ACADEMY

Curriculum Guide

Certificate in Applied Quantitative Research

Three levels of applied quantitative research, from reading evidence to approving research

Quant research as it's actually practiced.

3 levels | 38 examined modules plus an orientation per level | 9 electives | 150 interview questions

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1. About the program

Learn quantitative research through real-world cases, practical interpretation, statistical reasoning, and the mistakes that matter in professional research. Build the knowledge to evaluate research critically and prepare for quantitative research interviews.

The program is organized in three levels. Each level asks one central question, moves through a sequence of modules built on one another, and ends with an official examination. Together, the three examinations and an applied final project lead to the **Certificate in Applied Quantitative Research**.

1.1 The three levels at a glance

Level	Title and stage	Central question	Modules
I	**Quantitative Foundations & Financial Reasoning** Foundational	*What do the numbers actually tell us?*	Orientation + 10
II	**Applied Quantitative Research & Strategy Validation** Intermediate	*Is this research credible, robust, and economically meaningful?*	Orientation + 13
III	**Advanced Quantitative Research & Professional Decision-Making** Advanced	*Would you approve this research for real-world deployment?*	Orientation + 15

1.2 How a level is built

- **Module 0, orientation.** Every level opens with a short orientation that explains what changes at that level, how its modules fit together and why they come in that order. It is not examined.
- **Core modules.** Each examined module is divided into sections. Every section sets out the theory in full, with definitions, derivations and references, then a worked example, figures and applied checks with explained answers.
- **Research cases.** Realistic case files with exhibits and charts, where you reconcile the numbers, challenge the claim and write the conclusion the evidence can support.
- **Electives.** Optional mathematics, descriptive-statistics and Python tracks at every level, with their own progress, open at any time and separate from the examination.
- **Practice assessment and interview preparation.** A practice assessment to rehearse the examination, and 50 interview questions per level with model answers.
- **Official examination.** 40 multiple-choice questions on the level's core concepts, with a passing score of 75% (30 of 40).

1.3 Teaching approach

The course teaches research as it is practiced. Modules are ordered so that each one builds on tools taught before it: each level starts with the questions a researcher asks, builds the methods needed to answer them, and finishes with a module that brings everything together into a professional review. The common mistakes that invalidate research (data leakage, selection bias, overfitting, unsuitable benchmarks, wrong denominators, weak validation, confusing statistical significance with economic value) are taught explicitly rather than left for the reader to discover.

2. Who this program is for

The Academy is written for anyone who needs to judge quantitative evidence rather than simply accept it. It suits readers who are entering the field as well as practitioners who want sharper research reasoning.

Reader	What the program offers
Students and graduates	A structured route from statistical foundations to professional research judgment, with interview preparation aligned to each stage.
Aspiring quantitative researchers	The methods a research reviewer actually applies: hypotheses, backtest design, bias and leakage detection, validation, robustness and the economics of a strategy.
Traders	A disciplined way to test whether an edge is real, survives costs and turnover, and holds across market regimes.
Investment and portfolio analysts	Performance metrics read correctly, factor and risk models, and the incremental value of a signal inside an existing portfolio.
Finance professionals and decision-makers	The ability to challenge a research proposal, ask the right questions of a model, and communicate a recommendation with its limitations.

2.1 What you need before starting

- Familiarity with basic arithmetic, percentages and algebra is useful. No prior Academy level is needed for Level I.
- No programming is required for the core curriculum. The electives develop mathematics (from foundations and linear algebra to Calculus III), descriptive statistics and Python for those who want them.
- Curiosity about why a result holds, and willingness to question attractive numbers.

3. What you will learn and gain

Each level develops one professional competence. The objectives below are the ones the level is built and examined around.

3.1 Level I: Quantitative Foundations & Financial Reasoning

> **Competence.** Read financial evidence with conceptual clarity, numerical intuition, and an awareness of statistical uncertainty.

- Interpret core financial and statistical measures.
- Understand probability and uncertainty.
- Recognize misleading statistical conclusions.
- Read basic quantitative research exhibits.

