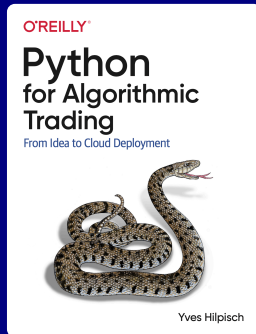
# The Python Quants



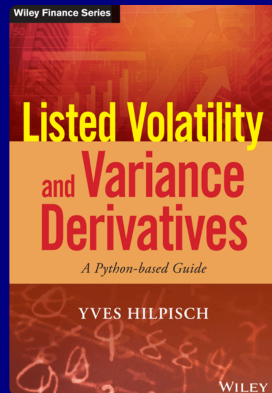
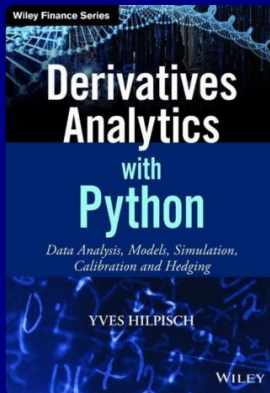
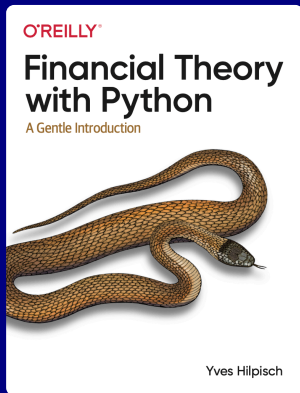
# The Python Quants in 60 Seconds

- Independent, practice-first education company led by Dr. Yves J. Hilpisch.
- Three coherent programs: CPF, TAE, TCE (plus bundle option).
- A single learning philosophy: books as the basis, guided practice, real code, real workflows.
- 7 Python & AI for Finance books published (5x O'Reilly, 2x Wiley).
- 1,000s of academics & professionals trained live and online.
- Corporate training for leading institutions (Citadel, Two Sigma, PDT Partners, and more).
- 20 years of Python & AI for quantitative finance.

# Python & AI for Finance Books (I)

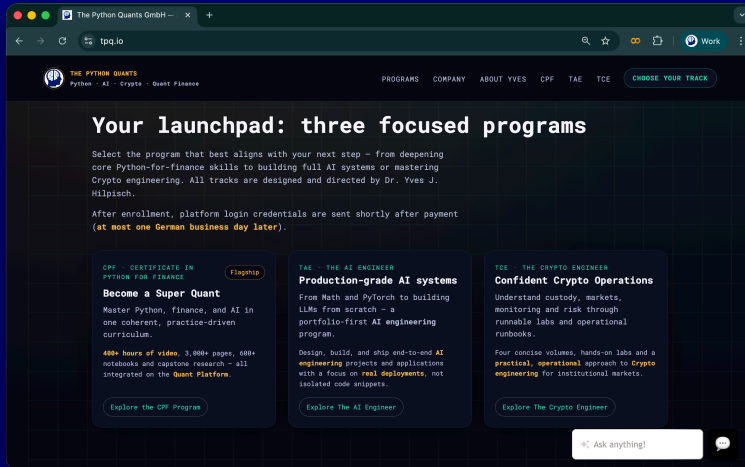


# Python & AI for Finance Books (II)



# Three Programs in Comparison

# Three Programs in Comparison



The screenshot shows a web browser window with the URL [tpq.io](https://tpq.io). The website has a dark theme and a grid background. The header includes the logo for 'THE PYTHON QUANTS' and navigation links for 'PROGRAMS', 'COMPANY', 'ABOUT YVES', 'CPF', 'TAE', 'TCE', and a 'CHOOSE YOUR TRACK' button. The main heading is 'Your launchpad: three focused programs'. Below this, a paragraph explains that the programs are designed by Dr. Yves J. Hilpisch and that login credentials are sent after payment. Three program cards are displayed: CPF (Flagship), TAE (Production-grade AI systems), and TCE (Confident Crypto Operations). Each card includes a brief description, key features, and an 'Explore' button. A chat bubble at the bottom right says 'Ask anything!'.

