

CFDS[®]

Chartered Financial Data Scientist

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

.\ZEK

Society of Investment
Professionals in Germany



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

»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

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

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

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® – 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 in-class, 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

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 high-level 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

Target Groups:

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

Personal Requirements:

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

Course of Action

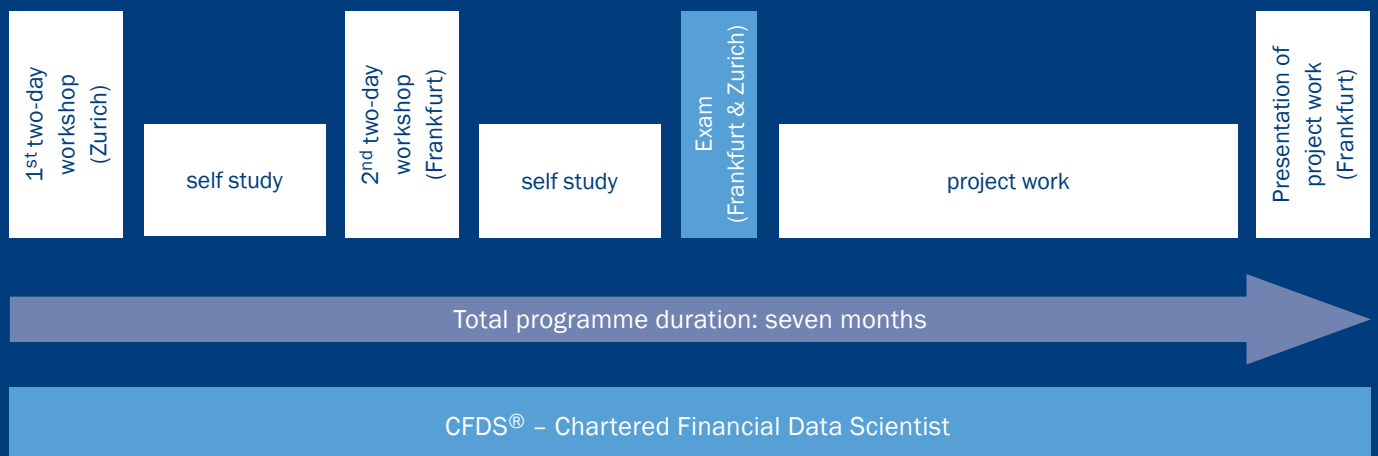
The CFDS programme consists of 3 in-class blocks of two days each. The first two blocks are workshops addressing the main topics of financial data science and will give an introduction to data analysis using Python. Each of these blocks will be followed by weeks of self study with provided readings.

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



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 two-hour multiple choice exam in-class.

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).

Terms and Conditions of DVFA GmbH

1. Scope of Agreement

These General Terms and Conditions for Participants apply to participation in all Events, including certificate programmes and workshops, as well as seminars, symposia and conferences (Other Events) and eSeminars offered by DVFA – Deutsche Vereinigung für Finanzanalyse und Asset Management GmbH, together with the individual registration form, online registration or registration via the Shopping Cart on the DVFA website, and the accepted Contract.

2. Registration

- 2.1 The registration form must be filled out with the relevant information, signed and sent to DVFA. Written registration may be sent by Post or fax – or in the case of Other Events and eSeminars, also via the relevant online registration form or the Shopping Cart. Registration constitutes a binding statement of intent on the part of the Participant or, in the case of registration by the employer, the Participant's employer to enter into a Contract for participation in the DVFA Event specified in the registration form; upon signing, registration is binding for the Participant or the Participant's employer. DVFA shall confirm receipt of the binding registration (Confirmation) in writing or via e-mail. Event registration is then subject to acceptance of the registration by DVFA. The DVFA shall state in writing or via e-mail its acceptance of the Participant to the relevant Event (Acceptance Statement).
- 2.2 By sending the registration, the Participant and, as applicable, the Participant's employer expressly acknowledge these General Terms and Conditions for Participants. These General Terms and Conditions for Participants apply equally to members and non-members of DVFA Deutsche Vereinigung für Finanzanalyse und Asset Management e.V. – to the extent not otherwise specified in writing.
- 2.3 Ancillary agreements in conjunction with these General Terms and Conditions shall only be valid and effective if they have been set forth in writing between both parties. Unilateral reservations or preconditions in relation to the registration are expressly excluded from the Contract.

