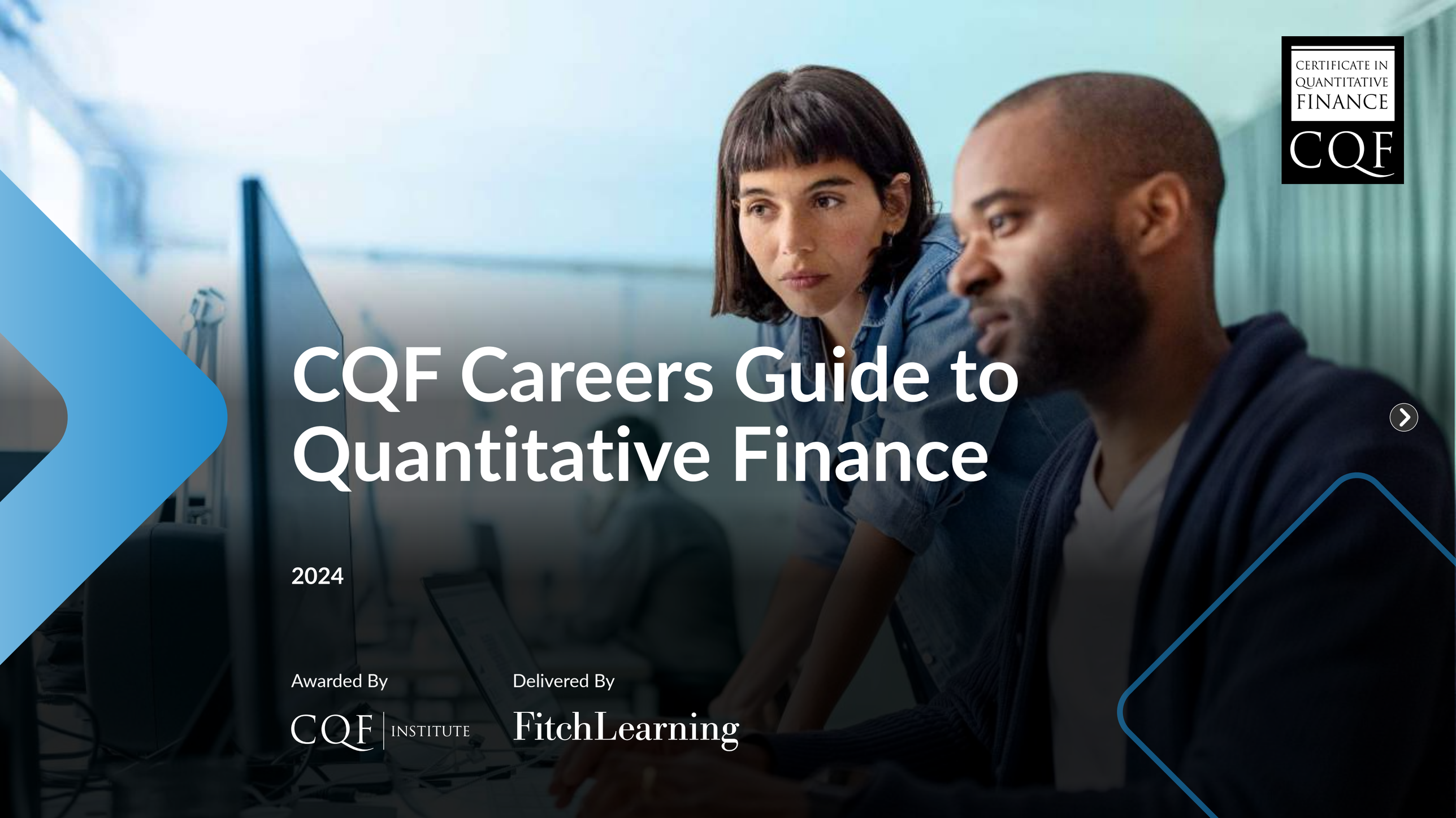

CERTIFICATE IN QUANTITATIVE FINANCE

CQF

CQF Careers Guide to Quantitative Finance

2024

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Contents

Welcome

"Welcome to the 2024 CQF Careers Guide to Quantitative Finance. Whether you're just starting out or looking to advance in your career, the annual Guide is designed to support you in navigating the dynamic landscape of quantitative finance. Leveraging over two decades of enhancing quant careers via the CQF qualification, this resource offers insights into the latest opportunities and the necessary skills needed for professional growth in this ever-changing field."

Dr. Randeep Gug,
Managing Director, CQF Institute

Published by the CQF Institute, the 2024 CQF Careers Guide to Quantitative Finance is a practical resource for anyone interested in a career in quant finance. It explores the ever-evolving opportunities in the field using insights from recruiters, CQF faculty, CQF Institute members, and CQF alumni.

Introduction

The annual CQF Careers Guide covers six career paths in quant finance:

- Portfolio Management
- Risk Management
- Quant Strategies and Research
- Data Science and Machine Learning
- Technology
- Quant Trading

In each of these areas, the 2024 Guide outlines the latest skills needed, typical roles and responsibilities, and general salary ranges for Asia, America, and Europe, before delving deeper into the transformative impact of machine learning and how it is reshaping quant careers.

As demand for cutting-edge quantitative finance and machine learning expertise grows, this Guide also focuses on the value of further education in a highly competitive environment. For over 20 years, the Certificate in Quantitative Finance (CQF) has been trusted by professionals globally to teach the latest techniques that are used in the industry. With its focus on the practical application of quant finance and machine learning techniques, the globally recognized, master's-level professional qualification is offered online and part-time and equips delegates with the expertise and confidence to meet market demands now and in the years to come.

Employment Trends in Quantitative Finance

Employment Trends in Quantitative Finance

In recent years, the global financial markets have experienced significant volatility due to several factors, including the pandemic, geopolitical instability, and inflationary pressures. These challenges drove some central banks to raise interest rates dramatically through 2023. Although we may see a lowering of interest rates in 2024, there is still uncertainty in the marketplace.

Despite this uncertainty, there is continued demand for professionals with a strong quant skillset across many functions within financial services. The start of 2024 has seen an increasing need for professionals proficient in data science, machine learning, Python programming, risk management, and specialized knowledge in credit and fixed income sectors. These competencies are crucial for tackling the intricacies of the current financial landscape.

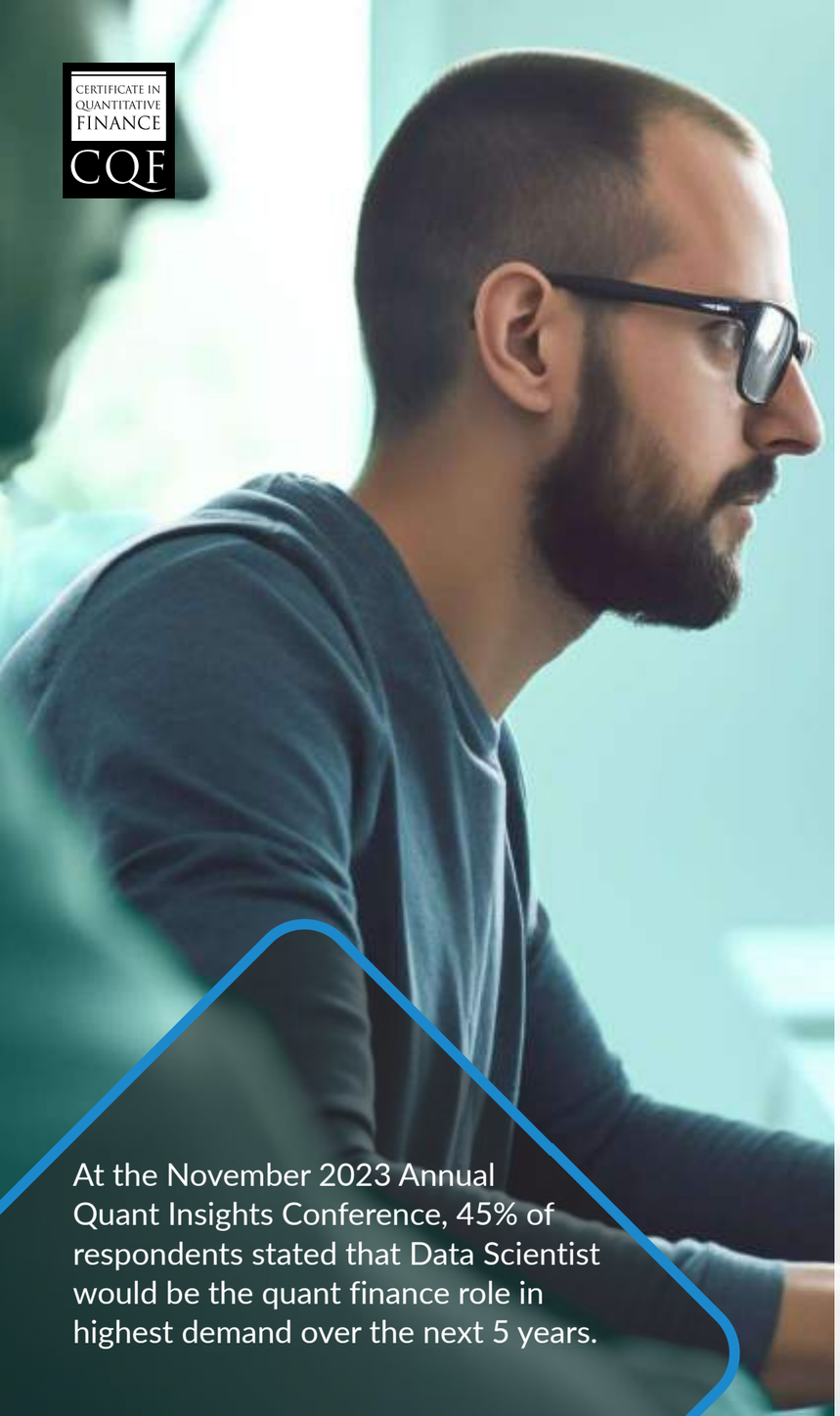
At the November 2023 Annual Quant Insights Conference, 85% of respondents felt that demand for quants would increase due to continuous advancements in technology.

What Quant Skillsets are Financial Firms Looking for This Year?

Equity, Credit, and Fixed Income Skills

As the markets continue to experience volatility, recruiters report that the demand for quants with expertise in credit, fixed income, and equity markets has been, and remained, strong due to their critical role in navigating the complexities of a high-interest-rate environment. These skills also play a crucial role in risk management and regulatory compliance, as well as when pricing complex securities and developing sophisticated models in an environment of technological advancement and financial product innovation.

> "This year, we had calls straight after New Year's Day with clients who are talking about building teams and hiring up to potentially double figure quants. It could be a very busy year in 2024."
>
> **Patrick Flanagan,**
> **Managing Director, Clarence George**



At the November 2023 Annual Quant Insights Conference, 45% of respondents stated that Data Scientist would be the quant finance role in highest demand over the next 5 years.

Data Analytics Skills

Recruiters also report a robust demand for quants proficient in data analytics and technology. With the continued prominence of AI, machine learning, and data science, firms are keen to harness these tools for strategic advantage. Quants are expected to possess data science expertise and analytical acumen to mitigate the immediate impacts of sudden changes and volatility in the financial markets.

