



CHARTERED FINANCIAL DATA SCIENTIST



Society of Investment
Professionals in Germany

AZEK

SWISS TRAINING CENTRE FOR
INVESTMENT PROFESSIONALS





QUOTES

**»Data Scientist: The Sexiest Job of the 21st Century«*

Thomas H. Davenport | President's Distinguished Professor in Information Technology and Management at Babson College
D.J. Patil | Chief Data Scientist of the United States Office of Science and Technology Policy

»It is a capital mistake to theorize before one has data.«

Sherlock Holmes | "A Study in Scarlett" (Arthur Conan Doyle)

»Data is the new oil ...

and Financial Data Science is the new exploration.«

David Avakian | Senior Data Scientist, BlackRock at the launch of the Financial Data Science Association in Zurich, Nov 6th 2015

»In God we trust. All others must bring data.«

W. Edwards Deming | Statistician, professor, author, lecturer, and consultant

CREDIT POINTS FOR DVFA MEMBERS

After successful completion of the CFDS programme DVFA members achieve 10 credit points as part of their self-assessment. **Learn more about membership at** www.dvfa.de/mitgliedschaft



THE DVFA QUALIFICATION PROGRAMME CFDS®

„Double certificate from DVFA & AZEK“

Chartered Financial Data Scientist has been expanded internationally since 2019 and is offered together with AZEK | Swiss Training Centre for Investment Professionals. On the respective days of inclass, the participants can exchange their experiences and benefit from each other. This programme aims to introduce finance professionals into the potentially endless opportunities which arise when insights scientifically extracted from big data are empowering financial market participants. Successful participants will significantly enhance their abilities and employability in six ways:

OBJECTIVES

1. Understand the implications of the gradual shift from the assumption based decision making of the 20th century to the evidence based, data driven decision making of the 21st century.
2. Learn to critically assess the information value of a variety of different data sets based on data source and scientific characteristics.
3. Learn to understand asset management as a data-analysis-decision-data process including general knowledge of the most effective statistical procedures for explaining the variation of asset prices.
4. Enjoy a practical session of training in the currently most popular programming language of Financial Data Science: Python.
5. Will be introduced into the world of Big Data, machine learning and deep learning methods to source insights from these data riches.
6. Learn how to visualise and communicate valuable insights gained through Financial Data Science.

After passing the exam and conducting a three month project work, successful candidates are granted the title

CFDS® – Chartered Financial Data Scientist

SYLLABUS

MODULE 1

Introduction to Financial Data Science

- What is Financial Data Science?
- Building Block 1: Computer Science & Big Data
- Building Block 2: Math & Stats
- Building Block 3: Financial Markets & Asset Management
- Financial Data Science in the context of previous industrial revolutions
- FinTech vs. Financial Data Science
- Financial Data Science vs. Financial Economics
- The Data Value Chain

Exploring and Analysing Data

- Scientific Research Design & Question formulation
- Data and Decision Making
- Understanding Cognitive Bias
- Statistical Analysis: a refresher
- Basic Distributions
- Parametric and Non-Parametric Tests
- Regression Analysis
- Integrating data and domain knowledge

Data & Asset Management: does the asset create data or is independent data the asset?

- Corporate self-reported data: accounting and/or disclosing
- Corporate self-funded data: issuer paid ratings
- Third party promotional data: sell-side research
- Independent buy-side assessments of assets: ratings & news analytics
- Macroeconomic data: accounting and/or disclosing by nation states
- Environmental data: measuring physical constraints
- Sociodemographic data: more than intergenerational shifts
- Big Data & Sociolytics: real-time tracking of societies
- Financial Market data: the most valuable information sponge of all

The Science of Data

- Independence of data
- Understanding variation
- Levels of Measurement
- The Data Generation Process & its characteristics
- Upper Partial Moment
- Lower Partial Moment
- Tracking Error vs. Trailing Error
- Machine Readability
- Data Integrity & Documentation

Understanding Asset Management from a financial data science perspective

- Data flows through asset management: Data-Analysis-Decision-Data
- Market Segment Inefficiencies & Porter's competitive forces
- Outcome variables: Risk adjusted return (Alpha) vs. Return/Risk ratio
- Control variables: Market variability (Beta) & Style Factors
- Diversification: much more non-diversifiable, firm specific risk than expected
- A data flow model Equity Investments
- Fixed Income Investments: towards a laboratory infrastructure
- Financial Data Science of Activism & Alternatives
- Business Development empowered by Data Science

Statistical Analysis of asset price variation

- Explaining variation with variables
- Statistical power & explanatory power
- OLS and alternative algorithms
- Point estimates & confidence intervals
- Cross-sectional vs. time series approaches
- Single vs. multi step methods
- Predictability vs. causality
- Equity Investment explained by Carhart's model
- Fixed Income Investment explained by Elton & Gruber's model