**THE PYTHON QUANTS**  
Python · AI · Crypto · Quant Finance

PROGRAMS COMPANY ABOUT YVES CPF TAE TCE CHOOSE YOUR TRACK

## Your launchpad: three focused programs

Select the program that best aligns with your next step – from deepening core Python-for-finance skills to building full AI systems or mastering Crypto engineering. All tracks are designed and directed by Dr. Yves J. Hilpisch.

After enrollment, platform login credentials are sent shortly after payment (at most one German business day later).

**CPF · CERTIFICATE IN PYTHON FOR FINANCE** Flagship

**Become a Super Quant**

Master Python, finance, and AI in one coherent, practice-driven curriculum.

480+ hours of video, 3,000+ pages, 680+ notebooks and capstone research – all integrated on the **Quant Platform**.

Explore the CPF Program

**TAE · THE AI ENGINEER**

**Production-grade AI systems**

From Math and PyTorch to building LLMs from scratch – a portfolio-first AI engineering program.

Design, build, and ship end-to-end **AI engineering** projects and applications with a focus on **real deployments**, not isolated code snippets.

Explore The AI Engineer

**TCE · THE CRYPTO ENGINEER**

**Confident Crypto Operations**

Understand custody, markets, monitoring and risk through runnable labs and operational runbooks.

Four concise volumes, hands-on labs and a **practical, operational** approach to **Crypto engineering** for institutional markets.

Explore The Crypto Engineer

Ask anything!

# CPF vs TAE vs TCE (High-Level Comparison)

*“Professional Processes and Best Practices at Every Step.”*

	CPF	TAE	TCE
Outcome	Become a Super Quant (Python + finance + AI)	Build production-grade AI systems (LLMs, agents)	Engineer crypto systems with confidence (custody, markets, ops)
Best for	Quants, finance professionals, analysts, career changers	Engineers/ML practitioners building real AI apps	Builders, risk/ops leads, quants touching crypto rails
Core coverage	Quant research + data + pricing + investing + trading + applied AI	PyTorch, LLMs, agents, deployment patterns	Primitives, Bitcoin, market plumbing, monitoring, runbooks



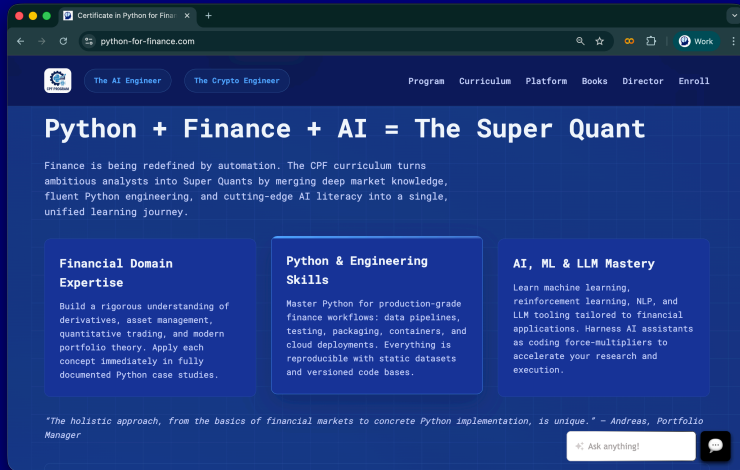
# CPF vs TAE vs TCE: Hard Facts

	CPF	TAE	TCE
Books/key PDFs (count)	7 published + 2 unpublished books	8+ custom textbooks and docs	4 books + 17 notes PDFs
Docs/books pages (approx.)	3,000+ pages across books and program PDFs	1,250+ pages of engineering docs and textbooks	341+ book & 100+ notes pages
Jupyter notebooks	600+ notebooks integrated with the CPF curriculum	100+ Colab-ready notebooks for AI engineering	51 notebooks tightly linked to the TCE books
Code/scripts	Full research and trading code embedded in 600+ notebooks	300+ Python scripts for models, agents, and tooling	30 scripts plus runnable labs for custody, markets, and monitoring

CPF core track (fully revamped): 61 PDFs, 2,903 pages.  
Text: 29 files, 1,968 pages; Slides: 32 files, 935 pages.