Risk Management Skills

Risk management has also been a key area for hiring in quant finance, as financial firms must comply with a wide range of securities regulations in the post-financial crisis era. As markets become more complex with the introduction of new products, global interconnectedness, and the increasing use of new technologies, firms need risk managers to understand and mitigate potential threats that may appear as a result. The models and methods used in risk management are also becoming more quantitative and complex. This trend requires risk managers who not only understand financial markets, but also have strong quantitative skills to develop and manage these models.

> “Quantitative development and sell-side risk management are two growth areas now. In terms of asset classes, fixed income and derivatives are becoming popular in banks and that’s where we’ve seen the most demand for quant professionals over the last year or so.”
>
> **James Holland,**
> **Director, Quant Capital**

What Core Skills Do Quants Always Need?

No matter what happens in the wider financial markets, all quants need the same fundamental skills, regardless of the career path they are on.

In brief, the essential domains are:

- **Mathematical skills** – Quants draw on a variety of mathematical methods, with a focus on probability, statistics, linear algebra, calculus, and differential equations, including PDEs and SDEs, for pricing assets from equities and bonds to structured products and derivatives.
- **Programming skills** – Programming skills have become essential for quants. Traditional programming languages such as C and C++ have been popular for quants historically, and Python has become prominent, especially for data science.
- **Financial skills** – Quants should understand the asset classes and financial instruments available in the markets. Depending on their role, a quant will have detailed knowledge of asset pricing techniques, trading methods, investment strategies, portfolio management, or risk management practices.

Since each of these fields is quite complex, many people continue their education beyond a bachelor's degree. Thousands of professionals globally have completed the **Certificate in Quantitative Finance (CQF)** to increase their career prospects by gaining a master's-level professional qualification that is highly regarded in the industry.

At the November 2023 Annual Quant Insights Conference, 60% of respondents thought that risk management would be the career path that would experience the most growth in the next few years.

Which Business Skills are Now Essential for Quants?

All recruiters interviewed for this Guide stated that strong communication skills are a vital asset for quants.

The quant function is typically more integrated within wider technology, trading, risk, or client-facing teams than it was 10 to 15 years ago due to the complex, data-driven nature of modern markets, the regulatory emphasis on risk management, and a shift towards interdisciplinary team approaches.

Firms need quants who can take technical information or large amounts of data and communicate essential insights back to non-technical stakeholders concisely. For quants looking to succeed in today's job markets, it is key to consider how to showcase and perfect these skills.

At the November 2023 Annual Quant Insights Conference, 52% of respondents said that communication skills would become increasingly essential for quants.

In Summary

As we move through 2024, quant finance professionals will benefit from not only mastering the fundamental quant techniques, but also taking an interest in both finance and economics, as the dynamics between financial markets, central banks, global turbulence, and government policies are intertwined.

Focusing on the development of skills in the classic quant disciplines of math, finance, and programming, along with the softer skills, such as communication, job candidates will position themselves for success.

> "Being able to communicate ideas to non-technical people has become important to our clients because a lot of work, especially in front office, involves dealing with senior stakeholders, traders, clients, and many non-technical people. You must be able to convey very technical information across different populations."
>
> **John Meadowcroft,**
> **Head of Quant Analytics, Anson McCade**

Career Paths and Compensation

Career Paths and Compensation

This section of The CQF Careers Guide outlines the six main career paths in quantitative finance:

- Portfolio Management
- Risk Management
- Quant Strategies and Research
- Data Science and Machine Learning
- Technology
- Quant Trading

Each path will explore typical skills, roles and responsibilities, and compensation.

The job hierarchy is split into entry level, mid-level, and senior positions, although job hierarchies and related job titles can vary from firm to firm:

- **Entry Level:** 0 - 5 years' experience.
- **Mid-Level:** 5 - 10 years' experience.
- **Senior Level:** 10+ years' experience.

There are strong earning and progression opportunities across all paths. Recruiters predict particularly strong growth within risk management, technology, data science and machine learning. As these fields evolve, so too does the necessity for professionals to refine and expand their competencies. Professionals who possess a strong quantitative skillset, a keen interest in innovation, and dedication to ongoing development are well-equipped to succeed.

Portfolio Management

Professionals working in Portfolio Management are responsible for asset allocation and portfolio construction. They initiate trades and monitor portfolios and their exposures carefully.

As portfolios have become increasingly complex considering market volatility and technological innovation, recruiters report a growing demand for seasoned portfolio managers with strong computational skills and expertise in fixed income and global data analysis, reflecting the industry's focus on developing inflation-resistant investment strategies. As firms aim to mitigate inflation risks, there has also been an increased emphasis on commodities.

Skills for Portfolio Management

Quants in portfolio management have strong quantitative and mathematical modeling, coding, and analytical thinking skills. They have a deep understanding of the various asset classes and a clear communication style. They also have good people skills, as their role may entail direct interactions with clients, which includes handling requests, observing pre-trade client guideline compliance, and addressing tax and other management issues. They must possess extensive knowledge of the firm's investment products, as well as products that are available in the broader financial market.

> "With the market in flux, liquid inflation-proof strategies have been at the forefront for many funds. There has been a large appetite for individuals with strong specializations in fixed income and macroeconomics, as well as the traditional quant skills. Commodities have been high on the agenda with new buildouts across the market, and we expect that to continue as firms look to diversify their portfolios and hedge against inflation."
>
> **Jermaine Barnes,**
> **Director, J. K. Barnes Ltd.**

Portfolio Management

TYPICAL JOB AREAS

Portfolio Analyst

Portfolio analysts conduct in-depth portfolio analysis, encompassing asset class and industry knowledge, insights on historic trends in the markets, and an understanding of financial metrics and regulatory and legal restrictions that may affect the portfolio. Portfolio analysts communicate with portfolio managers, as well as trading, risk, and compliance teams. They may also present to clients.

Quantitative Analyst

Quantitative analysts use a range of techniques to price assets, manage risk, and identify investment opportunities. Quant analysts will work in the front or middle offices at an investment firm, asset manager, or hedge fund, with the front office being closer to the clients and trading, and the middle office working on risk management and model validation.

Quant Portfolio Manager

Quant portfolio managers focus on the use of quantitative investment strategies to manage portfolios for institutional and retail investors. They develop models to analyze empirical data, searching for patterns and insights to inform the investment decision-making process.

CQF Corner

The CQF program gives delegates a strong understanding of asset allocation and portfolio construction, covering everything from **modern portfolio theory** and the capital asset pricing model to advanced portfolio management techniques.

Portfolio Management
Investment Bank

	North America		Europe		Asia	
	Base	**Total Comp**	**Base**	**Total Comp**	**Base**	**Total Comp**
Portfolio Analyst Associate	$175,000 - $200,000	$275,000 - $295,000	$95,000 - $150,000	$110,000 - $175,000	$85,000 - $125,000	$90,000 - $150,000
Portfolio Manager VP	$200,000 - $250,000	$375,000 - $425,000	$150,000 - $225,000	$175,000 - $300,000	$125,000 - $175,000	$150,000 - $200,000
Portfolio Manager Senior VP / Director	$250,000 - $350,000	20-30% of Revenue Generation	$225,000 - $300,000	$300,000 - $550,000	$175,000 - $250,000	$325,000 - $375,000

Abu Dhabi-based CQF alumnus, Jean-Paul Kachour is Head of the Core Systematic Portfolio at Abu Dhabi Investment Authority (ADIA), a sovereign wealth fund. We spoke to Jean-Paul about the importance of having a growth mindset and the skillsets quants should be pursuing today.

> "You may hear the adage that machine learning will not replace a senior manager, but a senior manager who understands machine learning will replace one who does not."

An Interview with a Head of Core Systematic Portfolio

Why did you pursue a career in quant finance?

I began work on the consulting side before entering a graduate program in financial engineering. After that, I was recruited by PSP investments, on the asset owner side. At PSP, I was responsible for growing our active management book, partnering with hedge funds, and delivering returns.

Where did you go after your time at PSP?

I joined ADIA, where I was brought in for my emerging markets expertise. I was eventually given broader portfolio management responsibilities across both emerging and developed markets, with increasing exposure to quant investing.

What should people look out for as they are building a career?

You must adopt a growth mindset, focus on skills development, and acquire knowledge across multiple domains because you do not know where your career may go in the future. Hard quant skills and a growth mindset will always be attractive to employers.

Why did you enroll on the CQF?

I wanted to refresh my statistical background and go further into machine learning. The curriculum was Python-based, and the weight given to machine learning in the context of portfolio management and risk management was extremely attractive to me.

What skills should people pursue today?

The world has turned upside down with the democratization of data. There is much more information available, and you must be able to tap into it to be on a level playing field. Python and related analytical skillsets are critical. You may hear the adage that machine learning will not replace a senior manager, but a senior manager who understands machine learning will replace one who does not. Those that directly invest in the markets, especially in the derivatives space, will benefit greatly from the CQF.

What advice would you give to someone starting their career today?

In a world that increasingly rewards specialization, new entrants need to develop domain expertise in more than one area, while also being on the lookout for emerging opportunities to stand out. One should not be complacent, as employers are looking for adaptability, world-class skills, and commitment.

Read the full interview

Risk Management

Professionals working in Risk Management support the investment decision-making process through risk analysis and the creation of risk model frameworks for specific assets and asset classes.

As interest rates stabilize, recruiters anticipate a fresh wave of hiring in risk management, especially within banking and the sell side, signaling opportunities for experts who possess robust technological capabilities for risk assessment. Candidates with the ability to perform stress testing, scenario analysis, and those who bring a strategic mindset will be especially valuable.

Skills for Risk Management

Quants working in risk management possess strong quantitative and financial modeling skills and have proficiency with programming in Python, for example. They have knowledge of various methods including "Value-at-Risk" (VaR and its variants), statistical models, and simulations to evaluate the risk exposure for an asset or across an entire portfolio of assets. They require knowledge of stochastic calculus, Monte Carlo, PDEs, and other numerical techniques. They need to have familiarity with financial markets, including the most recent regulatory developments. Over the past two decades, there has been a strong emphasis on regulatory compliance and stress testing; therefore, risk managers are often engaged in model testing and validation.

> "We're seeing risk being modeled by in-house quants more often in the banking and sell-side spaces and, as interest rates stabilize, there will likely be a fresh wave of hiring in this area."
>
> **James Holland,**
> **Director, Quant Capital**

Risk Management

TYPICAL JOB AREAS

Risk Analyst

A risk analyst evaluates individual assets, portfolios, and external industry and economic conditions to help firms make risk-aware investment decisions.

Market, Liquidity, or Credit Risk Manager

Risk managers use data analytics and mathematical models to evaluate the risk profiles of financial instruments and portfolios, measuring the changes to those profiles over time. They are responsible for risk reporting internally to senior management and externally to regulators.

Model Validation Quant

Model validators work with models and methods developed by front office quants to assess their validity and mitigate the existence of model risk. Since the Global Financial Crisis, regulators often interact directly with quants in the middle office, including model validators. This area of quant finance has grown significantly in recent years.

CQF Corner

The CQF program helps delegates build knowledge of **risk models** and analytical practices and covers a range of methods such as VaR and its variants, Monte Carlo simulation, time series analysis, stress testing, and statistical models.