3.2 Level II: Applied Quantitative Research & Strategy Validation

> **Competence.** Assess research methodology, challenge empirical evidence, and judge whether a strategy evaluation is credible.

- Evaluate backtesting methodology.
- Identify research biases and data leakage.
- Interpret out-of-sample performance.
- Challenge weak research conclusions.
- Assess practical strategy economics.

3.3 Level III: Advanced Quantitative Research & Professional Decision-Making

> **Competence.** Integrate multiple quantitative concepts into a defensible professional decision under incomplete evidence.

- Evaluate competing quantitative models.
- Judge statistical and economic evidence.
- Understand model deterioration and research uncertainty.
- Assess portfolio integration and implementation constraints.
- Defend a research recommendation through a final applied project.

3.4 What you take away

- A working toolkit for reading, validating and challenging quantitative research, from a single return calculation to a full strategy proposal.
- The habit of separating evidence from narrative, statistical significance from economic value, and a backtest from a decision.
- Practice writing research reviews and recommendations that state their assumptions and limitations.
- On completing every requirement, the Certificate in Applied Quantitative Research.

4. Level I: Quantitative Foundations & Financial Reasoning

> **Foundational level.** *What do the numbers actually tell us?*

Develop the statistical intuition and quantitative reasoning required to understand and interpret financial evidence.

No prior Academy level is required. Basic mathematical familiarity is useful.

4.1 Core modules

No.	Module and what it introduces
0	**Start Here: The World of Quantitative Research** Before any formula, this module answers the questions most people have when they first meet the field: what quantitative researchers actually do, what a working day looks like, which skills matter, how research ideas are born, what kinds of strategies exist, how the careers and pay work, and where AI fits. **Sections:** What quantitative research is; A typical day of a quantitative researcher; The skills that matter, and where you will build them; Where research ideas come from, and how they become questions; The main families of quantitative strategies; Careers and compensation; How AI helps quantitative researchers, and where it does not; Your roadmap through Level I. *Orientation, not examined.*
1	**Thinking Like a Quant** You do not need to predict the next market move to think like a researcher. Start by making a claim precise enough to be wrong, then ask what evidence would change your mind. **Key topics:** Hypotheses and evidence; Uncertainty and benchmarks; Prediction versus explanation **You will be able to:** Distinguish a testable hypothesis from an appealing market narrative.
2	**Financial Data & Returns** A performance number is a calculation with conventions behind it. Learn to reconstruct that calculation before deciding whether the headline is meaningful. **Key topics:** Simple and log returns; Compounding and volatility; Dividends, adjustments, frequency **You will be able to:** Explain why a 50% gain followed by a 50% loss does not break even.
3	**Probability for Financial Markets** Accuracy is only one ingredient in a research decision. Learn to combine probabilities with payoffs, information, and the frequency of the events you are trying to detect. **Key topics:** Conditional probability and independence; Base rates and Bayes; Expected value and payoff asymmetry **You will be able to:** Explain why a signal with 70% directional accuracy may still lose money.
4	**Financial Distributions** An average compresses a whole collection of outcomes into one number. This module teaches you to recover the risk information that the average leaves out. **Key topics:** Mean, median, variance; Skewness and kurtosis; Fat tails, outliers, normality **You will be able to:** Explain how identical average returns can conceal very different risks.
5	**Financial Performance Metrics** There is no single number that ranks every strategy fairly. Build a compact performance view that separates growth, consistency, downside, and the assumptions behind each ratio. **Key topics:** CAGR, drawdown, volatility; Sharpe and Sortino; Win rate, profit factor, comparability **You will be able to:** Compare two profitable strategies using their risk characteristics.

