

## 2021 FRE Pre-Program Bootcamp Curricula

\*Subject to minor changes

As of April 1, 2021

Professor David C. Shimko

### Required student preparation in advance of online course:

- Your personal laptop must be loaded with Excel. Install the **Data Analysis** and **Solver** add-ins.
- You may load your computer with a free download of Python. Anaconda is the recommended method to install the Python scientific stack. Once you have downloaded Anaconda you can run Python code in the interactive Jupyter Notebook environment. You could even try writing simple programs on your own before the bootcamp starts
- Purchase the texts for the online course, or identify alternative sources from your previous study.

### Textbooks and Online Materials:

Online portion, 5/24/21 - 7/5/21, Tuesdays and Thursdays 8:00-10:00 a.m. New York time

#### Recommended texts for preparation:

- **Guide to Financial Markets, The Economist**, 6<sup>th</sup> Edition (Free PDF available at [https://media.economist.com/sites/default/files/pdfs/Guide\\_to\\_Financial\\_Markets\\_6e.pdf](https://media.economist.com/sites/default/files/pdfs/Guide_to_Financial_Markets_6e.pdf))
- **A Primer for the Mathematics of Financial Engineering**, Second Edition (Financial Engineering Advanced Background Series), by Dan Stefanica
- **A Linear Algebra Primer for Financial Engineering**: Covariance Matrices, Eigenvectors, OLS, and more (Financial Engineering Advanced Background Series), by Dan Stefanica

Bootcamp mornings, 8/16/21 - 8/31/21

#### Required Text for Course:

- **A Practical Guide to Quantitative Finance Interviews**, Xinfeng Zhou, 2008. [Note that this will be provided as an e-book by the department]
- **Heard on the Street: Quantitative Questions from Wall Street Job Interviews**, 19<sup>th</sup> Edition, Timothy Crack, 2018. [Students will be required to purchase this book on own]

**Bootcamp afternoons, 8/16/21-8/31/21**

**Required Texts for Course:**

*(students should arrange access to these free resources)*

- **Introduction to Python for Econometrics, Statistics and Data Analysis**, author Kevin Sheppard (4<sup>th</sup> edition PDF available for free download)
- **Python Data Science Handbook**, author Jake VanderPlas (available for free on Google Colabs and Github)
- **Introduction to Statistical Learning**, authors James, Witten, Hastie, and Tibshirani (1<sup>st</sup> edition PDF, sufficient for this course, is available for free download)
- *(Optional)* **Elements of Statistical Learning**, authors Hastie, Tibshirani and Friedman (2<sup>nd</sup> edition PDF available for free download)

**Online Portion (2 hour lectures)**

Instructor: Prof David Shimko  
 Teaching Assistant: tbd  
 Time and location: 8:00 a.m. – 10:00 a.m. New York (Eastern) time  
 Course code: FRE-GY.5010

#	Date	Instr	Topic: Subtopic
1	5/26	DS	Markets: Money & foreign exchange ( <b>The Economist</b> : Ch 1-2)
2	5/28	DS	Markets: Fixed income markets (Ch 3-4)

3	6/2	DS	Markets: Corporations and equity (Ch 7)
4	6/4	DS	Markets: Exchange-traded derivatives (Ch 8-9)
5	6/9	DS	Markets: Financial institutions
6	6/11	DS	Markets: Innovation and structuring
7	6/16	DS	Calculus: Differentiation and integration, analytic and numerical
8	6/18	DS	Calculus: Constrained optimization, numerical methods
9	6/23	DS	Linear Algebra: Basics, matrices, matrix operations
10	6/25	DS	Linear Algebra: Regression and inference
11	6/30	DS	Differential Equations: Analytic solutions
12	7/2	DS	Probability: The Gaussian (normal) and related distributions
13	7/7	DS	Statistics: Hypothesis testing
14	7/9	DS	Timed exam for certificate

*Reminder:* Even if you only intend to attend selected lectures of the **online** boot camp, we highly recommend that you register. You will not be penalized for online lectures that you do not attend.

*Python note:* Google Colabs is an online environment where one can run Python code using a web browser without having Python installed on your machine. This might help those who have not downloaded Anaconda or who have had trouble with their Anaconda installations.

## Onsite Boot Camp Mornings

Instructor: Prof Pasquale Cirillo

Time and location: 9:00 a.m. - 12:00 p.m., Pfizer Auditorium

Course code: FRE-GY.5030

#	Date	Instr	Topic
1	8/16	PC	Math basics
2	8/17	PC	Basic probability
3	8/18	PC	Probability distributions, expected value, variance & covariance, order statistics
4	8/19	PC	Statistics and hypothesis testing
5	8/20	PC	Markov chains
6	8/23	PC	Martingales & Random walks
7	8/24	PC	Brownian motion and stochastic calculus
8	8/25	PC	Option pricing
9	8/26	PC	The Greeks, option portfolios and exotics
10	8/27	PC	Review and final test

## Onsite Boot Camp Afternoons

Instructor: Prof Conall O'Sullivan

Time and location: 1:00 p.m. – 4:00 p.m., Pfizer Auditorium

Course code: FRE-GY.5040

#	Date	Instr	Topic: Subtopic
1	8/3	COS	Introduction to programming in Python
2	8/4	COS	Computation and functions in NumPy
3	8/5	COS	Introduction to Pandas
4	8/6	COS	Linear regression with Statsmodels
5	8/7	COS	Times series with Python
6	8/10	COS	Introduction to machine learning and Scikit-Learn
7	8/11	COS	Hyperparameters, model validation and feature engineering
8	8/12	COS	Naïve Bayes classification and support vector machines
9	8/13	COS	Decision trees, random forests, PCA and other ML algorithms
10	8/14	COS	Final Python econometrics and machine learning project