Risk Management
Investment Bank

	North America		Europe		Asia	
	Base	**Total Comp**	**Base**	**Total Comp**	**Base**	**Total Comp**
Risk Analyst Associate	$80,000 - $100,000	$90,000 - $110,000	$75,000 - $90,000	$80,000 - $100,000	$45,000 - $60,000	$50,000 - $65,000
Risk Manager VP	$125,000 - $175,000	$140,000 - $190,000	$100,000 - $150,000	$110,000 - $165,000	$60,000 - $125,000	$65,000 - $130,000
Risk Manager Senior VP / Director	$175,000 - $250,000	$190,000 - $275,000	$150,000 - $175,000	$165,000 - $190,000	$125,000 - $150,000	$130,000 - $165,000

An Interview with a Head of Market Risk & Product Control

Singapore-based CQF alumnus, Borja Garcia Haendler is Head of Market Risk and Product Control Asia at Julius Baer, a Swiss private banking group. We spoke to Borja about his current role and the importance of interpersonal skills.

> "As someone involved in the hiring process, I place great emphasis on identifying candidates who exhibit a genuine hunger for learning and a propensity to challenge the status quo."

What is involved in your current role?

My duties involve analyzing the Profit and Loss (PnL) for the Markets team, overseeing risk limits, monitoring liquidity risk, and evaluating new products in Asia. I am also involved in the bank's innovation and digital transformation. I engage in experimentation, conduct strategy sessions, and evaluate new technological concepts. I have been particularly immersed in the exploration of technologies such as Blockchain and AI.

Where did the CQF add value to your career?

The CQF gave me essential skills that have enhanced my professional ability, particularly in approaching and resolving complex challenges. The knowledge gained has proven invaluable in navigating problem-solving scenarios within my role. However, the biggest impact of the CQF lies in the confidence the program gave me, which has empowered me to tackle any obstacle. This self-assurance is of utmost importance, as possessing the tools alone is insufficient without the belief in one's capability to succeed.

What skills are required to be successful in quantitative finance today?

There are several essential skills, but two stand out: flexibility and an insatiable capacity to acquire new knowledge. As someone involved in the hiring process, I place great emphasis on identifying candidates who exhibit a genuine hunger for learning and a propensity to challenge the status quo, as these traits are instrumental in thriving within the field.

What skills will become more important?

Critical thinking will assume more significance, as it becomes imperative to analyze the vast amount of data generated and the ability to assess the reliability of AI-generated insights. Interpersonal skills will gain prominence as a differentiator for success. The ability to communicate complex concepts and build meaningful relationships will facilitate the integration of AI-driven insights with human expertise. Adaptability will be critical, as professionals must swiftly respond to changing circumstances and trends. The capacity to learn and reskill efficiently will be vital to remaining competitive.

What advice would you offer to someone just starting their career?

Embracing new technologies is the key to unlocking avenues for progress. Nurturing critical thinking skills will enable professionals to evaluate the implications of emerging technologies. Simultaneously, the ability to collaborate effectively fosters the development of impactful solutions that cater to diverse market needs.

Read the full interview

Quant Strategies and Research

Professionals in Quant Strategies and Research blend traditional quantitative skills – like statistical analysis, mathematical modeling, and rigorous backtesting – with modern techniques from machine learning and data science to devise and validate investment strategies. These quants leverage their expertise to unearth alpha while maintaining diligent risk control.

The evolving landscape of quant finance now prizes candidates who combine classical training in financial theory and econometrics with proficiency in cutting-edge computational methods. Mastery in AI and machine learning, for dynamic strategy development and risk management is increasingly sought after, signifying a shift towards a multifaceted, tech-forward domain in financial analysis.

Skills for Quant Strategies and Research

Professionals working in quant strategies and research have a detailed knowledge of mathematical and statistical models. They also require knowledge of financial mathematics and stochastic calculus. They have good programming skills in Python or C++, and may have skills in R, MATLAB, or SAS as well. Knowledge of machine learning and natural language processing techniques is increasingly in demand.

> "Over the past two years, we've seen a significant uptick in quant macro-systematic strategies. Portfolio managers and trading teams are increasingly focusing on cross-asset futures, FX, commodities, and other products influenced by global events and situations. Even more traditional equity players are diversifying and growing their teams in this space."
>
> **Tyler Robinson,**
> **Director & Co-Head of Quants, Selby Jennings**

Quant Strategies and Research

TYPICAL JOB AREAS

Quant Researcher

Quant researchers develop and implement pricing models and trading strategies and analyze existing strategies to identify improvements. They also create tools to automate research tasks and visualize the information found in complex datasets. Responsibilities may include working on strategy research, backtesting models, latency strategy research, machine learning research, econometrics research, and market microstructure research.

Quant Strategist

Quant strategists research and implement trading strategies using pricing and trading models. They develop risk models to manage portfolio risks and analyze current strategies to identify issues and make improvements. Quant strategists often work with traders, quant analysts, software engineers, and quant developers. Responsibilities include analyzing trading and asset allocation opportunities and working with a comprehensive set of risk reporting and pricing tools.

Derivatives Analyst

Derivatives analysts apply mathematical formulas and computer algorithms to evaluate financial data, detect investment trends, and recommend asset allocation strategies. They also evaluate transactions from risk management and legal standpoints to ensure compliance.

CQF Corner

The CQF program gives delegates a strong understanding of the **mathematical and statistical models,** and machine learning techniques needed to work in quant strategies and research.

Quant Strategies and Research
Buy Side

	North America		Europe		Asia	
	Base	Total Comp	Base	Total Comp	Base	Total Comp
Quant Researcher Associate	$150,000 - $175,000	$250,000 - $325,000	$125,000 - $150,000	$200,000 - $300,000	$95,000 - $125,000	$165,000 - $185,000
Quant Researcher VP	$175,000 - $225,000	$325,000 - $500,000	$150,000 - $200,000	$300,000 - $500,000	$125,000 - $180,000	$225,000 - $300,000
Quant Researcher Senior VP / Director	$225,000 - $325,000	$500,000 - $800,000	$200,000 - $250,000	$500,000 - $700,000	$180,000 - $250,000	$300,000 - $500,000

New York-based CQF alumna, Chelvi Paramanathan, is Global Head of Pricing and Analytics at J.P. Morgan Chase & Co., a global financial services firm. We spoke to Chelvi about making the move into finance and her advice for job hunters.

> "The CQF has had a significant impact on my career because in working with all kinds of risk, it gave me the confidence to come up with solutions that have quantitative proofs."

An Interview with a Global Head of Pricing Analytics

How did you decide to pursue your current career path?

My dream was to become a software engineer, so I studied Electronics and Electrical Engineering, and then completed a postgraduate degree in AI. I started work as an engineer while pursuing my master's in Knowledge Engineering/AI. However, I have always been passionate about numbers too and I looked for an opportunity to do both. I found this in finance. I quickly developed a deep interest in learning more about the application of math in finance, so I did a master's-level credit program in finance. This helped me to secure a front office role and I moved into quant research, where I built models for business efficiency and price discovery.

When did you decide to earn the CQF?

At that point in time, I was contemplating a CPA or a CFA, but neither were deeply focused on the quant side of things. Then I came across the CQF, and it was precisely what I was looking for. I felt that I would get a certification in quant finance and learn how to work with quant models and apply AI techniques. The CQF has had a significant impact on my career because in working with all kinds of risk, it gave me the confidence to come up with solutions that have quantitative proofs and help with decision making or solve clients' problems with quantitative evidence.

What is involved in your current role?

I have built a global team that evaluates client portfolios in the securities financing business. I am also responsible for data analytics and innovation initiatives for the business, so I have a group of data scientists and quant researchers generating new ideas and tools to drive business efficiency. I work closely with our functional partners in technology, product development, and quant research to build end-to-end solutions. I am responsible for managing the financial resource usage of our business, which is the capital footprint for the business under Basel III guidelines.

What advice would you give to someone looking for their next quant role today?

Staying current in your field is essential and I recommend being committed to expanding your domain expertise regularly. We drive our own careers, so we must have passion and envision the path to achieve that goal and stay focused. Communication skills are very valuable and effective teamwork is as well.

Are there any specific skillsets along the horizon that people should consider?

Machine learning is important. However, AI is not applicable to every domain, so it is good to be able to critique methods and shortcomings. That said, programming is essential, along with familiarity of big data platforms like Spark, and people should follow the evolution of these tools. Having programming skills and the ability to tell a story with data will make a difference.

Read the full interview

Data Science and Machine Learning

Professionals working in Data Science and Machine Learning are responsible for research, modeling, and testing. They work with data sets to uncover relationships and patterns in empirical data.

In the rapidly evolving landscape of data science and machine learning, financial institutions want candidates that have strong technical skills, including programming and machine learning techniques, alongside industry-specific knowledge. Recruiters still cite Python as being the hottest programming language in the field, with many firms asking for it as an essential skill on job specifications.

Skills for Data Science and Machine Learning

Professionals working in data science and machine learning need to have a deep understanding of algorithms, as well as specific domains such as natural language processing or signal processing, to help identify and assess patterns in the data. They must possess strong quantitative analysis skills, a solid grasp of AI and machine learning techniques, and familiarity with programming languages commonly used in the field, with Python being particularly important.

Roles in this career path require significant knowledge of models and programming. These jobs tend to sit within the research area of an organization. Firms that are active in data science and machine learning include investment banks, asset managers, hedge funds, and technology companies that offer consulting services to the financial industry. There are also opportunities for quants in tech organizations that develop software products for the financial industry.

> "The large language models are hot now, so being able to use those tools and understanding the underlying technology can definitely help you stand out."
>
> **Tyler Robinson, Director & Co-Head of Quants, Selby Jennings**

Data Science and Machine Learning

TYPICAL JOB AREAS

Data Scientist

Data scientists in quantitative finance apply their analytical skills to extract insights from large datasets, using machine learning algorithms and statistical methods to inform decision-making and drive business strategies.

Machine Learning Engineer

Machine learning engineers focus on building, training, and deploying machine learning models tailored to the needs of institutions, ranging from predictive analytics to natural language processing.

Data Analyst

Data analysts use descriptive statistics to evaluate problems, create data visualizations, and develop insights based on empirical analysis. They may assist with collecting and cleaning data sets and supporting the senior members of the data science team.

CQF Corner

With modules on **Data Science and Machine Learning**, the CQF explores modeling and machine learning methods used to solve real-world problems in finance. Python Labs enable delegates to practice implementing the models studied.

Data Science / Machine Learning
Investment Bank

	North America		Europe		Asia	
	Base	**Total Comp**	**Base**	**Total Comp**	**Base**	**Total Comp**
Data Scientist Associate	$100,000 - $175,000	$125,000 - $200,000	$80,000 - $125,000	$100,000 - $150,000	$80,000 - $110,000	$90,000 - $120,000
Data Scientist VP	$175,000 - $250,000	$225,000 - $275,000	$125,000 - $200,000	$150,000 - $225,000	$110,000 - $130,000	$120,000 - $140,000
Data Scientist Senior VP / Director	$250,000 - $275,000	$275,000 - $400,000	$200,000 - $250,000	$225,000 - $300,000	$130,000 - $200,000	$140,000 - $220,000

New York-based CQF alumnus, Charlie Flanagan, is Head of Applied AI for Balyasny Asset Management, a global investment firm. We spoke to Charlie about his career journey through quant finance.

> "Alternative data and data analysis are in fashion now and there has never been a greater need for quants working in these areas."

An Interview with a Head of Applied AI

How did you become interested in quant finance?

