##### EPAT Primer

* Basics of Algorithmic Trading: Know and understand the terminology
* Excel: Basics of MS Excel, available functions and many examples to give you a good introduction to the basics
* Basics of Python: Installation, basic functions, interactive exercises, and Python Notebook
* Options: Terminology, options pricing basic, Greeks and simple option trading strategies
* Basic Statistics including Probability Distributions
* MATLAB: Tutorial to get an hands-on on MATLAB
* Introduction to Machine Learning: Basics of Machine Learning for trading and implement different machine learning algorithms to trade in financial markets

##### Statistics for Financial Markets

* Data Visualization: Statistics and probability concepts (Bayesian and Frequentist methodologies), moments of data and Central Limit Theorem
* Applications of statistics: Random Walk Model for predicting future stock prices using simulations and inferring outcomes, Capital Asset Pricing Model
* Modern Portfolio Theory - statistical approximations of risk/reward

##### Python: Basics & Its Quant Ecosystem

* Data types, variables, Python in-built data structures, inbuilt functions, logical operators, and control structures
* Introduction to some key libraries NumPy, pandas, and matplotlib
* Python concepts for writing functions and implementing strategies
* Writing and backtesting trading strategies

##### Market Microstructure for Trading

* Detailed understanding of ‘Orders’, ‘Pegging’, ‘Discretion Order’, ‘Blended Strategy’
* Market Microstructure concepts, order book, market microstructure for high frequency trading strategy
* Implementing Markow model and using tick-by-tick data in your trading strategy

##### Equity, FX, & Futures Strategies

* Understanding of Equities Derivative market
* VWAP strategy: Implementation, effect of VWAP, maintaining log journal
* Different types of Momentum (Time series & Cross-sectional)
* Trend following strategies and Statistical Arbitrage Trading strategy modeling with Python
* Arbitrage, market making and asset allocation strategies using ETFs

##### Data Analysis & Modeling in Python

* Implement various OOP concepts in python program - Aggregation, Inheritance, Composition, Encapsulation, and Polymorphism
* Back-testing methodologies & techniques and using Random Walk Hypothesis
* Quantitative analysis using Python: Compute statistical parameters, perform regression analysis, understanding VaR
* Work on sample strategies, trade the Boring Consumer Stocks in Python

##### Machine Learning for Trading

* Modeling data with AI, index and predicting next day’s closing price
* Supervised learning algorithms, Decision Trees & additive modeling
* Confusion Matrix framework for monitoring algorithm’s performance
* Logistic Regression to predict the conditional probability of the market direction
* Ridge Regression and Lasso Regression for prediction optimization
* Understand principle component analysis and back-test PCA based long/short portfolios

##### Trading Tech, Infra & Operations

* System Architecture of an automated trading system
* Infrastructure (hardware, physical, network, etc.) requirements
* Understanding the business environment (including regulatory environment, financials, business insights, etc.) for setting up an Algorithmic Trading desk

##### Advanced Statistics for Quant Strategies

* Time series analysis and statistical functions including autocorrelation function, partial autocorrelation function, maximum likelihood estimation, Akaike Information Criterion
* Stationarity of time series, Autoregressive Process, Forecasting using ARIMA
* Difference between ARCH and GARCH and Understanding volatility, Non linearity of volatility, Gaussian Mixture Models (GMM)

##### Trading & Back-testing Platforms

* Introduction to Interactive Brokers platform
* Code and back-test different strategies on various platforms
* Using IBridgePy API to automate your trading strategies on Interactive Brokers platform

##### Portfolio Optimization & Risk Management

* Different methodologies of evaluating portfolio & strategy performance
* Risk Management: Sources of risk, risk limits, risk evaluation & mitigation, risk control systems
* Trade sizing for individual trading strategy using conventional methodologies, Kelly criterion, Leverage space theorem

##### Options Trading & Strategies

* Options Pricing Models: Conceptual understanding and application to different strategies & asset classes
* Option Greeks: Characteristics & Greeks based trading strategies
* Implied volatility, smile, skew and forward volatility
* Sensitivity analysis of options portfolio with risk management tools

##### Hands-on Project

* Self-study project work under mentorship of a domain/expert
* Project topic qualifies for area of specialization and enhanced learning