UCLA Anderson School of Management

Preparing for MFE

The MFE is an intensive and challenging program that picks up pace quite early on. We'd strongly recommend that students start investing some of their time, between now and Fall, towards preparing for the program.

The coursework is very hands-on and requires programming in multiple languages. Below, we've put together a list of some resources that we think might help students (especially those with limited programming background, or those that need math refreshers) develop working level familiarity with some of these tools (staple for any FE).

R – Is a free and open source language, and is very popular within the industry. It is also extensively used within the program.

- R Programming (good intro course to R; very compact; can be finished over a weekend): Coursera
- Regression Models (complements the intro R course; plus great intro to regression models): Coursera
- Introduction to Computational Finance with R (R + Finance; uses R within finance context): DataCamp
- Other intro level courses: Udacity (course by Facebook)

Python – Great open source programming language, widely used in many areas of finance, fintech etc. Some important libraries to know are: Numpy, Pandas, Matplotlib and Scikit.

- Introduction to Programming with Python: EdX (Course by Harvard)
- Good for beginners: EdX (course by IBM), TutorialsPoint
- Python Data Structures (entertaining + good quick intro to basic data types used in python): Coursera
- Python Programming Tutorials: pythonprogramming.net. Python Programming tutorials from beginner to advanced on a massive variety of topics. All video and text tutorials are free.
- Wes Mckinney is ex-AQR Capital and helped develop the 'pandas' library – Book

Structured Query Language (SQL) – SQL is good to know and helpful in many ways; not just when dealing with databases, but also when manipulating data within SAS or R.

- Databases – Relational Databases and SQL: EdX (course by Stanford)
- Databases – Advanced Topics in SQL: EdX (course by Stanford)

C++ – It is also beneficial to come in with knowledge of C++.

- C++ Programming for Financial Engineering: QuantNet

Machine Learning – Growing # of firms are employing ideas from ML in financial research and trading.

- Almost everyone starts off with this course by Andrew Ng: Coursera
- Learning from Data - Caltech course that goes deep into the inherent model-building dilemma of reducing in-sample error and increasing out-of-sample generalizability, taught by Feynman Prize winner Professor Yaser Abu-Mostafa (beginner level): Caltech
- Statistical Learning (R + machine learning): EdX (course by Stanford)
- Machine Learning for Trading (ML + finance): Udacity
- Interesting set of videos combining Python + Finance: YouTube
- **Free books:**
    - An Introduction to Statistical Learning
    - The Elements of Statistical Learning
    - Deep Learning
    - Neural Networks and Deep Learning
- Videos of lectures by Andrew Ng of Stanford: YouTube
- Neural Network Frameworks:
    - TensorFlow: https://www.tensorflow.org
    - TensorFlow for R: https://tensorflow.rstudio.com
    - mxnet (Python and R): https://mxnet.incubator.apache.org
    - scikit for Python: http://scikit-learn.org/stable/

MATLAB – Great for pricing derivatives, and doing analysis involving matrix algebra.

- Introduction to Programming with MATLAB (as the name suggests it's a good introductory lecture series to gain familiarity with MATLAB. Bonus – they provide a student license of MATLAB for course duration, which is great for practice): Coursera

Additional Data Science Courses – Some free recommended online courses related to data science. Provided by Harvard through EdX.

- Data Science: Visualization
- Data Science: Probability
- Data Science: Inference and Modeling
- Data Science: Machine Learning

Additional DataCamp Resources – Each incoming MFE student will have a subscription to DataCamp at no cost while preparing for the program. The following DataCamp courses have been recommended by current MFE students.