I did an accounting degree, and then I started working for a broker-dealer, where I became interested in derivatives. I got a placement on the equity options desk, which was my first exposure to the world of quant finance. I worked on that desk for two years. Then, I had an opportunity to join a hedge fund in the Bahamas. They focused on deep quant research, and I learnt from some incredibly talented quants and engineers. However, I felt I needed get into more depth on quant methods, so I enrolled in the CQF.

Why did you choose the CQF?

There were several considerations. The first was an interest in gaining rigorous training in quant methods. During my undergraduate degree, I took some operations research classes, but I did not have formal education in a quantitative discipline. I wanted to expand my understanding beyond equity options pricing, which had been my professional focus until then. A second motivating factor was the opportunity to meet other quants in the field. I was still in the Bahamas and a bit isolated from the quant community, so being able to connect with CQF delegates and the broader quant community was very helpful. Finally, I felt that the range of topics covered in the CQF appealed to me.

Where did you go after that?

I spent a few more years at the fund in the Bahamas and then I went to grad school. I had been working for nine years at that point and wanted to take a break. I ended up completing a master's degree in computer science at Harvard and an MBA at Columbia University. It was great to be exposed to the programs and professors after those years of practical experience.

What have you been doing since?

After grad school, I joined Google as a Data Scientist. I did that for five years and then about a year and a half ago, I left to join Balyasny Asset Management as the Head of Data Science for a new Growth Equity Fund, which is focused on investing in private companies that are on the path to doing an IPO. I am now the Head of Applied AI.

What would you advise people who are getting into quant finance now?

Alternative data and data analysis are in fashion now and there has never been a greater need for quants working in these areas. Even in the world of fundamental investing, this is something I see on a regular basis. At Columbia Business School, one of the traditional homes of the value investing philosophy, they are making Python classes mandatory. Enrolling in a high-quality, well-established quant program like the CQF is more important than ever because everyone is speaking our language these days, but few truly understand it.

Read the full interview

Technology

Quant professionals working in Technology design, develop, and implement software solutions to support various departments across the firm.

Recruiters state that hiring has remained very strong for quantitative developers, with demand being driven by trends such as AI and machine learning, big data, and the growth of financial technology. Languages like Python are becoming increasingly popular, but the hard-core C and C++ skills are still foundational for quant developers due to their performance, control over memory, compatibility with legacy systems, and critical role in algorithmic trading.

Skills for Technology

Quants in technology will have excellent coding skills in Python, C, C++, or C#, for example. They should also have a good understanding of computational mathematics, software engineering, and financial products. They tend to work on projects with several teams if they are in a large organization, so having domain expertise combined with good skills in collaboration and communication will be helpful.

> "Python has become the new standard for programming, but if you have done a lot of work in C++ or MATLAB, you should not disregard these languages and should continue to ensure that you are great at them."
>
> **Richard Booty,**
> **Managing Partner, Testwood Partners**

Technology

TYPICAL JOB AREAS

Quant Developer

Quantitative developers, also known as quantitative software engineers, or quantitative engineers, develop, implement, and maintain quantitative models. They are highly skilled programmers, specialized in languages like Python or C or C++, and its variants, and they often work at the intersection between software engineers and quantitative analysts. Typical responsibilities may include developing and maintaining programming libraries, developing high-performance numerical library components, performance tuning of libraries, and consulting on high-performance computing, optimization, and strategy.

CQF Corner

With **advanced electives** on C++, Generative AI and Large Language Models, Quantum Computing, and Decentralized Finance Technologies, the CQF helps delegates develop the skills needed to implement models used in technology roles.

Technology

	North America		Europe		Asia	
	Base	**Total Comp**	**Base**	**Total Comp**	**Base**	**Total Comp**
Quant Developer Associate	$150,000 - $200,000	$200,000 - $250,000	$100,000 - $125,000	$120,000 - $150,000	$70,000 - $100,000	$80,000 - $120,000
Quant Developer VP	$200,000 - $250,000	$250,000 - $350,000	$125,000 - $175,000	$150,000 - $200,000	$100,000 - $150,000	$120,000 - $170,000
Quant Developer Senior VP / Director	$250,000 - $300,000	$350,000 - $500,000	$175,000 - $225,000	$200,000 - $300,000	$150,000 - $180,000	$170,000 – $200,000

Prague-based CQF alumna, Sara Goblova, is Senior Equity Derivatives Software Engineer at Barclays, a global financial services company. We spoke to Sara about her career highlights, how the CQF added value, and her advice for new professionals.

> "There are many new areas that are appealing, such as machine learning or quantum computing, so it is beneficial to be curious and willing to learn new skills."

An Interview with a Senior Equity Derivatives Software Engineer

What do you do in your current role?

I am a Senior Software Engineer in equity derivatives, currently working on several projects. One is on valuation-based Profit and Loss (PnL) attribution. The second is the Fundamental Review of the Trading Book. Barclays is based in the UK, so we are subject to the Basel 3.1 requirement standards implementation. These regulatory requirements can be very demanding, but it is a great opportunity to make our systems more efficient and to adopt new technologies. Finally, I work on production support for our traders in London, New York, and Hong Kong.

Why did you pursue your current path?

I am from Eastern Slovakia and did not have much exposure to math or computers in school. When I came to Prague to study international business for my degree, I started learning to program on my own and enjoyed it. I joined Barclays as a graduate developer and realized this is what I wanted to do.

What do you enjoy most about your role?

I like learning something new every day. We don't always know what is around the corner. I like being in an environment that keeps evolving and where you must learn new things and keep pace.

How did the CQF add value to your career?

Before I enrolled, I realized it was an excellent opportunity to help me decide if quant finance was the direction I wanted to go in professionally. The CQF enabled me to obtain knowledge without enrolling in a university program, which would have forced me to take time off. Through the CQF, I met amazing people, especially the lecturers, who are truly interested in what they teach and always worked to convey complicated subjects in a clear manner.

What skills are required to be successful in quantitative finance?

It is important to have strong programming skills and keep up with industry news. It is also important to have strong knowledge of the math and quant finance fundamentals, for example, to truly understand models like Black-Scholes. I think there are many new areas that are appealing, such as machine learning or quantum computing, so it is beneficial to be curious and willing to learn new skills. One of the most valuable personal skills is to become resilient to change and to the fear of failure. Changes happen constantly and you must be able to adapt to them.

What advice would you give to someone starting a career in the industry today?

Don't be afraid to ask "stupid" questions. Be willing to take small steps and time in your own self-educational process. I also recommend finding a good mentor and other people you can learn from in your area of specialization.

Read the full interview

Quant Trading

Professionals working in Quant Trading employ mathematical and statistical models to identify profitable trading strategies and to execute trades. They develop strategies and then focus on backtesting, analysis, and optimization. Quant traders may be involved in statistical arbitrage, algorithmic trading, and high-frequency trading.

Over recent years, quant trading has evolved to harness the abundance of market data via new technologies. As the field becomes more technology-driven, firms need candidates who can navigate and analyze vast datasets to uncover actionable insights, using their math and programming knowledge and sophisticated tools like AI and high-frequency trading algorithms. The modern quant trader must blend traditional financial acumen with data science expertise to thrive in this tech-driven trading environment.

Skills for Quant Trading

Quant traders must have deep knowledge of quantitative and statistical analysis, and strong programming skills in Python or C++, for example. They may have experience with machine learning techniques as well. Psychology is very important for quant traders and trading job candidates must demonstrate that they thrive in extremely competitive environments and can handle pressure well.

> "If you were interested in systematic trading 20 years ago, it was much harder to build your own trading strategies because access to the data and markets was difficult. These days there is much more information available, and you can build systems and trade on paper or in real life quite easily to test some concepts and assess your performance."
>
> **Richard Booty,**
> **Managing Partner, Testwood Partners**

Quant Trading

TYPICAL JOB AREAS

Quant Trader

Quant traders trade a variety of asset classes, including equities, bonds, commodities, currencies, and derivatives using a combination of market knowledge, trading experience, and math and computer skills. Quant traders work at investment firms, hedge funds, and banks. They may also be proprietary ("prop") traders working in small groups within such organizations, or independently for their own accounts.

Algorithmic Trader

Algorithmic ("Algo") traders conduct statistical analysis on equities, bonds, and currencies, for example, and apply statistical modeling and machine learning techniques to develop trading strategies. Algo traders design and implement algorithms, with a focus on evaluating potential predictive signals, market impacts, and trade scheduling optimization. Algo traders possess solid analytical and quantitative skills and strong proficiency with Python, or C++. Algo traders also have experience with Q/KDB and time series databases.

Watch a recording of the CQF Institute talk with CQF alumnus, Vitor Angrisani, to find out more about a typical working day for a Quant Equity Trader.

CQF Corner

The CQF program teaches the mathematical models traders need to price assets, manage risk, predict market movements, **implement algo trading strategies,** and find arbitrage opportunities.

Trading

	North America		Europe		Asia	
	Base	**Total Comp**	**Base**	**Total Comp**	**Base**	**Total Comp**
Quant Trader Junior Trader	$125,000 - $150,000	$150,000 - $180,000	$100,000 - $130,000	$120,000 - $155,000	$70,000 - $120,000	$85,000 - $140,000
Quant Trader Senior Trader	$150,000 - $200,000	30-50% of PnL	$95,000 - $225,000	10-40% of PnL	$150,000 - $170,000	10-40% of PnL
Quant Trader Head of Trading	$250,000 - $300,000	$550,000 - $700,000	$200,000 - $300,000	$260,000 - $525,000	$215,000 - $250,000	$325,000 - $375,000

London-based CQF alumnus, Hugh Tallini, is Head of FX Options Quant Trading at UBS, a multinational diversified financial services company. We spoke to Hugh about the transition from physics to finance and his advice for new quants.

> "The CQF gave me a good, intuitive understanding of quant finance techniques and the trading business that would have taken years otherwise to gain on-the-job or through self-study."

An Interview with a Head of FX Options Quant Trading

What do you do in your current role?

I head up the FX Options E-Trading team. I manage quant and quant development teams that create algorithms and build out systems that are used to trade FX options.

Why did you pursue your current path?

I started as a Physicist. The computing systems, data analysis, and techniques we used were very similar to those used in electronic trading, so it suited my interests and skills. I was fortunate in getting into finance at the start of the electronification of the financial markets and my career grew with that journey.

What do you enjoy most about your role?

The satisfaction of problem solving in a complex environment where the problem domain is always evolving, meaning there are constantly new challenges and learning opportunities.

What are some of the biggest achievements in your career to date?

Building out an algo trading eco-system from scratch and successively growing its capabilities each year. This goes hand in hand with building out the systems and helping to create the high-performing team that delivered this.

What have been some of the biggest challenges over the past few years?

The focus on regulatory requirements, particularly on algo trading, has grown enormously. This has led to more rigid processes and scrutiny being put in place around algo changes. Regulatory requirements must now be considered as a core part of project delivery, as well as system design and operation.

Where did the CQF add value to your career?

The CQF gave me a good, intuitive understanding of quant finance techniques and the trading business that would have taken years otherwise to gain on-the-job or through self-study. Additionally, the access to the Lifelong Learning platform is a great resource for keeping in touch with what is going on in the broader quant field.

What skills are required to be successful in quant finance today?

For electronic trading, it is data analysis and statistics, programming, and a thorough knowledge of your product area. Machine learning techniques are certainly becoming more important and will continue to be so in the years to come.