3. Scope of Performance

- 3.1 The scope of contractual performance is specified in the individual information material relating to the relevant Event and the additional details included in the registration form.
- 3.2 If, at the time of registration or acceptance, the time and place of individual Events have not been definitively stated in the informational material or registration forms, DVFA shall announce said data in due time prior to the Event.
- 3.3 In the case of digitally provided content, error-free reproduction may be subject to the recipient's access to adequate technical infrastructure (details specified, as necessary, in the individual Product Descriptions).

4. Changes

- 4.1 DVFA reserve the right to change Event programmes to the extent necessary, provided this does not detract from the subject matter of the Event, and to appoint substitute instructors in cases of emergency. DVFA shall inform Participants of any changes in due time prior to the Event.
- 4.2 Holding of individual Events is contingent upon registration of a minimum number of Participants. If the minimum number of Participants is not reached, DVFA is entitled to postpone the Event date or cancel the Event. DVFA shall immediately inform Participants in the case of Event postponement or cancellation, providing the date of the postponed Event or refunding any fees paid, as the situation warrants.
- 4.3 DVFA is entitled to change the venue of an Event, in which case it shall immediately inform the Participants.
- 4.4 If individual lesson hours cannot be held, the Participant shall have no claim to a replacement of the cancelled hour or reimbursement of fees.
- 4.5 In the event that an Event is cancelled in its entirety because an instructor is unable to attend, DVFA shall endeavour to offer a replacement date. If the Participant is unable to attend at the replacement date, this shall result in a claim to full or partial reimbursement of fees paid.

5. Examination Rules

Examinees are subject to the version of the Examination Rules in force at the time of the examination.

6. Payment Terms

- 6.1 DVFA shall receive the fees stated in the registration form. The Event fees are in each case subject to additional value added tax (VAT) in the statutory amount.
- 6.2 Event fee payment is due upon receipt of the related invoice, and payable within the period stated therein.
- 6.3 If the Event in question is a distance learning course, then the Event fee shall be invoiced in instalments; the number of instalments is calculated as the minimum duration of the course (in months) divided by three (3), rounded upward.
- 6.4 Receipt of Event fee payment by DVFA is a precondition for performance by DVFA and for participation in any Event. If payment is not received within the specified period, the Participant may be excluded from participation at any time. The Participant bears liability for any and all resulting damages.

7. Cancellation and Non-attendance

- 7.1 Certificate programmes and workshops
The Participant, or the Participant's employer in the case of Participants registered by their employer, may cancel registration in writing at any time until receipt of the Confirmation from DVFA, without incurring cancellation fees. If written cancellation is submitted after sending of the Confirmation by DVFA and prior to sending of the Acceptance Statement, an amount equal to one-third of the relevant Event fee plus VAT is payable as a cancellation fee. In the case of cancellations submitted after sending of the Acceptance Statement, the full Event fee is payable. The Participant, or the Participant's employer in the case of Participants registered by their employer, may, however, name a substitute Participant. DVFA reserves the right to disapprove the substitute if it deems that the requirements for participation in certificate programme or workshop are not met. If a substitute Participant takes part in the Event, said substitute bears joint liability with the Participant, or the Participant's employer in the case of Participants registered by their employer, is, even if the Participant does not attend the certificate programme or workshop, obliged to pay the full Event fee. The foregoing also applies to partial Event bookings.
- 7.2 Other Events
For cancellations submitted at the latest fourteen (14) days prior to the start of the Event, an amount equal to one-third of the relevant Event fee – up to a maximum of EUR 500 – plus VAT is payable as a cancellation fee. For cancellations within fourteen (14) days prior to the start of the Event, the full Event fee is payable. Cancellation shall be submitted in written form by Post, fax or e-mail. A substitute Participant may be named, subject to the approval of DVFA.
- 7.3 eSeminars
After sending of access data or provision of access to the relevant content, cancellation is no longer possible.
- 7.4 Distance Learning
If the booked Event is a distance learning Event, cancellation without cause is possible only upon conclusion of the first semester after entry into the registration Contract, observing a notice period of six (6) weeks, and thereafter observing a notice period of three (3) months. In the event of cancellation, the Participant, or the Participant's employer in the case of Participants registered by their employer, are liable for payment of the portion of the Event fee covering the performance received during the term of the Contract. Payments for performance up to the end of the cancellation period are non-refundable.