No.	Module and what it introduces
6	**Correlation & Dependence** Two columns that move together may be one source of information in disguise. Learn what dependence measures reveal, what they miss, and why that matters for research and diversification. **Key topics:** Covariance and correlation; Ranks and autocorrelation; Spurious relationships and diversification **You will be able to:** Recognize when correlated signals offer little independent information.
7	**Statistical Inference** A measured effect is not the same as a known effect. Learn the language used to move from a sample result to a careful claim about uncertainty. **Key topics:** Sampling and confidence intervals; Hypothesis tests and p-values; Effect size and statistical power **You will be able to:** Distinguish statistical significance from economic value.
8	**Behavioral Finance & Market Psychology** Markets are made of people, and people do not process risk like a textbook. **Key topics:** Prospect theory and loss aversion; Cognitive and emotional biases; Overreaction, underreaction and technical analysis **You will be able to:** Explain why a loss-averse investor may refuse a bet with positive expected value.
9	**Machine Learning Foundations** Machine learning lets a computer learn a rule from examples instead of being told the rule. **Key topics:** Models, loss and gradient descent; Linear models, trees, ensembles and neural networks; Overfitting, validation and precision versus recall **You will be able to:** Explain why a model with low training error can still predict badly on new data.
10	**Reading Quantitative Evidence** You now have the tools to review a research exhibit rather than just read its headline. Bring the pieces together and write a recommendation that the evidence can actually support. **Key topics:** Tables and denominators; Charts and sample sizes; Unsupported claims and research recommendations **You will be able to:** Identify unsupported claims in a quantitative research report.

4.2 Electives

Optional tracks that develop supporting skills at this level. Each has its own progress and can be studied at any time; electives do not affect examination eligibility.

No.	Elective	What it covers
E1	**Mathematical Foundations & Linear Algebra** Mathematics	Build mathematical confidence, then study pure linear algebra with step-by-step examples, geometric interpretation, and quick checks, closing with mental math techniques. **Topics:** Percentages and units; Equations and functions; Powers and logarithms; Summation; Vectors and dot products; Matrices and linear systems; Linear combinations, span, and subspaces; Independence, bases, and dimension; Row reduction, rank, and null spaces; Linear maps, inverses, and determinants; Vector geometry and cross products; Projections and least squares; Gram-Schmidt and change of basis; Eigenvalues and symmetric matrices; Covariance and portfolio risk; Mental math: left-to-right arithmetic, squares and percentages
E2	**Introduction to Descriptive Statistics** Descriptive statistics	A compact companion to the core course: calculate medians and modes, compare ranges and quartiles, read empirical percentiles, and build honest frequency summaries. **Topics:** Medians and modes; Range and quartiles; Empirical percentiles; Frequency tables and histograms; Units and transformations; Boxplots and a descriptive audit
E3	**Introductory Python for Research** Python	Learn to read basic Python and follow simple pandas workflows, with code examples and instant-feedback checks. **Topics:** Syntax and objects; Strings and numbers; Lists, tuples, dictionaries, and sets; Conditions and loops; Functions; pandas tables; Filtering and missing data; Returns, grouping, and joins

4.3 Practice and assessment

- Quick checks with explained answers in every section of every module.
- Research cases with exhibits and charts, written as committee or review scenarios.
- A Python workshop of applied tasks, run in your own Python environment (optional).
- A practice assessment to rehearse the official examination.
- 50 interview questions with model answers, open from the day you enroll.
- The official Level I examination: 40 multiple-choice questions, pass mark 75%.

5. Level II: Applied Quantitative Research & Strategy Validation

> **Intermediate level.** *Is this research credible, robust, and economically meaningful?*

Learn to evaluate backtests, assess predictive signals, identify methodological biases, and judge the robustness of quantitative research.

Level II is open to Level I students and to students of the complete program. Its examination requires a pass in the Level I examination.

