

ALGOTRADING101

Full Syllabus Overview

Here Is What You Are In For

Full Syllabus – Key Learning Objectives

Note: These are broad learning objectives NOT specific lectures

- 1. Here's What You Are In For!**
 - a. What is an Algo Trading Robot, its key traits and code structure
 - b. What makes a successful Algo Trader
 - c. How to set up and navigate your infrastructure/coding software
- 2. Programming Basics 1: Variables and Conditional**
 - a. Basics of our coding language (MQL4)
 - b. Syntax, Variables, Operations and Conditional Expressions
- 3. Robot 1: Adeline - Our First Robot!**
 - a. Background to Forex markets, chart reading, basic indicators
 - b. Coding Adeline together
 - c. Testing Adeline using past data
 - d. Brief look at modelling quality
- 4. Uncommon Common Sense. Design Effective And Logical Robots**
 - a. Overview of our Strategy Development Guide
 - i. Preliminary Research
 - ii. Backtesting
 - iii. Optimisation
 - iv. Live Execution
 - b. Pros and Cons of an Algo Trading Robot
 - c. Mathematical Expectations of our robots' performance
- 5. Garbage In, Garbage Out. Understanding Data**
 - a. Data Sources and Storage
 - b. A look at the importance of data cleanliness
 - c. Cleaning data (basic)
 - d. Bad ticks, inaccurate testing and market tricksters
- 6. Programming Basics 2: Loops**
 - a. Learning how to code loops
 - b. Practice Exercises for Loops
- 7. Robot 2: Belinda - Utilising Volatility!**
 - a. Our first measure of volatility (ATR)
 - b. Introducing Belinda, the improved version of Adeline
 - c. Coding and testing Belinda
- 8. To Buy Big or Small? Position Sizing and Money Management**
 - a. Understanding trade/bet size (how much to trade per position) using a coin flip game
 - b. Designing a bet sizing algorithm based on account size
 - c. Coding our bet sizing algorithm
- 9. Robot 2A: Belinda Upgraded (No Gambler's Ruin for Me!)**
 - a. Implementing our bet sizing algorithm in Belinda
- 10. Where To Start? Idea Generation and Expectations**
 - a. Setting expectations for our robots based on our resources, personality, skill set, lifestyle and goals
 - b. A look at the different types of strategies
 - c. Grading ideas - Introducing our framework for vetting ideas

11. Programming Basics 3: Functions, Time and Self-Learning

- a. Learn to learn programming
- b. Code errors and debugging
- c. Coding Functions
- d. Practice Exercises for Functions

12. Relevant Statistics 101!

- a. Statistical significance and Law of Large numbers and their role in robot testing
- b. Deriving suitable minimum sample size for our backtests

13. Validating Your Robot: Backtesting!

- a. Ensuring code accuracy
- b. Types of market condition
- c. Testing for Robustness
 - i. Period Robustness
 - ii. Timeframe Robustness
 - iii. Seasonal Robustness
 - iv. Instrument Robustness
- d. Building robots for specific market conditions
- e. Stress testing our robots through black swans
- f. The butterfly Effect – Backtest bias via start point selection
- g. Grading the performance of our robots

14. Programming Basics 4: Arrays And Indicators

- a. A look at our mentality towards Indicators
- b. Math behind Indicators
- c. Coding Arrays and Indicators

15. Robot 3: Clarissa – Playing with Time

- a. Understanding the Datetime data type
- b. Coding rules revolving date and time manipulation
- c. Introducing and coding Clarissa – our robot that uses time entries

16. What A Mess - Managing Trades, Orders and Positions

- a. Order limitations by your brokers
- b. Coding our customised order function
- c. Multiple order management
- d. Modelling transaction cost, spreads and slippage

17. Robot 4: Desiree

- a. The history of the Turtle Traders
- b. Introducing and coding a simplified turtle strategy

18. Design Theories - Improving Robots By Manipulating Time, Entries and Exits

- a. Profitability in different timeframes
- b. Deriving optimal stop loss levels
- c. Comparing the importance of entries vs exits
- d. Analysing asymmetrical long and short rules

19. Add A Twist To Your Orders - Advanced Order Management

- a. Breakeven and trailing stops
- b. Hiding from your broker - Creating virtual stops and take profit orders

20. Robot 5: Desiree 2.0

21. Programming Basics 5: Clean Up Your Codes! Simple Is Fast!

- a. Clean and robust coding
- b. MT4 Global Variables
- c. MQL4 Libraries

22. Garbage In, Garbage Out Again. Advanced Data Cleaning

- a. Creating custom timeframes
- b. Cleaning data (advanced)
- c. Understanding and manipulating tick data