8. Rescission Policy

- 8.1 **The Participant has the right to rescind this Contract within fourteen (14) days without cause. The 14-day rescission period begins on the date of entry into the Contract.**

The rescission right can be exercised by sending a clear statement to
DVFA GmbH
Mainzer Landstr. 47a
60329 Frankfurt am Main
Germany
Tel.: +49 69/26 48 48 0
Fax: +49 69/26 48 48 488
Email: info@dvfa.de

(e.g. in a letter sent by Post, fax or e-mail), expressing the decision to rescind this Contract. The rescission form included with the Acceptance Statement may be used for this purpose, but this is not a requirement. The rescission is deemed timely if the rescission statement is sent prior to expiry of the rescission period.

8.2 Consequences of rescission

If the Participant rescinds this Contract, DVFA shall refund all payments received, including delivery costs (with the exception of additional costs arising from the Participant's use of delivery methods other than the lower-cost standard delivery option offered by DVFA), immediately and, at the latest, fourteen (14) days from the date of receipt of the rescission statement. For the refund of payments, DVFA shall employ the same payment method used for the original transaction, unless expressly agreed otherwise between the parties; in no case will the Participant be charged fees or costs for the refund of payments. If the Participant has requested interim performance during the rescission period, this is subject to payment of a reasonable amount to cover the portion of performance received relative to the full scope of performance set forth in the Contract in the period until DVFA was notified of the decision to exercise the rescission right under this Contract.

9. Liability

- 9.1 DVFA bears liability only in cases of intent or gross negligence. Liability for slight negligence shall come into question only in cases involving loss of life, physical injury and damage to health, or in the event of breaches of cardinal obligations (i.e. obligations essential for achieving the purpose of the Contract). If DVFA breaches its cardinal obligations through slight negligence, any liability is limited to foreseeable damages.
- 9.2 DVFA bears no liability for personal injury and/or property damage occurring during travel to or from the Event venue.
- 9.3 In the case of digitally provided content, DVFA bears no liability for disruptions caused outside of the domain DVFA, e.g. disruptions in transmission via the Internet.

10. Confidentiality

- 10.1 Event-related informational material and content are protected by copyright. All rights are reserved by DVFA. Any reproduction, distribution, revision or publication is subject to prior written approval from DVFA.
- 10.2 Access data for restricted Internet content (DVFA Network) provided in connection with registration may not be made available to third parties. Any violation results in grounds for blocking further access to the DVFA Network.
- 10.3 Participants are obliged to handle any and all data and information relating to other Participants and instructors as strictly confidential; the same applies to any and all data and information relating to the programmes or Events themselves.

11. Privacy

- 11.1 For the purposes of processing registration, conducting the event and, as applicable, managing membership in DVFA e.V., information and data provided by participants will be processed and stored as necessary executing the obligations of the contract, made available to cooperation partners. For the purposes of contract performance and ascertaining eligibility for discounted event fees, DVFA shall request that DVFA e.V. confirm the membership of registrants claiming membership.
- 11.2 DVFA keeps Participants informed about future events and publications by sending participants related informational material via e-mail and/ or mail. Participants can be excluded from the mailing lists at any time by request.

Requests for removal from mailing lists:

DVFA GmbH
 Mainzer Landstr. 47a
 60329 Frankfurt am Main
 Germany
 Tel.: +49 69/26 48 48 0
 Fax: +49 69/26 48 48 488
 Email: info@dvfa.de

12. Miscellaneous

- 12.1 In cases of force majeure, DVFA shall be exempted from performance obligations for the duration of the disruption. Force majeure includes fire, strike, lock-out and other circumstances not under the control of DVFA, which impede or hinder performance by DVFA.
- 12.2 If any provisions of these General Terms and Conditions for Participants are or become invalid, this shall not affect the validity of other provisions herein. In place of the invalid provision, the parties shall agree on a substitute provision best suited in legal terms to enact the intended commercial purpose of the original provision. In cases of any gap or omission in these General Terms and Conditions for Participants, the parties shall agree on a provision suited to enact the intentions of the parties had they given consideration to the omitted provision.
- 12.3 This Contract is governed by the Laws of the Federal Republic of Germany. The place of jurisdiction for any and all legal disputes arising from this Contract is Frankfurt am Main, provided the opposing party is acting in the capacity of a commercial agent. For legal disputes arising from a distance learning Contract, or relating to the existence of such a Contract, exclusive jurisdiction lies with the courts of the municipality in which the Participant is domiciled.

DVFA – Deutsche Vereinigung für Finanzanalyse 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.



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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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May 2019 | Programme and exam structure as well as the syllabus might be subject to change.