5.1 Core modules

No.	Module and what it introduces
0	**Start Here: From Reading Evidence to Validating Research** Level I taught you to read quantitative evidence. Level II teaches you to judge a strategy's research the way a professional reviewer does: is it credible, robust and economically meaningful? This short module explains what changes at this level, why most attractive backtests fail, and how the thirteen modules fit together. **Sections:** What changes in Level II; The Level II roadmap. *Orientation, not examined.*
1	**From a Research Idea to a Testable Hypothesis** A plausible idea is a starting point. Learn to turn it into a research protocol another analyst could challenge, reproduce, and potentially reject. **Key topics:** Research hypotheses; Scope; Testability **You will be able to:** Assess whether a research hypothesis is sufficiently defined.
2	**Research Design, Benchmarks & Backtesting** A backtest is a model of a decision process. Examine its assumptions before reading its performance curve. **Key topics:** Research design; Benchmarks; Backtest methodology **You will be able to:** Review whether a backtest design addresses its stated question.
3	**Financial Data Quality & Point-in-Time Integrity** Research quality starts with the observations you are allowed to use. Learn to inspect timestamps, revisions, identifiers, and missingness before modeling. **Key topics:** Data quality; Historical availability; Point-in-time integrity **You will be able to:** Identify data-integrity questions in an empirical study.
4	**Look-Ahead Bias, Leakage & Survivorship Bias** A strategy can look predictive because the experiment gives it an unfair advantage. Learn to locate contamination in the complete research process. **Key topics:** Look-ahead bias; Leakage; Survivorship **You will be able to:** Challenge a research design for potential information contamination.
5	**In-Sample, Out-of-Sample & Walk-Forward Evaluation** Independent evaluation is a research resource. Learn how to protect it, use chronological tests, and interpret results without quietly turning every test into more training. **Key topics:** Sample separation; Out-of-sample testing; Walk-forward design **You will be able to:** Assess the credibility of a proposed validation framework.

No.	Module and what it introduces
6	**Evaluating Predictive Signals and Forecasts** Predictive quality depends on the question and the loss function. Learn why accuracy, forecast error, probability quality, and trading value can disagree. **Key topics:** Predictive signals; Forecast metrics; Evaluation context **You will be able to:** Judge whether reported metrics support a predictive claim.
7	**Multiple Testing, Data Mining & False Discoveries** The best result from a large search is not the same evidence as one prespecified result. Learn to inspect the whole research process, including the discarded experiments. **Key topics:** Multiple testing; Selection; False discoveries **You will be able to:** Identify research-selection concerns in a reported result.
8	**Financial Time Series & Market Regimes** Financial observations arrive in time, often with dependence and changing conditions. Learn to judge how much evidence a historical sample actually provides. **Key topics:** Time-series structure; Regimes; Evaluation periods; Brownian motion and Itô's lemma **You will be able to:** Question whether an evaluation reflects relevant market conditions.
9	**Transaction Costs, Turnover & Strategy Economics** A gross statistical advantage must survive the process that turns a forecast into a position. Inspect costs, turnover, financing, and capacity with explicit units. **Key topics:** Transaction costs; Turnover; Economic significance **You will be able to:** Assess the implementation assumptions behind a strategy claim.
10	**Robustness, Sensitivity & Stress Testing** Robustness is a collection of questions about how much a conclusion depends on reasonable choices. Learn to stress the research without turning stress tests into another search for the best headline. **Key topics:** Sensitivity; Stress scenarios; Robustness **You will be able to:** Evaluate the scope of a strategy robustness review.
11	**Return, Risk & Factor Models** Methodology tells you whether evidence is credible; models turn that evidence into exposures, risk forecasts and position sizes. Learn the regressions, factor models, volatility models and sizing rules a researcher uses every day, together with what each one assumes. **Key topics:** Regression and factor models; Volatility forecasting; Risk allocation and sizing; No arbitrage and Arbitrage Pricing Theory **You will be able to:** Estimate exposures, forecast volatility and size a position with stated assumptions.
12	**Deep Learning for Financial Time Series** Deep learning stacks many simple computations into very flexible models. Learn how multilayer perceptrons, recurrent networks, LSTMs and transformers process data, how they are trained without overfitting, and why in finance a deep model must earn its place against simple, well-validated baselines. **Key topics:** MLPs and training; RNN and LSTM; Transformers and attention **You will be able to:** Explain how an LSTM or transformer forecaster works and what it must beat to be credible.
13	**Portfolio Integration & Professional Research Review** Bring the evidence together. A professional recommendation weighs data validity, independent evaluation, implementation, and incremental portfolio value, not one impressive statistic. **Key topics:** Portfolio fit; Evidence review; Research recommendation **You will be able to:** Prepare a structured assessment of a research proposal.

