

Module 16 · Printable reference

Algorithmic Trading and Backtesting

Key concepts, worked examples and risk reminders. Use alongside the full free course.

187 Algorithmic trading basics

An algorithm implements explicit decision and execution rules.

Example: A rule buys only after a completed close crosses a moving average.

Check: Does automating a signal improve its statistical edge automatically?

Answer: No; it improves repeatability, not necessarily profitability.

Caution: Automation does not make a rule profitable.

188 Market data structure

OHLCV data represents aggregated bars; timestamps define ordering.

Example: A one-minute bar stores open, high, low, close and volume.

Check: Why distinguish bar-start from bar-end timestamps?

Answer: It determines when the aggregated values became available for a decision.

Caution: Check timezone, missing bars and symbol changes.

189 Data cleaning

Identify duplicates, missing data and impossible prices before analysis.

Example: Reject a bar where low exceeds high.

Check: H=100,L=102: valid bar?

Answer: No; the high cannot be below the low.

Caution: Do not fill missing prices in ways that create imaginary fills.

190 Signal generation

Signals must use information available at decision time.

Example: Use completed bar t to generate an order for t+1.

Check: Why not buy at the current bar's open using its closing signal?

Answer: The close was not known at the open.

Caution: Using bar t+1 to choose a signal creates look-ahead bias.

191 Execution modeling

Model when and at what prices orders could realistically execute.

Example: A next-bar market order uses next available price plus modeled slippage.

Check: Does a low touching a buy limit guarantee execution?

Answer: No; queue position, quantity and price path matter.

Caution: A bar touching a limit does not guarantee a fill.

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192 Transaction costs

Include brokerage, taxes, fees, spread and slippage as applicable.

Example: Gross gain 100 minus total cost 35 leaves net 65.

Check: Gross 100, explicit cost 20, additional slippage 15: net?

Answer: 65.

Caution: Verify actual charges rather than hardcoding stale rates.

193 Backtest metrics

Report return, drawdown, exposure and trade distribution.

Example: Net gain 5,000 on capital 100,000 gives 5% simple return.

Check: Why can a high win rate coexist with negative expectancy?

Answer: Average losses and costs may outweigh many small wins.

Caution: Compare strategies over identical horizons and exposure.

194 Look-ahead bias

Look-ahead occurs when future information leaks into historical decisions.

Example: A centered moving average includes future observations.

Check: Why is a centered rolling average unsuitable as a real-time signal?

Answer: It uses observations after the current time.

Caution: Shift signals to their true availability time.

195 Survivorship bias

Excluding failed or delisted assets distorts historical samples.

Example: Testing only current index members ignores past removals.

Check: What is wrong with testing today's index constituents ten years ago?

Answer: Membership at that earlier time may have been different.

Caution: Use point-in-time membership when relevant.

196 Overfitting

Optimizing rules to historical noise can undermine future performance.

Example: Choosing best of 500 parameter sets on one year can inflate returns.

Check: Why is choosing the best of 500 runs risky?

Answer: Multiple comparisons can make random patterns appear exceptional.

Caution: Reserve untouched data for final evaluation.

197 Walk-forward testing

Fit on past windows and evaluate on later windows repeatedly.

Example: Train January–March, test April, then move forward.

Check: Can you change parameters after seeing April and still call April untouched test data?

Answer: No.

Caution: Do not retune using the test window before scoring it.

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198 Paper trading

Paper trading rehearses signals and operations without committing funds.

Example: Record simulated orders and compare with actual observable quotes.

Check: Why compare simulated fills with actual quotes?

Answer: To detect overly optimistic execution assumptions.

Caution: Simulated fills may be more favorable than real execution.

199 Operational safeguards

Automated systems need limits, monitoring and fail-safe handling.

Example: Reject duplicate orders and halt new entries after stale data.

Check: What should occur after a timeout with unknown order status?

Answer: Reconcile with the broker before retrying to avoid duplicate exposure.

Caution: A kill switch does not guarantee liquidation.

200 Deployment review

Evaluate operational readiness before considering live trading.

Example: Check credentials, logs, reconciliation and failure recovery.

Check: Does a profitable backtest demonstrate readiness for live execution?

Answer: No; operational, regulatory and execution risks require separate validation.

Caution: Start with simulation; never assume historical profitability persists.

Further reading

SEBI investor education: investor.sebi.gov.in · NSE: nseindia.com. References for background only; no endorsement or independent validation is implied.

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