- *Skill Tracks*: https://www.datacamp.com/tracks/skill
    - **R**
        - R Programming: R Programming (datacamp.com)
        - Importing & Cleaning Data: Importing & Cleaning Data with R (datacamp.com)
        - Data Visualization: Data Visualization with R (datacamp.com)
        - Tidyverse Fundamentals: Tidyverse Fundamentals with R (datacamp.com)
    - **Python**
        - Python Fundamentals: Python Fundamentals (datacamp.com)
        - Python Programming: Python Programming (datacamp.com)
    - **SQL**
        - SQL for Business Analysts: SQL for Business Analysts (datacamp.com)
        - SQL for Database Administrators: SQL for Database Administrators (datacamp.com)
    - **Tableau** (Good for visualizations and plots)
        - Tableau Fundamentals: Tableau Fundamentals (datacamp.com)
- *Career Tracks*: https://www.datacamp.com/tracks/career
    - **R**
        - R Programmer: R Programmer (datacamp.com)
    - **Python**
        - Python Programmer: Python Programmer (datacamp.com)
- *Courses (shorter: approx. 4-hour courses)*: https://www.datacamp.com/courses
    - **R**
        - Introduction to R: Introduction to R Online Course | DataCamp
        - Intermediate R: Intermediate R | DataCamp
        - Introduction to Tidyverse: Introduction to the Tidyverse | DataCamp
        - Introduction to Data Visualization with ggplot2: Introduction to Data Visualization with ggplot2 | DataCamp
    - **Python**
        - Introduction to Python: Introduction to Python | DataCamp
        - Intermediate Python: Intermediate Python | DataCamp
        - Data Manipulation with pandas: Data Manipulation with pandas | DataCamp
    - **SQL**
        - Introduction to SQL: Introduction to SQL | DataCamp
        - Joining Data in SQL: Joining Data in SQL | DataCamp

Additional Websites for Coding Practice – Other popular websites for coding and computer programming.

- LeetCode
- HackerRank

Math Prep Courses – Useful for brushing up on mathematical concepts used in the MFE program.

- Linear Algebra (through MIT): [Linear Algebra | Mathematics | MIT OpenCourseWare](#)

- Multivariable Calculus (through MIT): [Multivariable Calculus | Mathematics | MIT OpenCourseWare](#)

- Multivariable Calculus (through Udemy): [Calculus III (Multivariable Calculus) | Udemy](#)

- Differential Equations (through Udemy): [Differential Equations In Depth | Udemy](#)

- Complete Linear Algebra (through Udemy): [Master Linear Algebra: From Theory to Implementation | Udemy](#)

- Complete Linear Algebra (through Coursera): [Mathematics for Machine Learning: Linear Algebra | Coursera](#)

- Probability (through Coursera): [An Intuitive Introduction to Probability | Coursera](#)

- Advanced Statistics: (through UCLA Extension): [Advanced Statistics and Quantitative Methods | UCLA Continuing Education Online (uclaextension.edu)](#)

- Other Resources for Math Courses:

  o [CalcWorkshop](#)

  o [NetMath at Illinois](#)

  o [Stanford Center for Professional Development](#)

  o [Partial Differential Equations: Mathematics 476: Courses: Athabasca University](#) (must earn 80% or higher in this course)

Quant Interview Prep Resources – Books and publications recommended by the MFE Career Services Team to prepare for quantitative interviews.

- [A Practical Guide to Quantitative Finance Interviews](#) by Xinfeng Zhou (nicknamed "The Green Book")

- [Heard on the Street: Quantitative Questions from Wall Street Job Interviews](#) by Timothy Falcon Crack, PhD.

- [150 Most Frequently Asked Questions on Quant Interviews](#) by Dan Stefanica

- [Probability and Stochastic Calculus Quant Interview Questions](#) by Ivan Matic, Rados Radoicic, Dan Stefanica

- ["Quant Job Interview Questions & Answers"](#) from Street of Walls

Additional Tips and Recommendations – Other useful strategies for preparing for the MFE program.

- Practice coding and computer programming regularly to sharpen your skills.

- Get in the habit of reading publications such as [The Wall Street Journal](#) and [The Economist](#) to keep up to date with current financial news and trends.

Lastly, we've only listed some of the relevant courses available on popular MOOCs (Coursera, EdX, Udacity, Udemy, DataCamp, etc.). There are always new courses getting listed, so do check them out from time to time.