What advice would you give to someone starting a career in the industry?

Keep learning and investing in yourself and your skills so that you are able to stay up to date as the market evolves.

Read the full interview

The Quant Job Seeker's Guide

The Quant Job Seeker's Guide

The competition for jobs in quant finance is strong, so the following section addresses the key elements to consider when applying and interviewing for a new quant finance role.

The Job Application

The Resume

When applying for a role, the resume is usually a candidate's first opportunity to showcase themselves and their skillset to the recruiter or hiring manager.

For candidates looking to get an interview, they need to remember that recruiters and hiring managers are time poor and review a lot of resumes. To stand out, it is vital for candidates to convey why they are suitable for the job in the most concise format possible.

At the February 2024 Careers talk, 47% of respondents stated that tailoring their resume is the most challenging aspect of creating a resume.

Quick Tips for Resume Writing

Candidates can effectively showcase skills and experience while keeping their resumes brief by doing the following:

- **Tailor the resume** and highlight relevant skills and experiences needed for the specific job.
- **Incorporate common keywords** from the job description as many firms now pre-screen resumes online.
- **Use headings, bullet points, and bold text** to aid readability.
- **Avoid color, logos, and photos** as these can look unprofessional.
- **Keep formatting consistent** throughout the document.
- **Link to personal websites, GitHub, or other coding repositories,** or mention hackathons or coding competitions, if relevant.
- CQF alumni often showcase their **final projects** demonstrating how they have worked on real-world problems within quant finance.

> "Your resume is your opportunity to sell yourself to the hiring manager or recruiter who is time poor. We see lots of resumes daily, as do line managers, so it is about how you get our attention and land yourself that interview."
>
> **Patrick Flanagan,**
> **Managing Director, Clarence George**

Ordering a Resume

There is no set way to order a resume. However, a standard template for quant finance typically follows this order:

- **Name** and current contact details.
- **Executive summary** – two to six lines that give a snapshot of the candidate's experience and suitability for the role.
- **Professional experience** – highlight key responsibilities and achievements for previous roles, with a brief explanation about the company.
- **Skills** – for example, coding skills with the level of proficiency.
- **Academic credentials** such as undergraduate and postgraduate degrees.
- **Professional qualifications,** such as the CQF, listing subjects studied and results.
- **Publications** (where relevant).
- **References.**

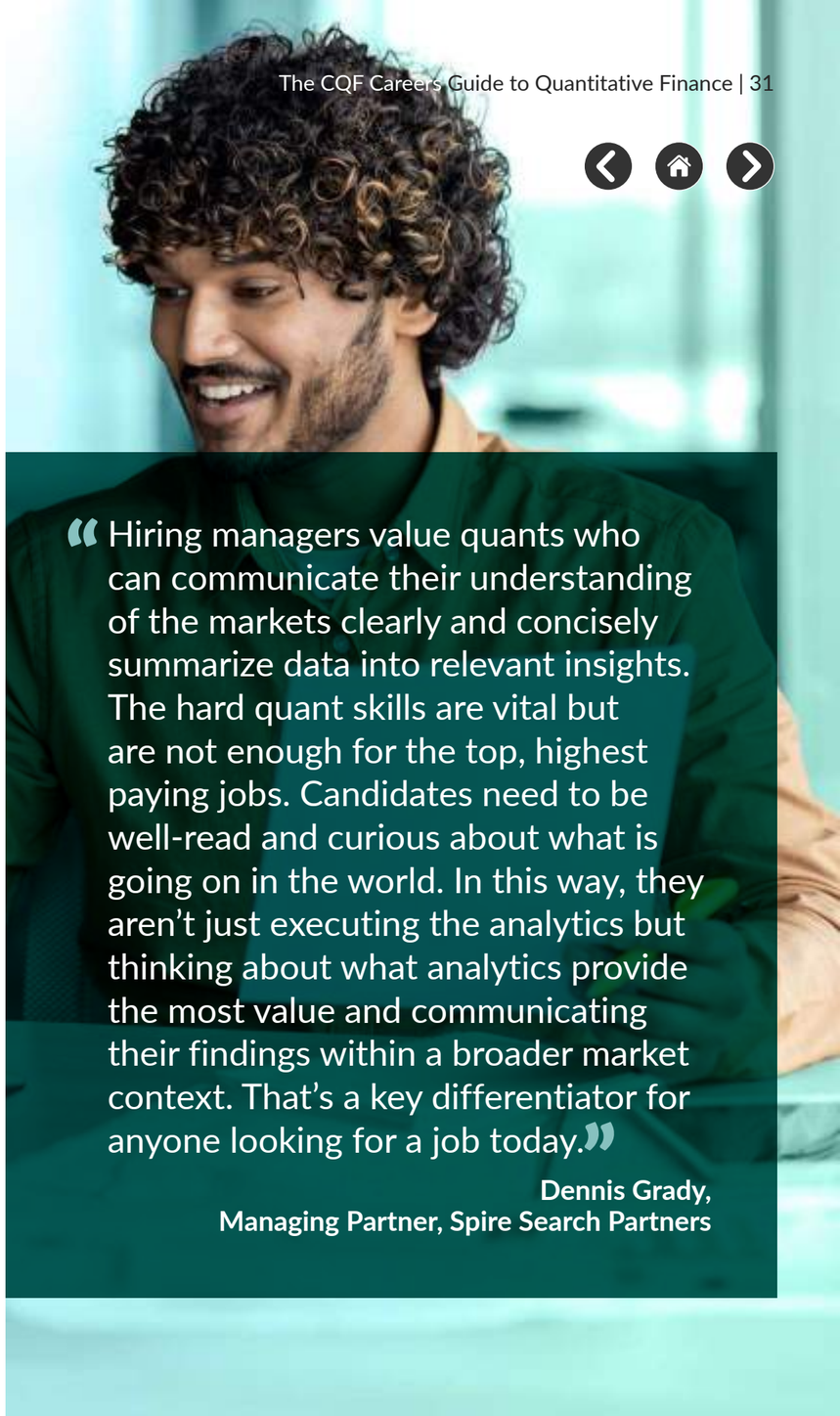
Candidates should remember that the resume will drive the interview, so it should cover everything they want to discuss at that time.

The Cover Letter

The accompanying cover letter should be brief and less than one page. This should be used by the candidate to express interest and to highlight why they are right for the role. It is important to tailor each letter for each application. Taking the time to do this shows that the candidate has read the job description and cares about the impression they make.

Watch a video with Patrick Flanagan, Managing Director at Clarence George, on how to build a standout resume.

> "Keep publications on your resume but be succinct. Resumes can sometimes go on quite long with a lot of research listed. Whilst this is great, in a commercial setting, people want people to be concise."
>
> **Patrick Flanagan,**
> **Managing Director, Clarence George**



> "Hiring managers value quants who can communicate their understanding of the markets clearly and concisely summarize data into relevant insights. The hard quant skills are vital but are not enough for the top, highest paying jobs. Candidates need to be well-read and curious about what is going on in the world. In this way, they aren't just executing the analytics but thinking about what analytics provide the most value and communicating their findings within a broader market context. That's a key differentiator for anyone looking for a job today."
>
> **Dennis Grady,**
> **Managing Partner, Spire Search Partners**

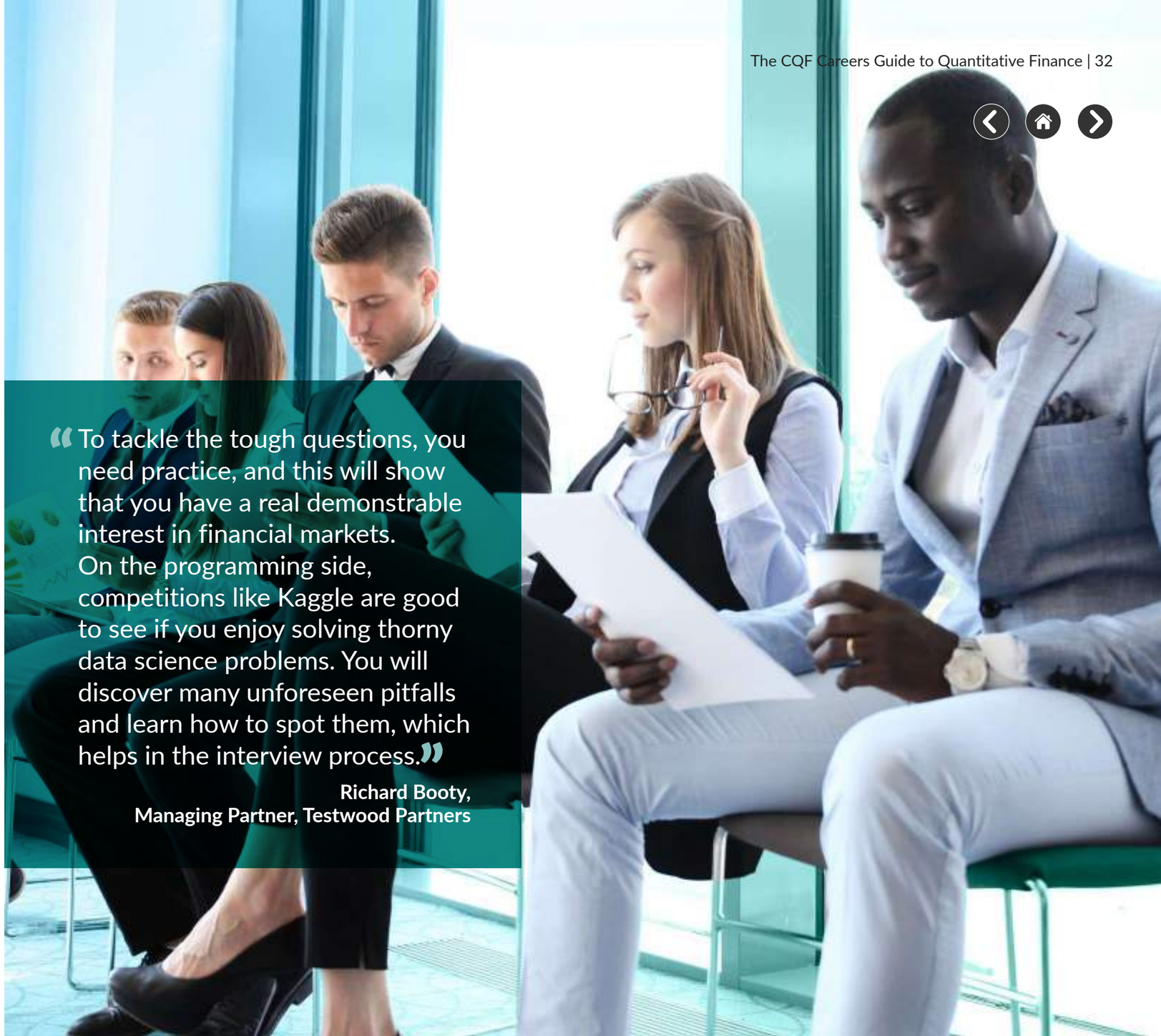
The Interview

Interviews are an opportunity to showcase skills but can be challenging at any career stage. Candidates looking to excel in the interview and achieve their career goals should enter the process as prepared as possible, having researched the company, and considered the types of questions likely to be asked.

Before the Interview

Quant finance is intellectually demanding, and employers will typically test a candidate rigorously, so candidates should take the time to prepare.