23. Perfect Your Bet Sizing - Advanced Position Sizing Methods

- a. Relationship between sizing and trading frequency
- b. Gearing up and down with volatility
- c. Impossible Trinity of Sizing - Relationship between Leverage, % Risked and Stop Loss
- d. First Principles of sizing - Building customised sizing algorithms
- e. Other types of sizing - Kelly Criterion, Martingales and Anti-Martingales

24. Robot 6: Elizabeth

25. Buff Up Your Robot Responsibly - Optimisation Without Curve Fitting

- a. Objective Functions, Robustness and Curve Fitting
- b. Parameter Robustness
- c. In and out-of-sample testing
- d. Optimisation Evaluation

26. I Like Colors And Shapes - Adding Graphics

- a. Creating a Dashboard: Graphics and Labels

27. Robot 7: Faye

28. Try And Try Again - Monte Carlo And Applications

- a. Basics of Monte Carlo Simulations
- b. Simulating expected and worst case behaviour

29. Not Rocket Science - Understanding Market Behaviour

- a. Self-fulfilling Prophecies
- b. Exploiting crowd behaviour
- c. Inverting losing strategies
- d. The switch - Changing trading rules in different market conditions

30. Breaking It Down - Testing Inefficiencies and Robots Separately

- a. Separately inefficiency analysis and robot testing
- b. Building multiple robots for one inefficiency

31. Looking Outwards - Trading On External Events

- a. Feeding external data into MT4
- b. Coding external events trade system

32. Robot 8: Grace

33. Understanding Performance - High Returns Are Meaningless!

- a. Robust Objective Functions
- b. Drawdown analysis
- c. Using external performance analyser

34. When Robots Fail - How, Why And Is It My Fault?

- a. Understanding and quantifying strategy failure
- b. Inefficiency erosion versus robot failure
- c. Black Swans and risk management systems

35. Robot 9: Haley

36. Walking Forward - Advanced Optimisation

- a. Customising Objective Functions
- b. Walk Forward Optimisation
- c. Performance patterns, consistency and seasonality

37. Let's Academise This! - Advanced Statistics And Econometrics

- a. Understanding Chance
- b. Multi-variable regression
- c. Mean reversion and Cointegration

38. Robot 10: Iris

39. I Want Numbers! - Quantifying Market Behaviour

- a. Defining Trends, Support and Resistance
- b. Analysing news and market reaction

40. Ring Ring! Notify Yourself When Something Goes Wrong (Or Right)

- a. Coding email and smartphone notifications
 - i. Price Levels
 - ii. Opening and Closing of Positions
 - iii. Equity threshold breached, Auto-Shutdown levels
 - iv. Uptime check
- b. Set up notifications in MT4 without coding

41. Robot 10A: Iris 2.0

42. Looking To The Future! - Advanced Optimisation 2.0

- a. Genetic versus Brute force Optimisation
- b. Walk-Forward Parameter Space evaluation
- c. Granularity analysis - Trading multiple parameter sets
- d. Rank optimisation - Stability of the parameter set

43. Time For Equities, Commodities And Bonds

- a. Spot versus Contract-For-Differences
- b. Data management for non-forex products
- c. Leverage, Margin and Point Value
- d. Modifying our robots to suit non-forex products

44. Everything is Relative - Relative Value Strategies

- a. Correlation versus Cointegration
- b. Correlation versus Causation
- c. (Legal) Market manipulation - Creating our own market conditions
- d. Pair Trading
- e. Multiple Pair Trading – (Low frequency) Statistical Arbitrage
- f. Hedge Ratio Theories
- g. The third party - Using proxy assets as reference

45. Robot 11: Judy

46. Many Robots One System - Running A Portfolio Of Robots

- a. Portfolio Robustness
- b. Capital Reallocation
- c. Robot performance correlation
- d. Portfolio Optimisation

47. Robot 12: Kate

48. Cash Is King! - Running Robots With Real Money

- a. Paper versus Live trading
- b. Minimum Capital Determination
- c. Broker Selection
- d. Virtual Private Servers
- e. Downtime Prevention Protocol
- f. Hedging issues

49. Watch Her Well - Monitoring Your Robot(s)

- a. Monitoring our robots
- b. Understanding Trading Psychology - Emotions during drawdowns
- c. When to manually intervene
- d. Reviewing performance - Updating our robots regularly

50. Buy This Robot, It Makes 100% A Month! - Evaluating Commercial Robots

- a. Commercial robots evaluation

51. Skynet - Robots That Think For Themselves

- a. Random Walk
- b. Artificial Neural Networks (ANN)
- c. Simple ANN application in finance

52. Robot 13: Lynda (Skynet)

53. Bonus Stuff!

- a. 2 Gigabyte of data
- b. 6 robot template

Note: This list may be subject to change.