5.2 Electives

Optional tracks that develop supporting skills at this level. Each has its own progress and can be studied at any time; electives do not affect examination eligibility.

No.	Elective	What it covers
E1	**Calculus I & II** Mathematics	Study single-variable calculus with worked steps, visual explorations, and immediate-feedback checks: from limits and derivatives to integrals, series, and approximation error, closing with mental math techniques. **Topics:** Limits and continuity; Derivatives and the chain rule; Trigonometric and implicit differentiation; Related rates, curvature, and local approximation; Single-variable optimization; Definite and indefinite integrals; The fundamental theorem of calculus; Integration techniques and improper integrals; Numerical integration, geometry, and differential equations; Parametric curves and polar coordinates; Sequences, series, and Taylor approximations; Probability densities and research sensitivities; Mental math: two-digit products, division, roots, logarithms and checks
E2	**Applied Descriptive Statistics** Descriptive statistics	Compare research samples using weighted summaries, robust location and scale, within- and between-group dispersion, conditional tables, and consistent time windows. **Topics:** Weighted means and composition; Weighted quantiles; Trimmed and winsorized summaries; Median absolute deviation; Pooled dispersion; Conditional tables and Simpson's paradox; Rolling summaries and missing observations
E3	**Intermediate Python for Research** Python	Build reliable research workflows with explained code examples, revealable output, and interactive checks on NumPy, pandas, timing, validation, and reproducibility. **Topics:** Reusable functions and modules; NumPy arrays and broadcasting; pandas time-series alignment; Rolling and expanding calculations; Point-in-time joins; Validation and testing; Reproducible research workflows

5.3 Practice and assessment

- Quick checks with explained answers in every section of every module.
- Research cases with exhibits and charts, written as committee or review scenarios.
- A Python workshop of applied tasks, run in your own Python environment (optional).
- A practice assessment to rehearse the official examination.
- 50 interview questions with model answers, open from the day you enroll.
- The official Level II examination: 40 multiple-choice questions, pass mark 75%.

6. Level III: Advanced Quantitative Research & Professional Decision-Making

> **Advanced level.** *Would you approve this research for real-world deployment?*

Evaluate competing research proposals, forecast models, portfolio applications, and complex evidence. Develop the ability to defend professional research decisions.

Level III is open to Level II students and to students of the complete program. Its examination requires a pass in the Level II examination.

6.1 Core modules

No.	Module and what it introduces
0	**Start Here: Professional Research Judgment** Level III is about the decisions senior researchers, risk committees and portfolio managers make when evidence is incomplete and the stakes are real. **Sections:** What changes in Level III; The Level III roadmap and the final project. *Orientation, not examined.*
1	**Professional Research Judgment Under Uncertainty** You are reviewing a proposal, not solving a puzzle with a guaranteed winning answer. Set an evidence standard, separate fatal defects from uncertainty, and decide what can safely be learned next. **Key topics:** Uncertainty; Decision criteria; Competing evidence **You will be able to:** Structure a defensible research decision under uncertainty.
2	**Advanced Statistical Inference & Performance Validation** Treat inference as a model of uncertainty with a sampling design, not a significance badge. Your job is to identify the unit of independent evidence, the selection process, and the economic claim the interval can actually support. **Key topics:** Inference; Performance validation; Evidence strength **You will be able to:** Assess the inferential support for a performance claim.
3	**Dependence-Aware Validation & Research Overfitting** Design evaluation around information intervals, cross-sectional groups, and the complete model-selection procedure. A mathematically neat split can still answer a question no live desk ever faced. **Key topics:** Dependence; Validation design; Research overfitting **You will be able to:** Critique whether validation accounts for relevant dependencies.
4	**Forecast Model Selection & Probabilistic Evaluation** A forecast is useful only relative to a target, loss function, and decision. Compare calibrated probabilities and uncertainty with the economics of acting, rather than choosing a model by directional accuracy alone. **Key topics:** Model comparison; Probabilistic forecasts; Evaluation criteria **You will be able to:** Compare forecast proposals using a structured evidence review.
5	**Structural Breaks, Regime Changes & Model Drift** A deployed model lives in changing markets. Distinguish a broken data pipeline from a changed relationship, and design responses whose costs and evidential requirements are explicit. **Key topics:** Structural change; Regimes; Model drift **You will be able to:** Identify the monitoring questions raised by changing conditions.