- **Research the company** and utilize platforms like Glassdoor, business press, and the firm's social media to learn about its direction and culture.
- **Anticipate interview questions** and rehearse responses to common questions and ensure a strong grasp of skills listed on the resume.
- **Practice brainteasers** and strategize multiple methods for tackling them to demonstrate analytical versatility.
- **Demonstrate passion for quant finance** by highlighting engagement in further reading, professional memberships, hackathons, or **industry events.**



> "To tackle the tough questions, you need practice, and this will show that you have a real demonstrable interest in financial markets. On the programming side, competitions like Kaggle are good to see if you enjoy solving thorny data science problems. You will discover many unforeseen pitfalls and learn how to spot them, which helps in the interview process."
>
> **Richard Booty,**
> **Managing Partner, Testwood Partners**

Interview Questions

During the interview, candidates can usually expect personal, behavioral, and technical questions, as well as brainteasers and practical tasks.

The types of questions and scenarios posed by hiring managers or recruiters will vary from firm to firm, and role to role. The following examples should just be a starting point for candidates when they are considering how best to prepare.

Personal Questions

- What interests you most about this position and the company?
- Why are you looking to leave your current role?
- What do you think you would contribute to the team?

Behavioral Questions

- Can you tell me about a time you had to make a decision based on limited information?
- Rate yourself on a scale of 1–10 on the type of risk taker you are. Tell me why and give examples to support your claims.

Technical Questions

- How would you explain the concept of overfitting in financial modeling?
- Discuss a technical project you have worked on that is relevant to this role. What challenges did you face and how did you overcome them? What was the biggest success?
- Which programming languages are you proficient in and how have you applied them to your work/studies?
- What is a p-value and why is it important in hypothesis testing?

Brainteasers

- How many gas stations are there in the US?
- How many fish are there in the Indian Ocean?
- What would you estimate to be the size of the tennis ball market in the UK?

Practical Tasks

- Candidates may be given a market scenario and asked how they would construct a portfolio to take advantage of it.
- Candidates may be asked to finish a code sample in the language specified on their resume.

Candidate Questions

At the end of the interview, most recruiters and hiring managers will allow the candidate to ask any questions they have about the role, team, or company.

Ideas for questions may include:

- What are the main challenges currently faced by the team?
- Can you describe the day-to-day typical responsibilities for this role?
- How does this role contribute to the overall success of the firm?

At the February 2024 Careers talk, 47% of respondents stated that uncertainty about the questions is the most challenging part of an interview.

Paris-based CQF alumna, Katherina Duong-Bernet, is EU Head of Business Development for Millennium Global Europe SAS. Katherina shared common interview mistakes, questions, and considerations.

> "Show that you can communicate, not only to solve a problem, but to solve the right problem in the right way."

An Interview with a Quant Hiring Manager

What common mistakes do candidates make during the hiring process?

One of the most common mistakes is not trying to obtain complementary information, other than what is given in the job description or from the recruiter.

How can aspiring quants stand out?

Come well prepared, having gathered information on the company: its foundation, competitors, shareholding structure, flagship product, and press. Ideally you want to speak with insiders and find out exactly what profile they are looking for.

How do you assess a candidate's technical skills during an interview?

We ask them to finalize a piece of code and comment on it. This is usually a basic exercise and performed in the coding language shown on their CV, but it demonstrates their level of experience, if coding is a core competency we want.

Typically, there will also be brainteasers, so get well acquainted with different types. Part of the objective is to see your reaction once you leave your comfort zone. The interviewer is likely to pose several questions, as they want to see how you work under pressure.

How important is communication ability?

A common stereotype is that quants are introverted. Show that you can communicate, not only to solve a problem, but to solve the right problem in the right way. You can also show that you perform well on a team with introverted people.

What are the top three things a candidate can do to prepare well for an interview?

1. Understand where the company is coming from and how they operate.
2. Know how to create as many matching points as possible.
3. If you have doubts, address them. You do not want to waste time in a role that is not a fit.

How important is it for candidates to have experience with machine learning?

The concept of AI is old, but the deployment of AI can be unique to each company. Do not jump to conclusions, but rather be prepared to have the conversation if asked. The CQF offers a very good foundation on machine learning techniques. You should acquaint yourself with the most obvious ones.

What advice would you give to new professionals starting their career today?

First, look across different industries to find the areas that interest you most. Second, look for companies where you can learn and be on a great team. Finally, look for indicators showing "they care." You want a firm that will support you as an individual when a major life event occurs.

Watch a video with Katherina Duong-Bernet on how to master the quant finance interview.

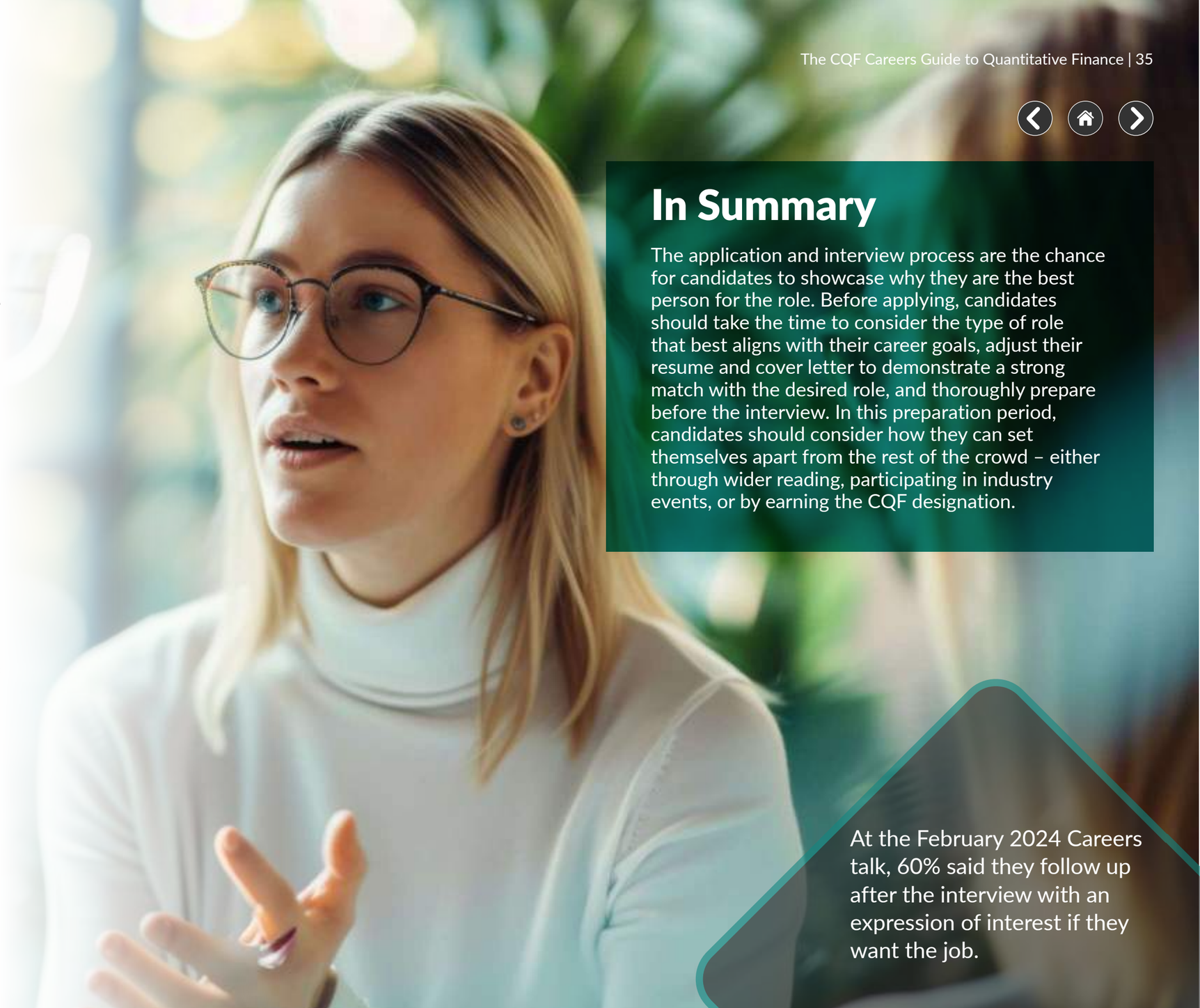
After the Interview

After the interview, it is polite to follow up with a short message to thank the hiring manager for their time, and either reiterate interest or indicate that it is not the right opportunity. This shows initiative and, if interested in the role, can help to keep the candidate top of mind.

The Offer

If the candidate receives a job offer, it is crucial to take the time to review whether the offer aligns with their expectations. If there are aspects that the candidate feels could be improved, they can engage in a professional negotiation to achieve the best outcome. It is advisable to be prepared with market salary data and a clear rationale for any requests.

If the candidate is not offered the job, it can be disappointing, but it is also an opportunity for growth. The candidate should express gratitude for the chance to interview and, if comfortable, request feedback.

