CQF Institute

Careers Guide to Quantitative Finance

2025

The CQF Institute is the awarding body of the CQF and part of Fitch Learning.

CERTIFICATE IN QUANTITATIVE FINANCE CQF

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Contents

Welcome

"Welcome to the 2025 Careers Guide to Quantitative Finance. Whether you're just starting out or a seasoned professional, this guide is your compass for navigating the ever-changing world of quantitative finance careers. Dive into the latest job market trends, gain insights into typical compensation, and explore the essential skills to elevate your career. Backed by 22 years of expertise in delivering our renowned CQF program, this guide is designed to empower you to make your next career move."

Dr. Randeep Gug,
Managing Director, CQF Institute

CQF Institute

Published by the CQF Institute, the 2025 Careers Guide to Quantitative Finance is an invaluable resource for anyone interested in pursuing a career in quantitative finance. We examine the ever-evolving opportunities in this sector, with insights from recruiters, CQF faculty, CQF Institute members, and CQF alumni.

Introduction

We explore six career paths in quantitative finance:

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

For each of these areas, we provide detailed information on typical skills, roles, responsibilities, and salary ranges across the Americas, Asia, and Europe. This edition also features insights from leading industry experts, Aaron Brown, Carol Alexander, and Wim Schoutens, highlighting critical areas of focus for aspiring professionals. Additionally, we investigate the impact of AI on quantitative finance careers and offer advice on the skills to focus on.

As the demand and competition for quantitative finance expertise continues to grow across financial services, possessing a cutting-edge skillset is more crucial than ever.

For over 22 years, the **Certificate in Quantitative Finance (CQF)** has stood out as the leading global professional qualification in quantitative finance and machine learning. The program focuses on the practical application of mathematical, statistical, and programming techniques to solve real-world financial problems. The program is designed to be flexible, offering online and part-time study that enables professionals to upskill without taking time out of their careers. With a cutting-edge curriculum that reflects market trends, the CQF provides a robust foundation for a successful career in quantitative finance now and in the future.

Employment Trends in Quantitative Finance

Employment Trends in Quantitative Finance

The quantitative finance industry continues to evolve rapidly, with several key trends shaping the employment landscape. As organizations strive to stay competitive in a volatile market, the demand for professionals in quantitative finance remains strong, particularly for those with multidisciplinary expertise and advanced technical skills.

Market Dynamics

Market Volatility

Market volatility has significantly shaped recent quantitative finance employment trends. Driven by global political and economic events, such as changes in the US administration and international conflicts, volatility has surged, prompting organizations to adapt their strategies and adjust their staffing priorities. This environment has intensified the competition for talent, particularly at senior levels, as organizations seek individuals who can effectively navigate these turbulent conditions. Recruiters report that organizations are increasingly focusing on retaining their top talent through bonuses and are open to hiring candidates from diverse backgrounds, including technology, academia, and other non-financial industries with the aim of filling critical roles more swiftly.

Geographic Shifts

Recruiters state that cities like Amsterdam, Hong Kong, and Singapore are experiencing heightened demand for quants, driven by high-frequency trading companies establishing operations in these regions. The Middle East, particularly the United Arab Emirates, is emerging as a key hub for portfolio management talent, attracting companies keen on leveraging its strategic location and receptive policies towards overseas professionals. These shifts reflect a broader trend of companies investing in new locations to access diverse talent pools and gain competitive advantages in worldwide markets.

Roles in Demand

As organizations adapt to changing market conditions and technological advancements, recruiters report that several roles are particularly in demand. Quant Researchers, who specialize in developing and implementing trading strategies, are highly sought after, especially those with expertise in machine learning and AI. This trend is driven by the need to leverage data for extracting alpha and optimizing trading strategies. Quant Portfolio Managers continue to be in demand, particularly those with experience in navigating economic downturns. Machine Learning Researchers and Quantitative Developers are also crucial, especially in high-frequency trading environments, as organizations focus on integrating machine learning-based systems to enhance their trading platforms.

> “Portfolio Managers are always in high demand if they have navigated economic downturns multiple times during their career with solid returns. I’ve seen a jump in appetite for those in private credit and commodities. Machine Learning Researchers, Quant Developers on trading systems, and Research Developers are also in demand.”
>
> **Jermaine Barnes,**
> **Director, J. K. Barnes Ltd.**

84% of respondents at the Annual Quant Insights Conference felt that technology and AI would offer the most opportunities for quantitative finance in 2025.

Skills to Focus on

Technical Skills

Alongside essential, core quantitative finance skills, recruiters report that proficiency in coding is a fundamental requirement for even the most junior roles. Python remains the dominant language, with C++ also highly valued, particularly in high-frequency trading. Java and other languages like R and MATLAB may be beneficial, but are not essential and more dependent on the specific role and company requirements.

Machine learning and AI skills have become critical, as organizations seek to leverage data-driven strategies and enhance trading models as efficiently and quickly as possible. Recruiters also state that skills in data sourcing, manipulation, and statistical analysis are essential for developing trading strategies and extracting alpha from large datasets.