# Certificate in Python for Finance (CPF)

# Certificate in Python for Finance (CPF)



<https://python-for-finance.com>

# CPF: Content, Target Groups, Benefits

This is the flagship program for quantitative finance with Python — designed to turn motivated learners into confident practitioners with reproducible, production-grade workflows.

## What it covers

- Python for finance workflows, data engineering, reproducible research, applied AI in finance.
- Focus on Financial Theory, Asset Management, Algorithmic Trading, and Computational Finance.

## Who benefits most

- Finance professionals, quants, analysts, researchers, lecturers, career changers, students.

## Why it matters now

- Quantitative finance is increasingly based on Python, driven by AI, and influenced by crypto — CPF delivers on all three dimensions.
- The GenAI era rewards teams that can combine domain depth with reproducible, production-grade execution.

# CPF: New Books (200+ Pages Each)

Brand-new resources for the GenAI era in quantitative finance.

## Python and AI for Asset Management

Data Science, Machine Learning, and Modern AI Workflows

Dr. Yves J. Hilpisch<sup>1</sup>

January 8, 2026 (preliminary draft)



<sup>1</sup>Get in touch: <https://t.me/yjhilpisch>. Web page: <https://yjhilpisch.com>. Research, strategizing, drafting, and visualization were assisted by CPF 5.5 as a co-writing tool under human direction. Comments and feedback are welcome.

## Python & AI for Algorithmic Trading

Efficient Markets, Data, and AI-Powered Trading Systems

Dr. Yves J. Hilpisch<sup>1</sup>

January 27, 2026 (work in progress)



<sup>1</sup>Get in touch: <https://t.me/yjhilpisch>. Web page: <https://yjhilpisch.com>. Research, strategizing, drafting, and visualization were assisted by CPF 5.5 as a co-writing tool under human direction. Comments and feedback are welcome.

# CPF: New Options Simulator Apps

The screenshot shows a web browser window with the URL `tpq.io/options/`. The page is titled "THE PYTHON QUANTS Derivatives Analytics Basics" and features a recommended sequence of apps: tree → pricer → simulator. The page is divided into three main sections, each with a title, a brief description, and a list of features.

**STEP 1 - DISCRETE INTUITION**

**Binomial Option Tree** [trees.html](#)

CRR binomial tree for equity options with European/American exercise and node-wise hedging/replication.

**WHAT IT DOES**

- Builds a CRR tree for  $S$  with user-defined steps,  $\sigma$ ,  $r$ ,  $q$ .
- Shows option values at each node and compares tree price to BSM.
- Replication mode displays  $\Delta$  and bond  $B$  per node.

**YOU PRACTISE**

- Deriving risk-neutral probabilities and discounting through the tree.
- Understanding  $\Delta/B$  hedging and early exercise for American options.
- Seeing how binomial prices converge to Black-Scholes-Merton as  $N$  increases.

**STEP 2 - CLOSED-FORM PRICING**

**BSM Option Pricer** [pricer.html](#)

Single-option Black-Scholes-Merton pricer with continuous dividends, disturbance sliders, Greeks, and sensitivity views.

**WHAT IT DOES**

- Prices European calls/puts under BSM with dividend yield  $q$ .
- Shows  $\Delta$ ,  $\Gamma$ , Vega(1%),  $\Theta$ (day),  $\rho$ (1%) plus intrinsic/time value and moneyness.
- Lets you disturb base parameters and see the impact via a Greek bar chart and sensitivity curve.

**YOU PRACTISE**

- Linking each parameter ( $S$ ,  $K$ ,  $T$ ,  $\sigma$ ,  $r$ ,  $q$ ) to price and Greeks.
- Interpreting  $\Delta$ ,  $\Gamma$ , Vega,  $\Theta$ ,  $\rho$  numerically and visually.
- Relating BSM pricing to arbitrage bounds and intrinsic vs time value.

**STEP 3 - DYNAMIC RISK**

**BSM Path & Risk Simulator** [simulator.html](#)

GBM spot path simulator with live BSM pricing, Greeks, and unhedged vs delta-hedged P&L over time.