No.	Module and what it introduces
6	**Causality, Confounding & Spurious Alpha** Prediction and causal explanation can point in different directions. Challenge a persuasive alpha story by asking what the data can identify, which variables were conditioned on, and what alternative economic mechanisms remain. **Key topics:** Causal claims; Confounding; Spurious alpha **You will be able to:** Challenge whether an apparent effect supports its proposed explanation.
7	**Signal Redundancy & Incremental Portfolio Value** A new signal earns its place through incremental portfolio value under estimation error, constraints, and trading costs. Translate standalone skill into a decision the portfolio can actually implement. **Key topics:** Signal overlap; Incremental value; Portfolio relevance **You will be able to:** Evaluate the evidence for an incremental portfolio contribution.
8	**Liquidity, Capacity, Crowding & Execution** A strategy can have credible predictive evidence and still be impossible to implement at the intended size. Review the cost curve, order logic, financing, and joint liquidation states before approving capital. **Key topics:** Liquidity; Capacity; Crowding and execution **You will be able to:** Assess whether implementation constraints are sufficiently addressed.
9	**Stochastic Calculus & Arbitrage-Free Pricing** Continuous-time finance rests on two ideas: a calculus for functions of random paths, and the principle that prices must not allow arbitrage. **Key topics:** Martingales and Itô's lemma; SDEs and estimation; Replication and risk-neutral pricing **You will be able to:** Derive an option price from no arbitrage and keep the pricing and physical measures separate.
10	**High-Frequency Trading & Market Microstructure** High-frequency trading lives inside the order book, where profits per trade are tiny, speed is measured in microseconds and the main risks are adverse selection and operational failure. **Key topics:** Order book and microprice; Market making and adverse selection; Latency, fills and operational risk **You will be able to:** Explain how a market maker earns or loses the spread and evaluate an HFT strategy claim.
11	**Reinforcement Learning for Trading Decisions** Reinforcement learning (RL) learns to act by trial and error, choosing actions that maximize a long-run reward. **Key topics:** Markov decision processes; Q-learning and policy gradients; Execution, simulators and evaluation **You will be able to:** Formulate a trading decision as an RL problem and judge whether an RL result is credible.
12	**SQL for Research Data** Most research data lives in relational databases, and most data errors are query errors. **Key topics:** Keys, NULLs and joins; Window functions; As-of joins and reproducible queries **You will be able to:** Write a leak-free, reproducible SQL query that builds a point-in-time research dataset.
13	**Live Performance Monitoring & Model Governance** Live oversight is part of the research product. Define reproducible artifacts, timely diagnostics, responsibilities, and a controlled response to model and data failures without inventing certainty from a dashboard. **Key topics:** Monitoring; Governance; Model review **You will be able to:** Outline the oversight requirements of a proposed model.

No.	Module and what it introduces
14	**Communicating Research to Investment Decision-Makers** A professional recommendation is concise because the analysis is structured, not because the limitations are missing. Translate technical uncertainty into a decision another person can challenge and own. **Key topics:** Research communication; Limitations; Decision rationale **You will be able to:** Organize a clear research recommendation and its justification.
15	**Advanced Research Review & Final Project Preparation** Act as an independent research reviewer. Combine validity, uncertainty, forecast quality, portfolio contribution, and execution into a concise decision. **Key topics:** Integrated review; Research report; Project preparation **You will be able to:** Plan a concise, defensible evaluation of a professional research case.