Business Skills

Over the last 10 years, for many organizations, the quant function has shifted, so that many now find themselves seated alongside trading teams and other front office functions. Consequently, effective communication and the ability to explain complex ideas in simple terms are crucial for conveying insights and facilitating collaboration. However, recruiters report that communication skills must now encompass effective communication with AI systems as well. This involves giving clear instructions and being able to troubleshoot AI outputs, to innovate in a technology-driven environment efficiently.

> “Firms absolutely prioritize strong communication skills. You must be able to describe complex concepts simply and provide clear instructions, whether to people or AI systems. Building the best model is only part of the job; if you cannot explain it, its value diminishes. When using AI, it’s crucial to troubleshoot, delve deeper, and validate the system’s outputs, rather than accepting the first result as the final answer.”
>
> **Robin Frost,**
> **Director, Taylor Root**

Foundational Skills

No matter what happens in the markets, all quants need core foundational skills, regardless of their career path. These 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 are essential for quants. Traditional programming languages such as C and C++ have been popular historically, but Python has become the dominant language in recent years.

Financial Skills

Quants need to 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, and risk management practices.

CQF Corner

The CQF program offers optional **online primers** on all three foundational topics, perfect for sharpening your skills and getting ahead. Prepare yourself for success by diving into these essential topics before the program starts.

> "If you're one track-minded, like just code, code, code, then there's going to be less need for you. But if you're a coder that can think at a macroeconomic level, but then test on a micro level, be more cognizant of the environment, and then adjust as new tools become available, you will be in a strong position."

Dennis Grady,
Managing Partner, Spire Search Partners

Standing Out in Today's Job Market

For those looking to stand out in today's financial markets, recruiters state that their clients want candidates that can show passion for the field, adaptability, and drive.

Continuing Your Professional Development

Recruiters regularly recommend that professionals complete the **Certificate in Quantitative Finance (CQF)**, which provides practical, in-depth learning at a master's-level, while allowing individuals to continue to work. Enrolling on the CQF highlights a serious commitment to upskilling, covers the latest topics, and, through the Lifelong Learning element of the program, enables continuous education after graduation.

Building a Professional Network

Participating in events and networking organized by the **CQF Institute**, is crucial to connect with mentors, gain industry insights, and build relationships that open doors to new opportunities. Reading more widely around new developments in the industry and being able to discuss these confidently will stand candidates in good stead.

By staying informed about industry trends and cultivating meaningful connections, candidates position themselves as versatile and valuable assets to employers.

Over two thirds of respondents at the Annual Quant Insights Conference felt that the most important factor for success in a quantitative finance career is continuous learning and adaptability.

> "It's vital for candidates to communicate their story effectively, explaining their motivations and why they've chosen this industry. Demonstrating a proactive attitude towards learning and self-improvement is also key."
>
> **Brian Cullinan,**
> **Senior Consultant, Capital Markets Recruitment**

Career Paths and Compensation

Career Paths and Compensation

This section of the 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 the typical skills, roles, 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 portfolio management, quant strategies, technology, and 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 AI and machine learning, and a dedication to on-going personal and professional development will be well-equipped to succeed.

CQF Institute

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 portfolio managers with strong computational skills and expertise in equities, fixed income, and data analysis, reflecting the industry's focus on developing versatile investment strategies.

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 strong people skills, as their role may entail collaborating with other internal teams and 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 in the broader financial market. With the integration of AI and machine learning, they must understand how to use these tools for data analysis and predictive modeling to enhance decision-making and strategy development.

> "There is a war for talent at the top level of quantitative finance in terms of portfolio management and that has a knock-on effect right throughout the food chain. So, at entry level roles, even internships, and permanent roles, there's huge competition."
>
> **Brian Cullinan,**
> **Senior Consultant, Capital Markets Recruitment**

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 make presentations to clients.

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 their team's investment decision-making process.

Portfolio Management
Investment Bank

	North America		Europe		Asia	
	Base	**Total Comp**	**Base**	**Total Comp**	**Base**	**Total Comp**
Portfolio Analyst **Associate**	$180,000 - $210,000	$285,000 - $305,000	$100,000 - $155,000	$115,000 - $180,000	$90,000 - $130,000	$95,000 - $155,000
Portfolio Manager **VP**	$210,000 - $260,000	$390,000 - $440,000	$155,000 - $230,000	$180,000 - $310,000	$130,000 - $180,000	$155,000 - $210,000
Portfolio Manager **Senior VP / Director**	$260,000 - $365,000	20-30% of Revenue Generation	$230,000 - $310,000	$310,000 - $570,000	$180,000 - $260,000	$335,000 - $390,000

CQF Corner

The CQF program equips portfolio managers with a comprehensive understanding of **asset allocation and portfolio construction**. It includes traditional techniques like modern portfolio theory and the Black-Litterman model, while emphasizing cutting-edge approaches such as machine learning, ensuring participants are well-prepared to lead in the evolving landscape of portfolio management.