**WHAT IT DOES**

- Simulates GBM paths under risk-neutral or real-world drift.
- Re-prices the option at each step and tracks Greeks along the path.
- Implements discrete  $\Delta$ -hedging with transaction costs and shows hedged vs unhedged P&L.

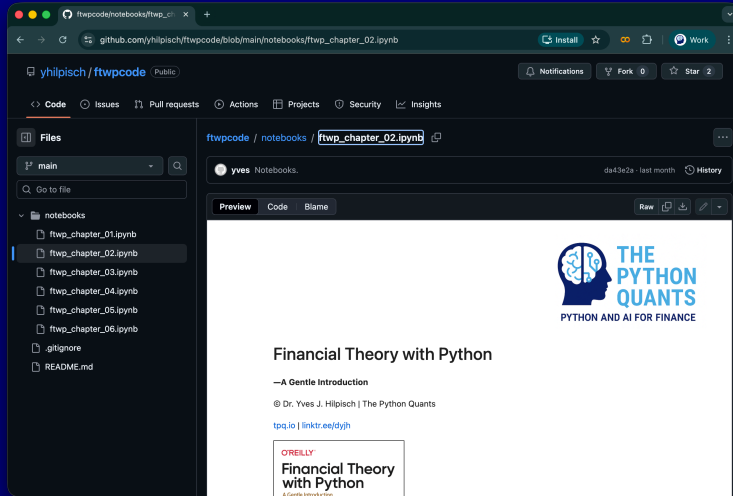
**YOU PRACTISE**

- Connecting static Greeks to dynamic P&L and path behaviour.
- Exploring hedge frequency, volatility levels, and rate assumptions.
- Discussing gamma/vega risk,  $\theta$  vs realized variance, and hedging quality.

BSM with continuous dividend yield  $q$ . Educational analytics apps by The Python Quants.  
For educational use only; not investment advice and no warranty is given as to completeness, correctness, or fitness for any purpose.

One design : three apps : tree → analytic pricer → path simulator.

# CPF: Sample GitHub Repository

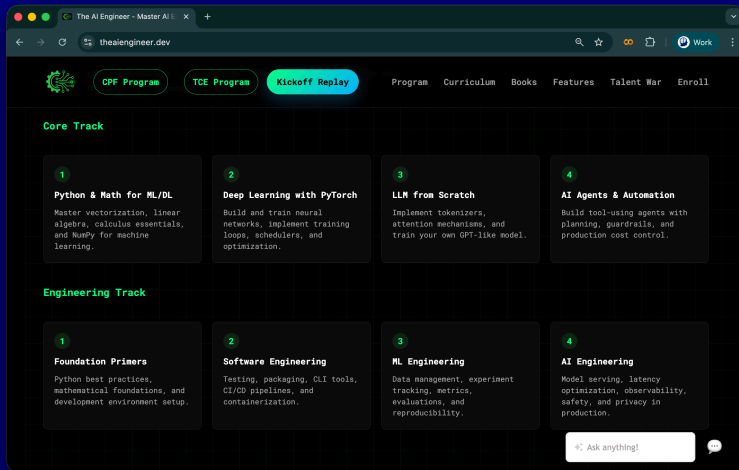


<https://github.com/yhilpisch/ftwpcode>

# The AI Engineer (TAE)



# The AI Engineer (TAE)



# TAE: Content, Target Groups, Benefits

This program is the fastest path from foundations to shipping: you build real AI systems (LLMs, agents, tooling) with an engineering-first, portfolio-driven approach.

## What it covers

- Math + PyTorch foundations, LLMs, agents, and production-grade AI engineering patterns.
- Focus on Deep Learning, LLM Engineering, AI Agents, and Production AI Systems.