6.2 Electives

Optional tracks that develop supporting skills at this level. Each has its own progress and can be studied at any time; electives do not affect examination eligibility.

No.	Elective	What it covers
E1	**Calculus III & Further Quantitative Foundations** Mathematics	Develop multivariable and vector calculus, then connect optimization, numerical linear algebra, probability, stochastic calculus, and tail risk through worked steps and explained checks, closing with mental math for interviews. **Topics:** Multivariable functions; Partial derivatives and gradients; Multivariable chain rule; Hessians and local curvature; Constrained optimization; Multiple integrals; Vector fields and line integrals; Green, Stokes, divergence, and surface flux; SVD, PCA, conditioning, and portfolio optimization; Likelihood and conditional expectation; Brownian motion, Itô, and Monte Carlo; Pricing measures, sensitivities, and tail risk; Mental math: large squares, interview constants, Fermi estimates and memory
E2	**Advanced Distributional Diagnostics** Descriptive statistics	A demanding descriptive-statistics lab on quantile shape, distribution distances, conditional diagnostics, empirical tail concentration, multivariate geometry, and defensible reporting. **Topics:** Quantile-based asymmetry; Empirical distribution distances; Conditional versus pooled change; Joint tail concentration; Partial moments and empirical tail averages; Multivariate distance and conditioning; Distributional review memo
E3	**Advanced Python & Machine Learning for Research** Python	Build numerical and ML research judgment with inspectable Python examples: stable systems, model families, time-aware evaluation, calibration, uncertainty, and deployment contracts. **Topics:** Research software architecture; Ridge, logistic models, trees, boosting, PCA, and neural gradients; Temporal and nested ML validation; Calibration, proper scores, and payoff-aware decisions; Permutation importance and conformal assumptions; Profiling and memory use; Vectorization and numerical stability; Simulation and reproducible random streams; Parallel computation tradeoffs; Robust pipelines and monitoring; Packaging and reproducibility

6.3 Practice and assessment

- Quick checks with explained answers in every section of every module.
- Research cases with exhibits and charts, written as committee or review scenarios.
- A Python workshop of applied tasks, run in your own Python environment (optional).

- A practice assessment to rehearse the official examination.
- 50 interview questions with model answers, open from the day you enroll.
- The official Level III examination: 40 multiple-choice questions, pass mark 75%.
- The applied final project, a research report reviewed manually (see section 7.3).

7. Examinations and the certificate

Study is flexible; examination and certification are rigorous. You can work through any level you are enrolled in at your own pace, but the examinations follow the order of the levels.

7.1 Official examinations

Item	Rule
Format	40 multiple-choice questions covering the core concepts of the level.
Pass mark	75%, which is at least 30 correct answers out of 40.
Duration	90 minutes as standard. Extended timing (180 minutes) or an untimed accessibility option can be selected before starting.
Feedback	Each first answer is recorded and locked, then explained, so every attempt teaches what to revisit.
Attempts	One initial attempt and 3 standard retakes.
Order	The Level II and Level III examinations each require a pass in the previous level's examination.

7.2 Certificate requirements

- Pass the official examinations of Levels I, II and III.
- Pass the manually evaluated Level III final project.
- Study completion, practice assessments and interview drills prepare you, but do not by themselves award a pass or the certificate.

7.3 The final project

A concise applied research report on a supplied research dossier: interpret the evidence, identify the methodological weaknesses, evaluate risk and economics, and support a defensible recommendation. No programming is required; a calculator or spreadsheet is enough. Quant Atlas reviews each project manually (allow up to 14 calendar days).