MODULE 2

Python for Financial Data Science

- Introduction to Python
- Basic Operations & Statistical plotting
- Pandas
- Quandl & Python
- Basic statistical analysis with Python

Big Data Storage and Retrieval

- Data at Scale: Concerns and Tradeoffs
- Distributed Data Processing
- Relational Databases
- Graph Databases
- Streaming Data Applications
- Cloud Computing

Machine Learning

- Machine Learning Pipeline Setup
- Experimental Design
- Feature Engineering & Dimensionality Reduction
- Supervised Learning & Classification
- Unsupervised Learning & Clustering

Deep Learning

- Foundation of Deep Learning
- Convolutional Neural Networks
- Recurrent Neural Networks
- Long-Short Term Memory Networks
- Frameworks & Tools

Data Visualization and Communication of Outcomes

- Design for Human Perception
- Effective Visual Presentation of Data
- Tools (Matplotlib, D3, JavaScript)



INFORMATION ABOUT PYTHON

Python is an interpreted, object-oriented, high-level programming language with dynamic semantics. Its highlevel built in data structures, combined with dynamic typing and dynamic binding, make it very attractive for Rapid Application Development, as well as for use as a scripting or glue language to connect existing components together. Python's simple, easy to learn syntax emphasizes readability and therefore reduces the cost of program maintenance. Python supports modules and packages, which encourages program modularity and code reuse. The Python interpreter and the extensive standard library are available in source or binary form without charge for all major platforms, and can be freely distributed. (Source: www.python.org)

More about the programme: www.dvfa.de/cfds



PERSONAL REQUIREMENTS

Programming skills are not required but some prior knowledge in statistics, e.g. in probability distribution, will be of help.

TARGET GROUPS:

- Data Analytics
- Data Management
- Risk Management
- Marketing/Sales
- Trading
- Compliance/Regulation
- IT

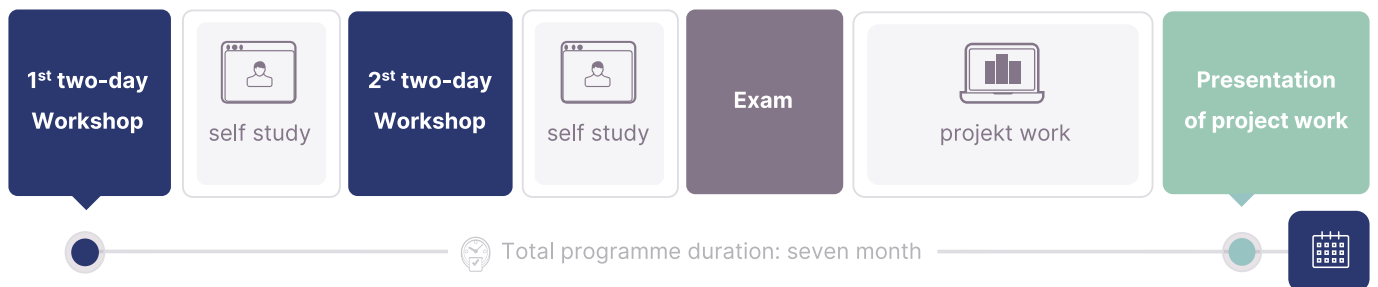


COURSE OF ACTION

The CFDS programme consists of 3 in-class blocks of two days each. The first two blocks are workshops addressing the main topics of financial data science and will give an introduction to data analysis using Python. Each of these blocks will be followed by weeks of self study with provided readings.

This knowledge in financial data science will be subject to a two hour multiple choice exam. All students passing that exam will then start a three months project work, that means analysing a real or fictive data set using Python. The results of the project work will be presented in a two-day closing session. The overall workload for the students sums up to approximately 145 hours during the five month study period. This compounds of approx. 35 hours of self study after the two workshops and approx. 75 hours for the project work. On average, this means about 5 hours per week during the programme.

The first in-class workshop takes place in Zurich. The second in-class workshop and the presentation of the project work takes place in Frankfurt. The exam can be taken in Frankfurt or in Zurich.





MATERIAL

COURSE MATERIAL

The study material will consist of a set of crucial articles to study basic structure of financial data science and recommend video clips describing the weaknesses of classic financial economics. Hereby, the material will focus on (i) why financial data science offers a wealth of opportunities unavailable in financial economics, (ii) what structural changes are to be expected as a result of such opportunities especially in the context of regulatory initiatives such as MiFID, (iii) how participants can train themselves in financial data science techniques and thinking and (iv) who students might want to team up with to realise the full potential of financial data science.