## Who benefits most

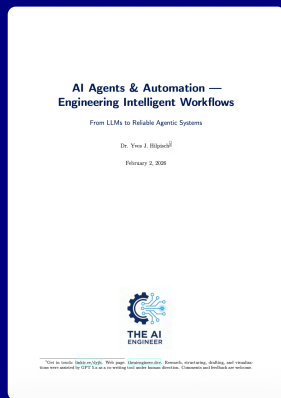
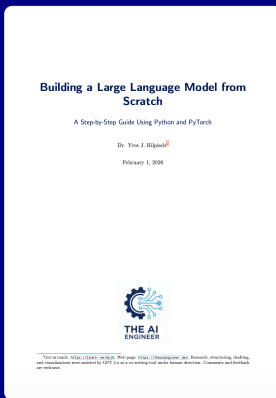
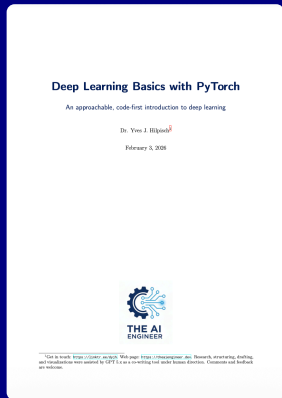
- Engineers and practitioners building real AI systems (including finance/quant contexts).

## Why it matters now

- AI engineering is among the highest-paid skills in 2026 — and demand is still accelerating.
- Shipping AI reliably is an engineering problem; TAE focuses on end-to-end systems and portfolios.

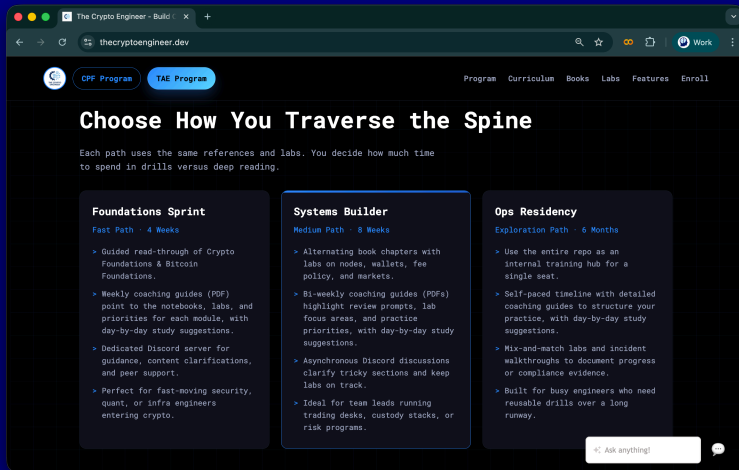
# Books about DL, LLMs, and AI Agents

Three focused books that support deep learning, LLM, and AI agent work across the TAE program (7 books total).



# The Crypto Engineer (TCE)

# The Crypto Engineer (TCE)



<https://thecryptoengineer.dev>

# TCE: Content, Target Groups, Benefits

This program bridges crypto theory to operational confidence: the goal is to help you reason about custody, markets, and live systems under real constraints.

## What it covers

- Crypto primitives, Bitcoin foundations, markets/data plumbing, and production operations (monitoring/runbooks).
- Focus on Custody & Wallet Ops, Bitcoin Infrastructure, Market Data Pipelines, and Monitoring/Runbooks.

## Who benefits most

- Builders, quants, and teams operating crypto rails (custody, markets, risk, compliance interfaces).

## Why it matters now

- Beyond hype, speculation, and scandals, crypto requires production-focused skills for custody, markets, and operations.
- Institutions need operational confidence; TCE bridges theory to incident-ready practice.

# Common Features (Across Programs)

# Common Features

The screenshot shows a web browser window with the URL `tpq.io/cpf/`. The page is titled "Certificate in Python for Finance" and has navigation links for "Ramp-Up", "Financial Theory", and "Bridge Topics". The main content area is titled "Bridge Topics: Covariance, Efficient Markets, FTAP" and contains three columns of text and links. The first column is titled "Covariance Geometry in a Two-Asset World" and discusses a focused treatment of covariance in a two-asset setting. The second column is titled "Efficient Markets Hypothesis - Theory and Tests" and discusses a compact note and slide deck on the Efficient Markets Hypothesis. The third column is titled "Fundamental Theorems of Asset Pricing - Finite-State Markets" and discusses a finite-state, one-period development of the Fundamental Theorems of Asset Pricing. Each column includes links to notes, slides, and recordings.

**Covariance Geometry in a Two-Asset World**

A focused treatment of covariance in a two-asset setting that builds geometric intuition around payoff clouds, covariance matrices, eigenvalues, and portfolio variance; it bridges directly into the risk and diversification perspectives used later in asset management.