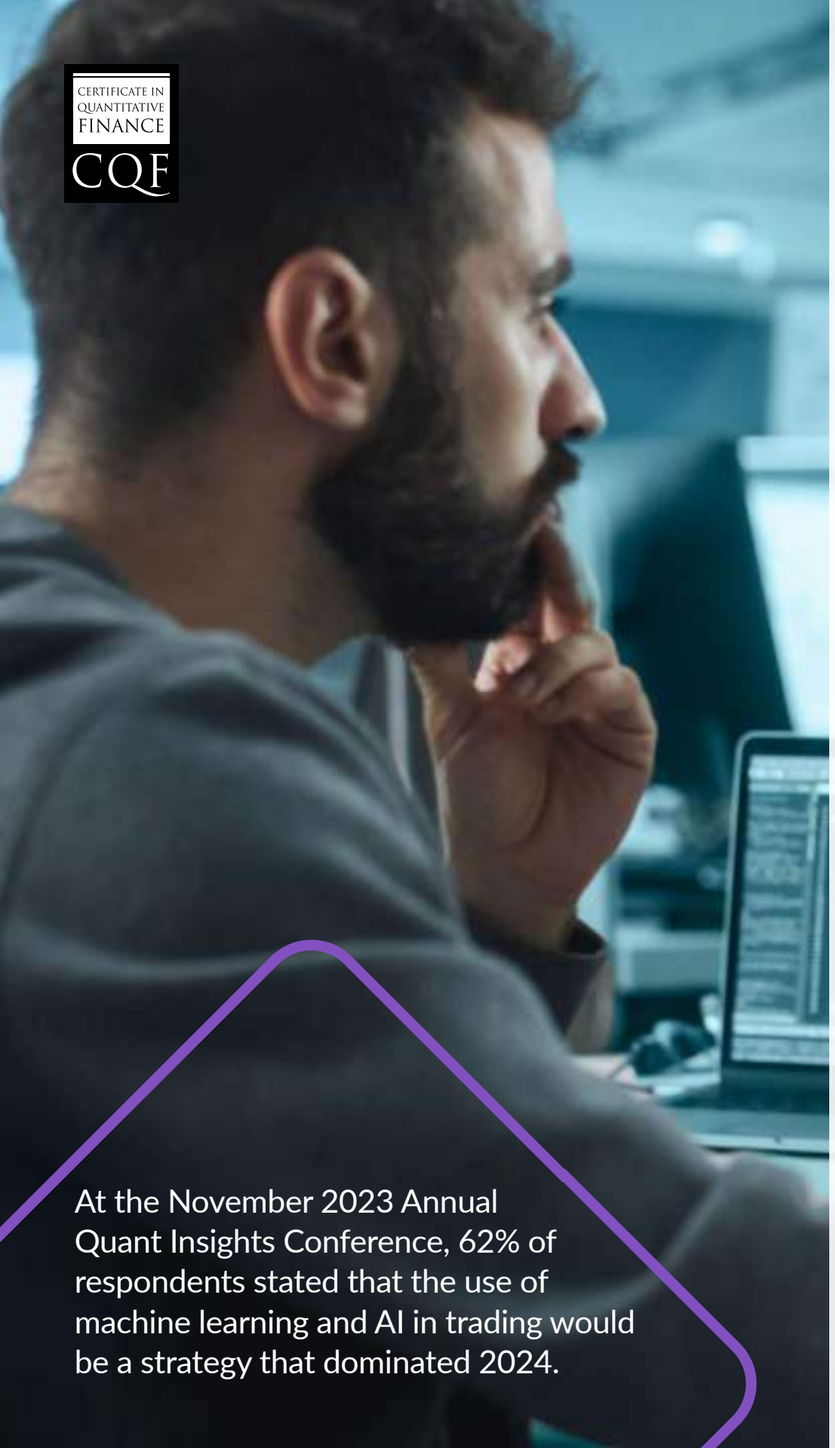


In Summary

The application and interview process are the chance for candidates to showcase why they are the best person for the role. Before applying, candidates should take the time to consider the type of role that best aligns with their career goals, adjust their resume and cover letter to demonstrate a strong match with the desired role, and thoroughly prepare before the interview. In this preparation period, candidates should consider how they can set themselves apart from the rest of the crowd – either through wider reading, participating in industry events, or by earning the CQF designation.

At the February 2024 Careers talk, 60% said they follow up after the interview with an expression of interest if they want the job.

Spotlight on Machine Learning and AI



At the November 2023 Annual Quant Insights Conference, 62% of respondents stated that the use of machine learning and AI in trading would be a strategy that dominated 2024.

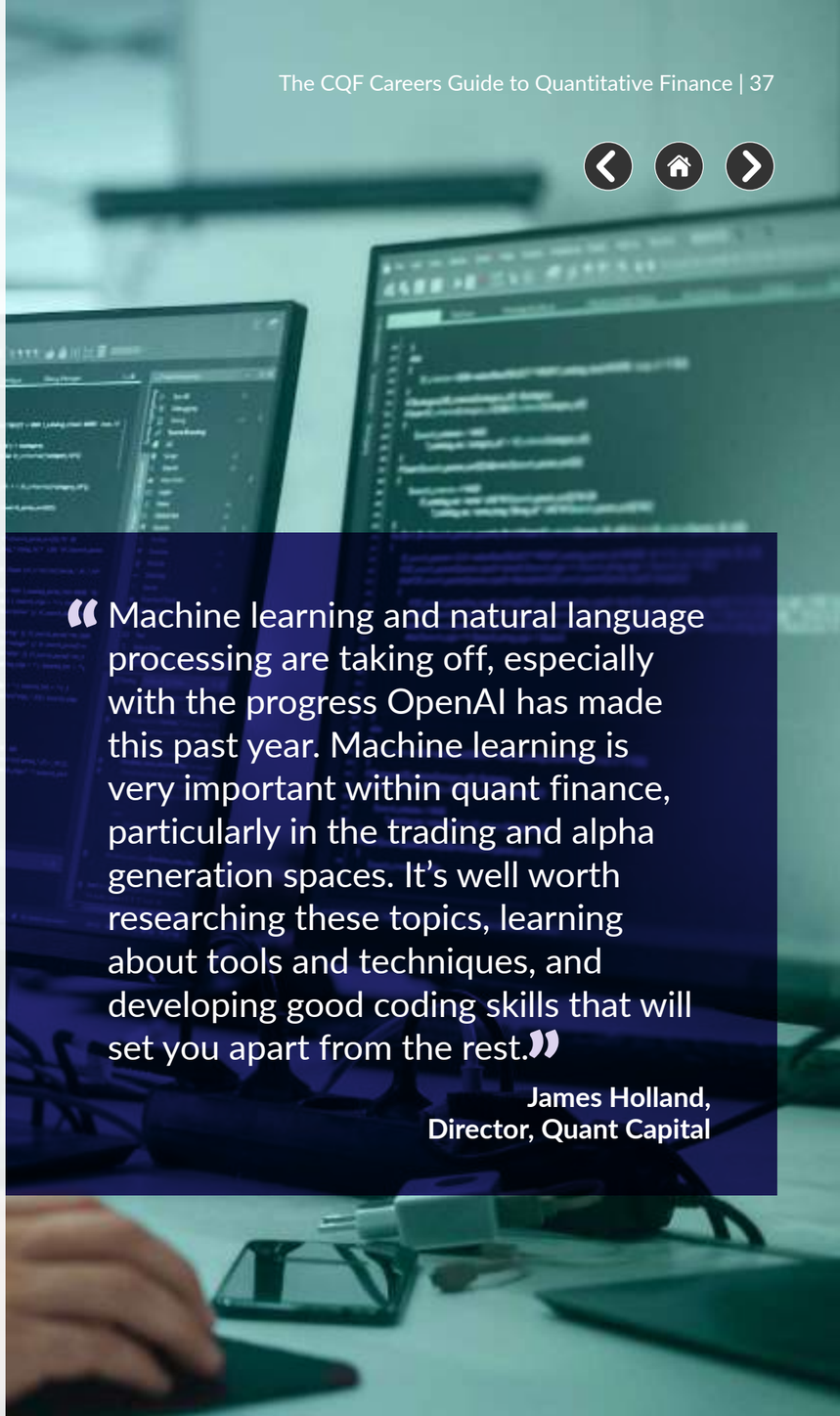
Spotlight on Machine Learning and AI

With the explosion of AI technologies, such as ChatGPT and its counterparts, interest in machine learning and AI has risen rapidly across the financial industry. The integration of these technologies has become a cornerstone for innovation in the field, offering sophisticated tools to parse through vast datasets, optimize portfolios, predict market trends, and automate complex trading strategies. For quant finance professionals, this provides a range of new opportunities.

Understanding Machine Learning and AI

Machine learning is a branch of artificial intelligence (AI) focused on algorithms that learn from data and improve over time. These algorithms can recognize complex patterns and make predictions, which is invaluable in financial markets that are rich in data and well-suited for the power of machine learning techniques to achieve deeper insights.

AI, encompassing machine learning, also includes technologies that simulate human intelligence processes. In quant finance, for example, this may involve natural language processing (NLP) to analyze sentiment, predictive models to analyze market conditions, or automated trading strategies.



> “Machine learning and natural language processing are taking off, especially with the progress OpenAI has made this past year. Machine learning is very important within quant finance, particularly in the trading and alpha generation spaces. It’s well worth researching these topics, learning about tools and techniques, and developing good coding skills that will set you apart from the rest.”
>
> **James Holland,**
> **Director, Quant Capital**

Current Applications of Machine Learning and AI in Quant Finance

There are several areas in quant finance where machine learning and AI are being utilized to enhance traditional methods. Key applications include:

Portfolio Optimization: Algorithms can process vast datasets to identify optimal asset allocations that balance risk and return.

Automated Trading: AI-driven systems can execute trades at high speeds, capitalizing on market inefficiencies and opportunities more quickly than human traders.

Risk Management: Predictive models can analyze market conditions and portfolio exposures to assess and mitigate risks.

Derivatives Pricing: AI can improve the accuracy of pricing complex financial instruments such as options and swaps by considering more factors and non-linear relationships that traditional models may not capture.

Sentiment Analysis: NLP is used to gauge market sentiment from news articles, social media, and financial reports, which can influence trading strategies.

Already, machine learning and AI are an indispensable asset in a quant's toolkit.

> "Machine learning in finance is everywhere, but there's a difference between using machine learning to help build and refine a strategy and developing a systematic strategy driven by machine learning alone. Many of the larger firms have dedicated machine learning teams and this trend has been growing over the past five years."

Richard Booty,
Managing Partner, Testwood Partners

Growth Areas for 2024

As we advance through 2024, predicted trends and strategies include:

Reinforcement Learning: This method is anticipated to gain traction for developing dynamic trading strategies, portfolio optimization, and derivatives pricing.

Alternative Data: The use of data sources, like satellite imagery and web activity, will grow, providing quants with unique investment insights.

Explainable AI (XAI): There will be a growing demand for models that provide transparent decisions, aiding compliance, and reducing model risk.

Quantum Computing: This could revolutionize quant finance by solving complex optimization problems much faster than classical computers.

Each of these areas is exciting, but integrating AI requires careful planning, robust infrastructure, and cross-disciplinary expertise.

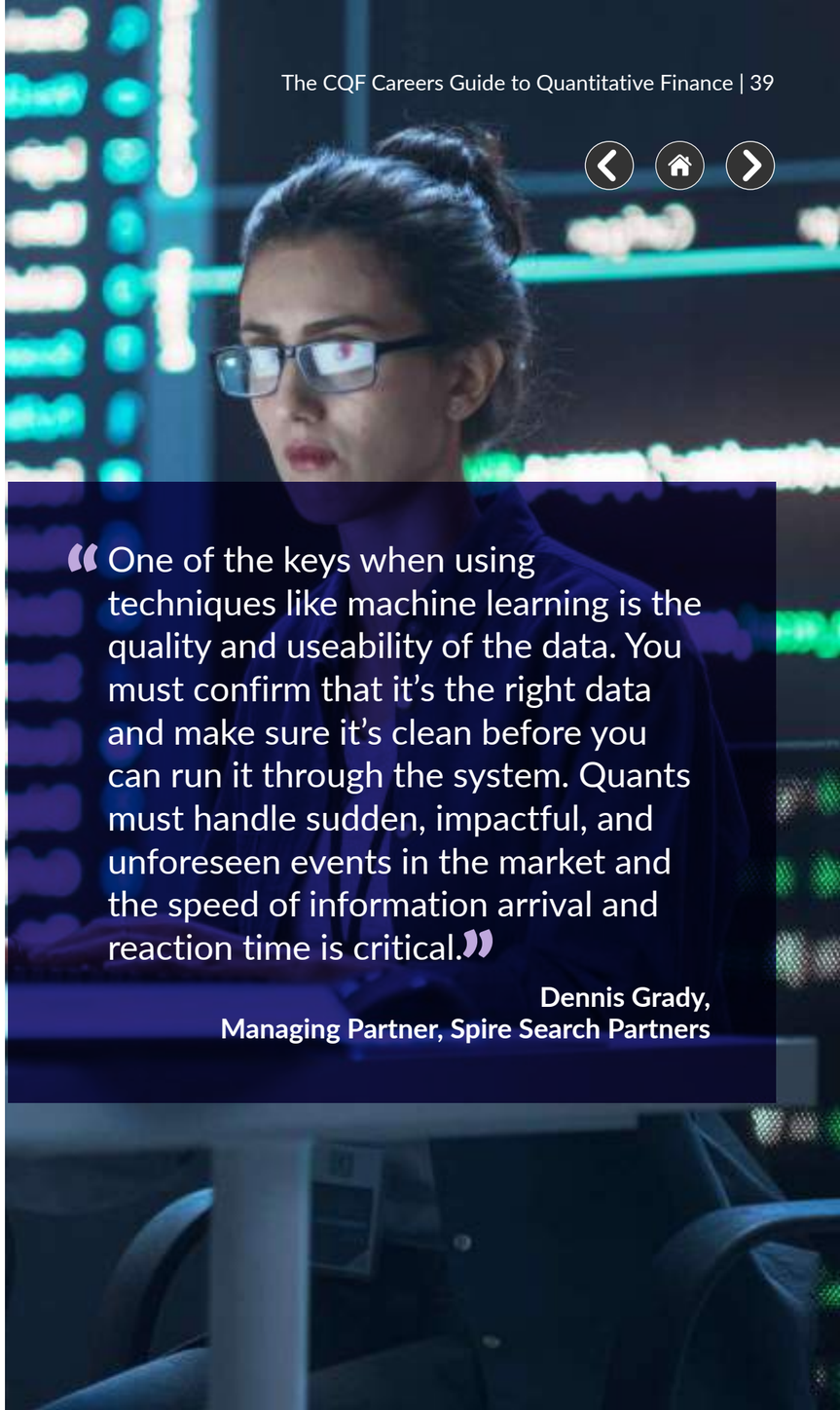
At our September 2023 Conference, 47% of respondents were most excited about the potential applications of reinforcement learning.