Assessment criterion	Weight
Statistical interpretation	**25%**
Identification of methodological flaws	**25%**
Risk and economic evaluation	**20%**
Quality of research recommendation	**20%**
Clarity and justification	**10%**

The Certificate in Applied Quantitative Research is a private, non-accredited educational certificate issued by Quant Atlas Academy. It is not a university degree, regulatory license, or independently accredited professional qualification.

8. Interview preparation

Each level includes 50 interview questions, 150 across the program. They exist for one purpose: to turn what you studied into answers you can give out loud, under pressure, to an interviewer who will push back.

8.1 What the interview workshops are for

- **Explaining, not just knowing.** Interviews test whether you can reason through a problem and justify each step. The workshops train that explanation.
- **Model answers and reasoning.** Every question comes with a model response, the reasoning behind it, follow-up questions an interviewer is likely to ask, and the weak interpretations to avoid.
- **Practice with feedback.** Choice questions give immediate feedback; written and spoken answers use guided self-review.
- **Open from day one.** Interview preparation is available from enrollment, independently of the examination, so you can return to it throughout your study.
- **Pattern recognition.** The last five questions of every level are the sequence and pattern puzzles quant interviews often include, from number sequences to recurrences and grids, each with a worked explanation.

8.2 Question categories by level

Level	Categories covered
Level I	Probability, Statistics, Distributions, Expected value, Financial mathematics, Performance interpretation, Basic quantitative reasoning.
Level II	Backtesting, Model evaluation, Data leakage, Research biases, Time-series interpretation, Strategy diagnostics, Statistical validation.
Level III	Advanced research judgment, Model selection, Portfolio risk, Forecasting decisions, Research robustness, Live model performance, Institutional research review.

The core interview preparation focuses on conceptual and applied quantitative research. The Python electives build programming, data analysis and machine-learning foundations, but they do not replace role-specific coding-interview preparation.

9. Roles the certificate targets

The program is designed around the work done in research-driven roles across asset management, trading and risk. The table shows where each part of the curriculum is most directly relevant.

Role	Where the curriculum is most relevant
Quantitative researcher	The full program, and especially Levels II and III: hypotheses, validation design, bias and leakage, multiple testing, forecast evaluation, causality and research approval.
Quantitative analyst or strategist	Level I foundations and Level II methods: returns, probability, distributions, performance metrics, inference, factor and risk models.
Quantitative trader	Strategy economics, transaction costs and turnover (Level II); liquidity, capacity, execution, high-frequency trading and market microstructure (Level III).
Risk analyst, model validation and model risk	Robustness and stress testing, structural breaks and model drift, behavioral biases, operational risk in automated trading, live monitoring and model governance.
Investment and portfolio analyst	Performance metrics, correlation and diversification, factor models, incremental portfolio value and portfolio integration.
Data scientist moving into finance	Machine learning foundations (Level I), deep learning for time series (Level II), reinforcement learning and SQL for research data (Level III), with point-in-time integrity, leakage control and the Python electives.

Successful graduates may list the certificate under professional development or certifications, with Quant Atlas Academy as the issuer, and discuss their assessed research work in interviews.

> The certificate recognizes educational achievement and assessed research reasoning. It is not a professional license and does not guarantee employment; hiring depends on your broader skills, experience and the requirements of each role.

10. A living curriculum, with permanent access

Quantitative research does not stand still, and neither does this program. The curriculum is maintained and extended over time, and students keep what they enrolled in.

10.1 Continuous updates

- Sections, worked examples, figures, research cases, interview questions and electives are added and refined as research practice and the field evolve.
- Updates to a level are included for every student enrolled in that level.
- New material goes through the same automated checks as the existing course: code exercises are executed and numerical questions are verified before publication.

10.2 Permanent access

- Access to the levels you enroll in is permanent. You can revisit any module, section, case or interview question whenever you need it, during your studies and long after.
- A recorded examination pass remains valid when new sections or modules are added. You never lose a pass or have to repeat a completed examination because the curriculum grew.

> **Our aim is access.** We are trying to make quantitative research knowledge accessible to students and professionals everywhere, not only to those who can attend expensive programs.

www.quant-atlas.com/academy