BRIDGE TOPIC - COVARIANCE

Notes: [covariance.pdf](#)

Slides: [covariancesl.pdf](#)

► Recording

Read this after the core variance-covariance material in Financial Theory to see the geometry and portfolio implications in a compact two-asset lab.

**Efficient Markets Hypothesis - Theory and Tests**

A compact note and slide deck on the Efficient Markets Hypothesis that formalize market efficiency as a conditional expectation restriction and walk through core empirical tests relevant for asset management and algorithmic trading.

BRIDGE TOPIC - EFFICIENT MARKETS

Notes: [markets.pdf](#)

Slides: [marketssl.pdf](#)

► Recording

**Fundamental Theorems of Asset Pricing - Finite-State Markets**

A finite-state, one-period development of the Fundamental Theorems of Asset Pricing that makes no-arbitrage, state prices, martingale measures, and completeness fully explicit in low-dimensional payoff spaces.

BRIDGE TOPIC - ASSET PRICING

Notes: [ftap.pdf](#)

Slides: [ftapsl.pdf](#)

► Recording

Use this to connect the abstract FTAP statements from the main Financial Theory notes to concrete two- and three-state examples with explicit replication and price bounds.



# Common Features (Learning Assets & Guidance)

These features are shared across CPF, TAE, and TCE — they keep learning coherent, fast, and oriented around real outcomes.

- Launchpads (fast onboarding + a single place for resources)
- Books as the basis (coherent reference layer)
- GitHub repositories with Colab-ready notebooks and code
- Recorded sessions (CPF, TAE)
- Slide decks for sessions and high-level summaries
- Weekly/bi-weekly coaching guides (with day-by-day study suggestions)
- Exercises and capstones per class (portfolio + real competence signal)
- Community and support (Discord + clarifications + accountability)

## Detailed Theoretical Notes & Books

For every core class, you get detailed theoretical notes/books that cover the key financial and mathematical concepts beyond the Python and AI coding work.

## Fundamental Theorems of Asset Pricing

Finite-State, One-Period Markets in the Smallest Nontrivial Setup

Dr. Yves J. Hilpisch

CPF Presiding

## Abstract

This note develops the Fundamental Theorem of Asset Pricing (FTAP) in the simplest possible discrete-time setting, a one-period economy with finitely many future states. We consider a complete market with two future states, where the overall probability measure is unique and replicable bonds are costly contingent claims, and (ii) as incomplete market with three future states, where there are infinitely many risk-neutral measures and contingent claim prices are generally interval-valued (no-arbitrage bounds). The exposition is self-contained and explains geometry, computation, and concrete numerical examples, including put-option pricing by replication in the complete case and by bounds in the incomplete case. All figures are collected on slide in an appendix and referenced from the main text.

<sup>†</sup>Get in touch: <https://linktr.ee/dyjh>. Web page: <https://tpq.so>. Research, structuring, drafting and visualisations were assisted by GPT-5.x as a co-writing tool under human direction. Comments and feedback are welcome.

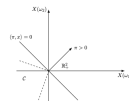


Figure 1: Separation of cones in the two-state case: the axes  $X(\omega_1)$  and  $X(\omega_2)$  represent payoffs in the two states and  $\mathbb{R}_+^2$  is the positive orthant. The dashed cone  $C$  collects attainable payoffs with negative initial cost and lies entirely outside  $\mathbb{R}_+^2$  except at the origin. The line  $\langle x, y \rangle = 0$  is the level set of a strictly positive state-price vector  $\tau > 0$  (here a vector in the direction  $(1, 1)$ ) and the pricing functional  $x \mapsto \langle x, \tau \rangle$  satisfies  $\langle x, \tau \rangle \leq 0$  for all  $x \in C$  while  $\langle \tau, x \rangle > 0$  for all nonzero  $x \in \mathbb{R}_+^2$ , so  $\tau$  separates  $C$  from  $\mathbb{R}_+^2$ .

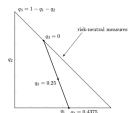


Figure 2: Three states (incomplete market): the set of risk-neutral measures  $\mathbb{Q}$  is typically a line segment inside the probability simplex. Here the segment corresponds to [Theorem 7.1](#).

