BITS Pilani, KK Birla Goa Campus

Wall Street Club in association w/ the Center for Technical Education

Introduction to Quantitative Finance

Instructors:

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Mentors:

Quant Wing of the Wall Street Club

Scope:

Introduction:

Quantitative finance is widely dubbed as the “future of finance” with the current growth in artificial intelligence and computational power. Simply put, it is the application of mathematics and computing to effectively model various financial scenarios. This leads to a better way to analyze financial markets by leveraging data, computation and automation with minimal supervision. This area is a rapidly growing career option for engineers, physicists, mathematicians, statisticians and economists alike.

Overview:

The objective of this course is to serve as an introduction to the key mathematical, financial and computational concepts of this field; and as such, the course will broadly be covered into these three phases

- Phase 1: Algorithmic Trading
- Phase 2: Mathematical Finance (Book that will be followed: Paul Wilmott Introduces Quantitative Finance)
- Phase 3 : Sentiment Analysis and Application of Quantitative Finance

The students will be introduced to the various challenges, approaches and models currently used by researchers and industry players alike. This course will focus on using Python, because of its wide popularity, functionality and simplicity.

Structure:

Sr. No	Week No.	Key Content	Target
Introduction / Orientation			
1	Week 1	What is quantitative finance? What is the motivation? Financial data, simple stock market data and how to manipulate data in Python.	This week will serve as an introduction / orientation for the course. In the hands-on tutorials, the students will be familiarized with Python libraries like numpy, pandas, scikit etc and to the open source platform GitHub.
PHASE 1: Algorithmic Trading			
2	Week 2	- introducing fundamental and technical analysis - explaining the idea of backtesters and APIs in order to trade on the market	First week of phase 1 - mathematical finance. This week will be aimed at introducing key financial concepts in a quantitative manner.
3	Week 3	- Using API to make algorithms that trade in the live market - Demos of a few trading strategies - How to make backtesters for your own strategies	In week 3, we will dive into creating trading algorithms that trade on the live market using APIs. This will be followed by our own examples of strategies work.
4	Week 4	- Implementation and doubt solving for phase 1 - Phase 1 assignment(release)	Discussion of the doubts of the students and an assignment based on backtesting will be released.

PHASE 2: Mathematical Finance			
5	Week 5	- Introduction to mathematical finance - Discussion of very elementary mathematical models	Students will be introduced to the concept of derivatives and how they are modeled using math. First few models of quant finance will be introduced
6	Week 6	- Stochastic Calculus - Everything about black scholes equation and formula	This week will serve as the most important one for phase 2 and extensive discussion
7	Week 7	- Hedging and building complications upon the basic BSE - Phase 2 assignment release	This week will provide a high level overview of BSE and how to build complications on it in order to model it more accurately and realistically Finally we shall release an assignment for this phase

PHASE 3: Sentiment Analysis and Application of Quantitative Finance			
8	Week 8	- Sentiment Analysis using Twitter - Assignments and Final Project	This week will help you apply your knowledge into real world projects with an example of using live Twitter data to analyze market sentiment

Evaluation:

The evaluation will have three components corresponding to the three phases of the course. The weightage is as follows:

40% - Phase 1 assignment submission
40% - Phase 2 assignment submission
20% - Phase 3 assignment submisison

Considerations can be made in deadlines if the student has a good class participation record.