# Shanghai Jiao Tong University

# CS296 Machine Learning for Finance in Python

| Instructor Information | Jackson Jinhong Mi<br>Home Institution: Shanghai Maritime University<br>Email: jhmi@shmtu.edu.cn<br>Office Hours: Determined by Instructor | | |
|---|---|---|---|
| Term | March 22, 2021 - June 11, 2021 | Credits | 3 units |
| Class Hours | Once per week, 150 mins per teaching day | | |
| Discussion Sessions | 1 hour each week, conducted by teaching assistant(s) | | |
| Total Contact Hours | 56 contact hours (1 contact hour = 45 mins, 2520 mins in total) | | |
| Required Texts (with ISBN) | Python for Data Analysis, Wes McKinney, O'Reilly, 2012, ISBN：978-1-449-31979-3<br><br>Machine Learning for Finance: The Practical Guide to Using Data-Driven Algorithms in Banking, Insurance, and Investments, Jannes Klaas, Packt Publishing, 2019 ISBN 978-1-78913-636-4 | | |
| Prerequisite | Students are expected to have a thorough knowledge of all material covered in an introductory finance course. | | |

**Course Overview**

This course is designed for those students have no experience or limited experience on Python. This course will cover the basis syntax rules, modules, importing packages (Numpy, pandas), data visualization, and Intro for machine learning on Python. The aim of the course is to provide a broad understanding of the principles and techniques of Python coding for finance applications mainly through the use of Ipython and Jupyter notebook with intuitively visualized output. The learning objectives will be achieved through discussing theory and solving tasks together. Following the introductory class, the course is divided into three main sections. We will begin with the fundamentals of data reduction and clustering applied specifically to financial time series data with Python libraries. Next, we will introduce machine learning to structured data. Last, we will discuss parsing textual data with natural language processing and reinforcement learning for financial markets.

**Course Goals**

1. Use of Python with Jupyter notebook in financial problem solving.

2. Understand basic application of Machine Learning

3. Understand how data analytics can improve financial decision-making

4. Foundation for performing data analytics in finance-related roles both inside the financial sector (e.g., commercial and investment banking, venture capital, private equity, asset management) and outside the financial sector (e.g., consulting, general management, corporate development, treasury).

**Grading Policy**

| Homework | 30% |
|---|---|
| Group  project | 35% |
| Final Presentation | 35% |

**Grading Scale**

| Number grade | Letter grade | GPA |
|---|---|---|
| 90-100 | A | 4.0 |
| 85-89 | A- | 3.7 |
| 80-84 | B+ | 3.3 |
| 75-79 | B | 3.0 |
| 70-74 | B- | 2.7 |
| 67-69 | C+ | 2.3 |
| 65-66 | C | 2.0 |
| 62-64 | C- | 1.7 |
| 60-61 | D | 1.0 |
| ≤59 | F (Failure) | 0 |

**Class Schedule**

| Date | Lecture | Readings |
| --- | --- | --- |
| Week 1 | Installing Python and IPython Notebook | McKinney Ch1 |
| Week 2 | Basic Python Language I | McKinney Ch 2 |
| Week 3 | Basic Python Language II | McKinney Ch 3 |
| Week 4 | NumPy Basics | McKinney Ch 4 |
| Week 5 | Getting Started with pandas | McKinney Ch 5 |
| Week 6 | Pandas II | McKinney Ch 6, 7 |
| Week 7 | Introduction to Machine Learning: Applying Machine Learning to Structured Data | Klaas Ch 1, 2 |
| Week 8 | Understanding Time Series | McKinney Ch 10, Ch 11; Klaas Ch 4 |
| Week 9 | Parsing Textual Data with Natural Language Processing | Klaas Ch 5 |
| Week 10 | Financial Data Applications: Generative Models | Klaas Ch 6 |
| Week 11 | Financial Data Applications: Reinforcement Learning | Klaas Ch 7 |
| Week 12 | Final Presentation | |