# Comprehensive Exercise Sets

Every core class comes with comprehensive exercise sets for nearly every chapter/topic: review questions, standard exercises, advanced exercises, capstone tasks, and interview-style questions.

## Bridge Week Exercises

CPF Program

February 2, 2026

### Abstract

This exercise set supports the Certificate in Python for Finance (CPF) bridge week. It covers covariance geometry, the Efficient Markets Hypothesis (EMH), and the Fundamental Theorem of Asset Pricing (FTAP). Each topic provides five exercise types: review questions, exercises, advanced exercises, a capstone project, and interview-style prompts—so you can scale the depth of your practice to the available time.



## 3 Fundamental Theorems of Asset Pricing

This section focuses on the Fundamental Theorem of Asset Pricing (FTAP) in a finite state setting. The exercises reinforce no-arbitrage pricing, state prices, martingale measures, and completeness.

### Review Questions

These questions check that you can restate the FTAP logic without leaning on long proofs.

1. Define no-arbitrage in a one-period, finite-state market.
2. Explain what a state price vector represents.
3. Describe the meaning of an equivalent martingale measure.
4. Explain the difference between completeness and incompleteness.
5. Summarize the statement of the first and second fundamental theorems.

### Exercises

These exercises ask you to compute state prices and identify arbitrage in small markets.

1. Construct a two-state market with one risk-free and one risky asset. Compute the state prices and verify no arbitrage.
2. Given a three-state payoff matrix, determine whether the market is complete.
3. Price a contingent claim using state prices and compare the result to a replication strategy.
4. Identify an arbitrage opportunity in a small market by constructing a zero-cost portfolio with positive payoffs.
5. Use a risk-neutral probability measure to price a payoff and confirm that it matches the state price approach.

### Advanced Exercises

These exercises connect FTAP concepts to bounds and robustness.

1. Derive price bounds for a contingent claim in an incomplete market.
2. Discuss how a change in the numeraire affects the martingale measure.
3. Explain how FTAP logic extends to multi-period trees in a conceptual way.
4. Compare the FTAP pricing approach to a utility-based pricing view in a single paragraph.

### Capstone Project

This project asks you to build a compact finite-state pricing menu.

1. Specify a three-state market with a risk-free asset and two risky assets.
2. Compute state prices, check for arbitrage, and classify the market as complete or incomplete.
3. Price two different contingent claims and show the steps clearly.
4. Write a short conclusion that links the results to the FTAP statements.

# Coaching Guides Across Programs

All programs (CPF, TAE, TCE) include weekly and bi-weekly coaching guides with clear, day-by-day study plans; below are CPF and TAE examples.

## CPF Week 4 Coaching Guide

Bridge Week: Covariance, Efficient Markets, Fundamental Theorems of Asset Pricing

CPF Program  
January 30, 2025

### Abstract

Week 4 is the CPF bridge week. You work through three compact notes on covariance geometry, the Efficient Markets Hypothesis, and the Fundamental Theorem of Asset Pricing as the transition from Financial Theory with Python (FTWP) to the multi-track phase is smooth. This guide helps you set a concrete rhythm for the bridge material, align these with quick Python checks, and integrate the Engineering Track classes without losing the focus on the core bridge topics.



## TAE Week 3 Coaching Guide

LLMs, Attention & Tiny Transformers Capstone

The AI Engineer Program  
November 15, 2025

### Abstract

Week 3 connects transformer theory with practical LLM engineering. You will deepen your understanding of attention and tiny decoder-only transformers using the dedicated booklets, then embed those ideas into an engineering workflow using Part II of the AI/ML Engineering book and the LLM guide. The capstone centers on a from-scratch tiny transformer language model, built and trained in a Colab notebook, with chat logging, checkpoints, and sampling utilities.



Dr. Yves J. Hilpisch

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**Email:** [team@tpq.io](mailto:team@tpq.io)  
**CPF Program:** [python-for-finance.com](http://python-for-finance.com)  
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**TCE Program:** [thecryptoengineer.dev](http://thecryptoengineer.dev)  
**Linktree:** [linktr.ee/dyjh](https://linktr.ee/dyjh)