EXAM & PROJECT WORK

After the two modules there will be a true/false multiple choice exam. Students who successfully passed the exam will be allowed to start their personalised project to experience a first use case of financial data science in their daily work, while under guided supervision. Students will hereby propose a project idea to the scientific directors which may well be of benefit to the student's employer but can also be an unrelated activity. Based on their project idea, the students will be allocated to the supervision of a specific scientific director, who will mentor them through their project via structured group webinar and personalised supervision.

SCIENTIFIC DIRECTORS & LECTURERS



PROF DR DAMIAN BORTH

Professor for Artificial Intelligence and Machine Learning | Universität St. Gallen

Prof Dr Damian Borth was the Director of the Deep Learning Competence Center at the German Research Center for Artificial Intelligence (DFKI), the Principle Investigator of the NVIDIA AI Lab at the DFKI. Prof Dr Borth's research focuses on financial data science, machine learning, and deep learning. His work has been awarded by NVIDIA at GTC Europe 2016, the Best Paper Award at ACM ICMR 2012, the McKinsey Business Technology Award 2011, and a Google Research Award in 2010. He is also a founding member of the Financial Data Science Association. Prof Dr Borth did his postdoctoral research at UC Berkeley and the International Computer Science Institute (ICSI) in Berkeley where he was also involved in big data projects at the Lawrence Livermore National Laboratory. He received his PhD from the University of Kaiserslautern and the German Research Center for Artificial Intelligence (DFKI). He was also a visiting researcher at the Digital Video and Multimedia Lab at Columbia University in 2012.



PROF DR ANDREAS HOEPNER

Professor of Operational Risk, Banking & Finance at the Michael Smurfit Graduate Business School and the Lochlann Quinn School of Business of University College Dublin (UCD)

He is currently also heading the 'Practical Tools' research group of the Mistra Financial Systems (MFS) research consortium. Prof Dr Hoepner serves as board member of the Financial Data Science Association and sits on independent assessment committees for the Investment & Pensions Europe (IPE) Awards, the Investment Innovation Benchmark (IIB), and the RI Awards. He sits on advisory boards for Bank J. Safra Sarasin, the Carbon Disclosure Project (CDP), the Deep Data Delivery Standards, the Future World Fund, Kempen and Invesco. Andreas received his PhD from St Andrews in June 2010, where he was on faculty 2009 to 2013 and built up the Centre for Responsible Banking and Finance as its Deputy Director. He is founding co-director of a social enterprise (Sociovestix Labs, a spin-off from the German Research Centre for Artificial Intelligence [DFKI]).

Prof Dr Hoepner's financial data science research has made him sole inventor of the US patent investment performance measurement (No. US8751357 B1).



DEUTSCHE VEREINIGUNG FÜR FINANZ-ANALYSE UND ASSET MANAGEMENT

DVFA is the Society of Investment Professionals in Germany, founded in 1960. Currently, DVFA has more than 1,400 individual members representing over 400 investment firms, banks, asset managers, consultants and counselling businesses. DVFA assures the credibility of the professionals and the integrity of the market by offering internationally recognised qualification programmes, by providing platforms for professional financial communication, and by effective self-regulation.

Via EFFAS, the umbrella organisation of European Analysts' Societies, DVFA offers access to a pan-European network with more than 17,000 investment professionals in 27 nations. Via ACIIA, the Association of Certified International Investment Analysts, DVFA is part of a worldwide network of more than 100,000 investment professionals.

DVFA GmbH as provider of training programmes and courses is a limited company owned by DVFA e.V. Since 1987, more than 5,000 graduates have received a degree from DVFA in one of our postgraduate-programmes. About 250 candidates are currently enrolled with DVFA per year. More than 150 tutors are under contract, practitioners from the financial industry as well as academics and professional trainers.

January 2021 | Programme and exam structure as well as the syllabus might be subject to change.

AZEK – THE SWISS TRAINING CENTRE FOR INVESTMENT PROFESSIONALS

AZEK is the Swiss Training Centre for Investment Professionals, founded in 1990. AZEK aims to provide a high level of qualification among financial professionals by offering Swiss Federal and International Diploma programs in financial analysis, wealth management and financial market operations. A large pool of around 100 highly experienced lecturers ensure the quality of our training programs in both the French and the German part of Switzerland. More than 4,800 diplomas have been awarded to date.

SFAA, the Swiss Financial Analysts Association and parent company of AZEK, was founded in 1962. It aims to promote the quality of the financial industry and the ethical conduct of its members. SFAA offers a whole range of seminars and events covering current and innovative financial market topics to its members. In addition, the association provides access to a broad network of more than 2,900 proven experts, located mainly in Switzerland. Via ACIIA, the Association of Certified International Investment Analysts, the SFAA is part of a worldwide network of more than 100,000 investment professionals.

AZEK

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