

1-Day Online Course

Markov Models and Regime-Based Investing

Program Description: Financial markets move through changing states of risk, correlation, dispersion, and drawdown behavior, which has made regime-aware investment frameworks increasingly relevant for portfolio construction and risk management. This one-day course gives investment professionals and mathematically trained analysts a practical, decision-oriented introduction to Markov chains, hidden Markov models, and regime-based investment approaches, with a strong focus on portfolio applications rather than abstract theory. The program explains how to move from simple observable regime models to hidden-state models and then to portfolio design, risk overlays, and non-Markov alternatives for regime identification. It is designed for organizations that want a rigorous but accessible course that can support both conceptual understanding and practical implementation work.

Target Audience: This course is designed for: portfolio managers, multi-asset investors, risk managers, quantitative strategists, investment analysts with strong mathematical backgrounds, CIO office and asset-allocation teams. Participants should be comfortable with basic probability, covariance, and portfolio concepts, but they do not need prior experience with hidden Markov models.

Materials: Participants will receive the slides presented as a PDF, spreadsheets containing example calculations of concepts discussed, Python scripts, PDF papers and texts for further reading after the course.

Delivery: 1 full day or 2 half-days. Online course (MS Teams). Timings based on the time zones of the participants. Online courses are not recorded.

What participants will learn

By the end of the course, participants will be able to:

- Understand the logic of Markov chains and transition probability matrices.
- Interpret regime models through both probabilistic and graph-theoretic intuition.
- Estimate transition probabilities from observable state histories.
- Understand how hidden Markov models infer latent market regimes from return data.
- Use regime probabilities in investment decisions, risk management, and tactical allocation.

Course highlights

- Clear introduction to observable and hidden regime models.
- Direct link from statistical models to investment decisions.
- Practical treatment of regime-based portfolio optimization.
- Discussion of implementation pitfalls, validation, and governance.
- Python and Excel VBA code illustrated with example data.

Program structure

Time	Topic
09:00-09:30	Why regimes matter in investing
09:30-10:30	Observable Markov chains: intuition, transition matrices, forward probabilities
10:45-11:30	More on observable Markov chains: graph theory link, convergence, and stationary distributions
11:30-12:15	Observable Markov chains in investment and risk management
13:15-14:30	From Gaussian models to hidden Markov models, estimation of HMMs
14:30-15:15	Gaussian and non-Gaussian emission models, relationship to logistic regression, neural networks, LLM and contemporary ML techniques
15:30-16:30	Regime-based investment approaches and portfolio optimization
16:30-17:15	Regime identification without Markov models, methods interesting beyond Markov models (logistic regressions, neural networks, ML-approaches)
17:15-17:45	Validation, pitfalls, and implementation issues

This is the structure of a one-day course. The topics can also be delivered over two half-days.

Core topics covered

Markov chains and state models

Introduction to Markov model and property, transition matrices, multi-step probabilities, stationary distributions, graph-theoretic interpretation. The objective is to give participants a solid but practical foundation for thinking about financial states as probabilistic systems.

Observable regime models

Participants learn how to model directly observed states such as volatility buckets, rating migrations or drawdown states, and how these models can be estimated from historical state paths.

Hidden Markov models

Introduction to hidden regimes, where states are not directly observed but inferred from emitting distributions. The benchmark is Gaussian HMM with regime-dependent expected returns and covariance matrices, which is especially relevant for multi-asset allocation and risk budgeting.

Regime-based investing and optimization

Participants see how regime information can be used for tactical tilts, scenario-based investing, portfolio optimization. Various implementation options are compared and discussed.

Non-Markov alternatives

Because many institutions prefer simpler and more transparent frameworks, the course also covers threshold-based, macro-based, trend-based, and clustering-based regime identification methods that do not rely on Markov assumptions.

Format and teaching style

The course combines conceptual explanation, investment interpretation, worked examples, and implementation guidance. It will be delivered as a lecture-based seminar, with exercises and demonstrations in Python and Excel solved live.

Depending on audience preference, the mathematical level can be adjusted from light and intuitive to more technical and implementation-focused. This makes the course suitable both for senior investors and for analyst teams who want to build internal regime-modeling capability.

Typical use cases for this course

This program is especially relevant for teams working on:

- Tactical asset allocation
- Dynamic risk budgeting
- Regime-aware portfolio construction
- Drawdown and volatility management
- Research into hidden-state models for multi-asset portfolios
- Building transparent regime indicators alongside existing strategic allocation.

Customization options

This program can be tailored to the needs of the organization for in-house trainings. Customizations include:

- More investment intuition, less mathematics
- More technical depth on HMM estimation and implementation
- Greater focus on equities, multi-asset portfolios, credit, or macro regimes
- Additional Python demonstrations or Excel-based workshops
- Examples and case studies using the client's own investment universe