Impact on Careers in Quant Finance

Quants must possess a more robust set of competencies than ever before. Those entering the field must be well-versed in traditional techniques and in cutting-edge tools and methods. As automation and AI become more prevalent, the demand for quants who can develop and oversee these technologies will increase.

The industry is also witnessing the increasing emergence of Data Scientists, AI Strategy Developers, and Machine Learning Financial Engineers. These professionals are expected to harness these new tools to create sophisticated models that predict market movements, identify investment opportunities, and manage risks more effectively.

Traditional quant roles are also evolving to incorporate the use of AI. Ultimately, the ability to adapt and the willingness to continuously learn will be the hallmark of successful quants in this landscape.



> "One of the keys when using techniques like machine learning is the quality and useability of the data. You must confirm that it's the right data and make sure it's clean before you can run it through the system. Quants must handle sudden, impactful, and unforeseen events in the market and the speed of information arrival and reaction time is critical."
>
> **Dennis Grady,**
> **Managing Partner, Spire Search Partners**

At the November 2023 Annual Quant Insights Conference, 90% of respondents stated it was vital to stay up to date with the latest techniques in quant finance.

How to Stay Competitive

Professionals looking to stay at the forefront of quant finance should explore:

Professional Qualifications: Earning the CQF ensures professionals gain practical quant and machine learning skills with access to continuous education for the rest of their careers.

Skill Diversification: Develop a broad skillset that includes traditional quant finance skills, as well as machine learning, AI, and softer skills.

Networking: Connect with peers, attend conferences, and participate in forums to exchange ideas and stay informed.

Adaptability: Embrace change and be able to pivot focus in response to new market conditions and technological advancements.

In Summary

Machine learning and AI are revolutionizing quant finance, creating new roles and transforming existing ones. Quants must continually update their skills to harness these technologies effectively. By adopting a growth mindset, they can navigate the complexities of the market and carve out successful, sustainable careers.

> "Pay attention to trends, for example, in machine learning and AI. What is being presented at AI and machine learning conferences? Those topics and technologies, while they might not be used currently, are usually only a couple of years away and they may be something that firms in finance are interested in."

Tyler Robinson,
Director & Co-Head of Quants, Selby Jennings

The Road to Success with the CQF

> "The CQF opened many doors for me in the world of quant finance. It provided me with a deep understanding of financial modeling and helped me develop the skills needed to work in roles such as risk analysis and portfolio management."
>
> **Yuehui Liang,**
> **Manager, Risk Analytics and Modeling, UOB**

The Road to Success with the CQF

The Certificate in Quantitative Finance (CQF) is the world's largest professional qualification in quant finance, awarded by the CQF Institute, delivered by Fitch Learning, and desired by top-tier firms around the world.

The master's-level program has been chosen by ambitious professionals globally for its unique focus on the cutting-edge quant finance and machine learning techniques used by leading practitioners in today's financial markets.

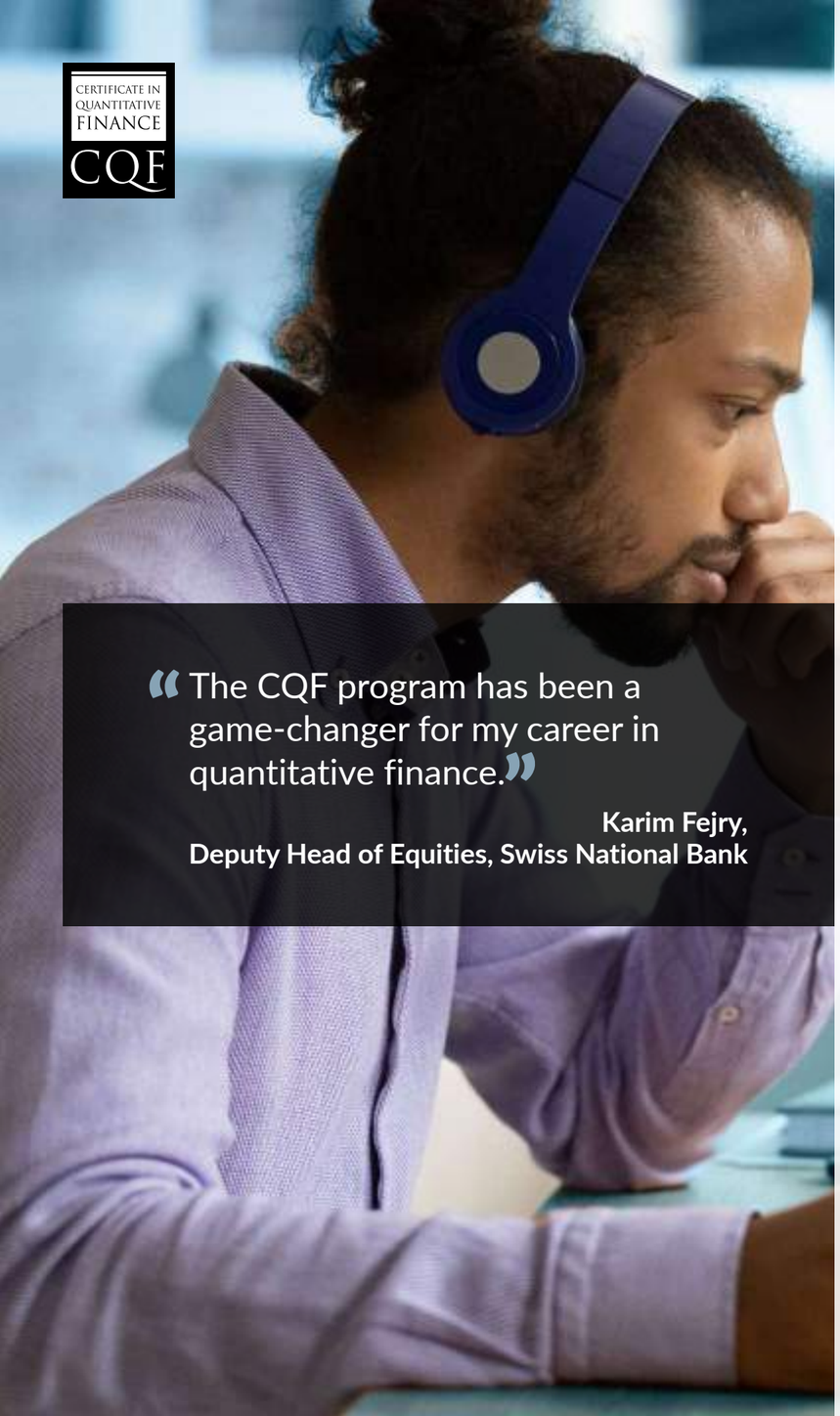
A stand-out designation

The CQF is tailored for professionals working in or aspiring to pursue the career paths outlined in this Guide and equips them with the skills to thrive in today's competitive job market and to excel in their fields.

20+
years of shaping quant careers

9,500+
alumni and current delegates

90+
countries-strong global community



Cutting-Edge Syllabus

The CQF syllabus is updated quarterly in consultation with the industry to ensure the skills taught reflect the real world. The program comprises six core modules, followed by two advanced electives that allow delegates to tailor their studies to their career goals and explore a range of topics from quant methods for ESG to quantum computing.

- Module 1: Building Blocks of Quantitative Finance
- Module 2: Quantitative Risk and Return
- Module 3: Equities and Currencies
- Module 4: Data Science and Machine Learning I
- Module 5: Data Science and Machine Learning II
- Module 6: Fixed Income and Credit
- Advanced Electives

World-Renowned Faculty

Led by the renowned Dr. Paul Wilmott, the CQF faculty includes leading quant practitioners such as Dr. Claus Huber, Dr. Espen Haug, Dr. Jessica James, and many others who use their real-world expertise to ensure CQF delegates grasp the theory behind the models taught in lectures and understand their practical limitations and applications in modern financial markets.

Practical Study

CQF delegates get immediate access to preparatory online primers in Math, Finance, and Python upon enrollment. Their learning journey is enhanced with drop-in math clinics, interactive Python Labs, discussion-based tutorials, and one-to-one faculty support. The exams and final capstone project focus on the implementation of skills and methods, so that delegates are equipped to confidently apply their skillset in the workplace.

Flexible Delivery

The CQF is ideal for busy professionals, offering a part-time curriculum that is accessible live online and on-demand over six months. Delegates upskill without pausing their careers, and can defer their studies for up to three years, free of charge.

Lifelong Partnership

CQF alumni receive permanent access to the ever-expanding Lifelong Learning library, which includes 900+ hours of additional lectures, masterclasses, and the latest qualification content, ensuring their skillset stays ahead of the curve for the rest of their careers. Additionally, alumni have access to the CQF Career Services for ongoing professional support and new job opportunities from financial firms across the globe.

Start your CQF journey today

Join an upcoming information session to discover how the globally recognized program could help you advance your quant finance career.

Register Now

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The CQF Institute is the awarding body of the CQF. Become a member today and connect with vibrant quant finance community of over 29,000 members around the world.

Gain insights with exclusive access to talks and conferences led by industry innovators and leaders. Network with like-minded peers in your community. Expand your knowledge with thought-leadership from leading experts.

Elevate your expertise today.

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> "Harness the knowledge from this Careers Guide and use it to navigate your next step. If you want to realize your full career potential, empower yourself by investing in the quant finance skills you need to achieve your goals now and in the future."
>
> **Dr. Randeep Gug,**
> **Managing Director, CQF Institute**

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References

CQF Institute resources include polling data from the Quant Insights Conferences hosted by the CQF Institute (September and November 2023) and polling data from the CQF Institute Careers Insights Talk with Katherina Duong-Bernet (February 2024).

Salary table sources include Robert Half's 2023 Salary Guide, Robert Walters' Salary Benchmarking Tool, and Selby Jennings' Investment Banking Salary Guide, Investment Management Salary Guide, the Quant Analytics Salary Guides for the US and Europe, and the Southeast Asia Salary Guide. Additional resources include eFinancial Careers, Glassdoor, and Indeed.

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