CQF Institute

Hong Kong-based CQF alumnus, Alen Pavlović, is a Portfolio Manager for Liquibit Capital, a quantitative-driven investment management and technology company. We spoke to him about a typical day as a portfolio manager and his advice to aspiring professionals.

> "The knowledge and practical insights gained from the CQF were instrumental in my transition into the front office."

An Interview with a Portfolio Manager

Tell us about your current role?

I am a Portfolio Manager in a crypto hedge fund that runs a delta neutral strategy. My job is to strategically manage the capital in the fund, which involves making day-to-day trading decisions and staying on top of the news in the space. I focus on studying the research, exploring new opportunities, and assessing new ways of making money. In addition, I manage the junior traders on the desk, who are helping me execute, together with the tech and research teams.

Where did you start your career and how did you progress?

I have worked at Morgan Stanley and Bitmex, both of which have helped me navigate my current job, not only in executing trades, but also in understanding all the bottlenecks that can exist. My career started as an electrical engineer at an electric car company. Fortunately, I got an opportunity to study abroad and some of the professors were in finance. That was when my first pivotal decision came about, and I switched to the financial space. A second, truly transformative decision was undertaking the CQF. The program provided a structured and powerful way to gain the advanced quantitative skills that are essential in today's financial markets, and I'm very grateful for that foundation.

What are some of the highlights and challenges in your field?

In the crypto space, the market is running 24/7 and it is nothing like other asset classes in terms of dynamics, volatility, and market inefficiencies. So, the biggest challenges are staying up to date with everything that is happening because market regimes are shifting very quickly. You also need to stay patient and calm. Sleep is optional; that is what I say anytime I interview a junior trader. This is no joke because something may happen at 2am or 3am, or on a Saturday or Sunday night. You need to be vigilant. That's part of the job here and being able to manage stress in this job is very important. Successfully navigating these challenges and identifying opportunities within this dynamic environment is incredibly rewarding.

Could you describe what a typical working day looks like for you?

My day usually consists of getting up between 5:00 to 5:30am. I have my coffee and review the portfolio books that we hold to make sure that there was no drama overnight. I catch up on any messages and alerts that may have happened. Then I go for a morning workout and head to the office. Usually, we'll have a strategic briefing in the morning with the CIO and junior traders, where we go through scenarios and expectations for the day and review our plan for what I like to call "defending the portfolios." Even though we are focused on systematic trading and machines are doing the job, I need our traders to observe all that activity and make sure that things are functioning as expected. Afternoons are usually spent on research and exploring new ways of doing arbitrage on crypto. We also spend time catching up with clients and service providers and discussing tools that we are using. If we need any additional enhancements, we explain it to them then. In the evenings, sometimes I may take clients to dinner; it is important to stay visible and reachable for the people you are working with. Soft skills are as important as hard skills; I would say being able to communicate very well is essential. Over communicate, really, that's what I always tell my team, because if you don't tell me, I don't know.

What are the most important skills for professionals in your field to have?

Analytical thinking is crucial for the research and putting ideas into practice. With all the general tools for coding now, you don't need to be a perfect programmer, but you need to think in a mathematical way, so, understanding the basics of quantitative finance and the concepts to apply in each situation is very helpful. I think that the CQF is doing an outstanding job on that front by giving that deep mathematical introduction, including, stochastic calculus; with that foundation, you are genuinely equipped with what you need. The CQF provided me with a critical toolkit. In addition, there is now a substantial component of AI/ML in the program. I did my final CQF project on Bitcoin, so it was a great learning experience, and I discovered some bottlenecks. Ultimately, the knowledge and practical insights gained from the CQF were instrumental in my transition into the front office; I was better prepared with both knowledge and understanding the expectations. I am very appreciative of how the CQF program facilitated this. One of the key balances in this field is to truly understand how to develop a profitable strategy and still be safe from a risk perspective.

Do you think the industry has changed since you started, and how do you see it changing in the next few years?

The industry has changed a lot; with crypto, there have been so many ups and downs, and you need to manage those situations smoothly. On the bright side, we are getting to the stage where crypto trading is not just taken up by individuals and pioneers; these days, institutions are knocking on our door trying to understand the space and explore opportunities in this asset class. Places like BlackRock and other big companies in the US are evaluating crypto, and regulation from the SEC and other regulatory agencies around the world is getting better. There is still a lot of work to do in setting up certain rules and regulations, but the news is more positive than negative in the crypto space these days. I believe we are on the cusp of seeing digital assets become a more mainstream and integrated part of the global financial system.

What would your advice be to someone starting a career in your field today?

Firstly, you should use your analytical and critical skills when you're developing trading strategies and always ask yourself, "What can go wrong?". Secondly, stay on top of the news and the latest developments but take care to filter out the noise that is coming in all the time. And finally, regarding your behavior on social media, for example, don't tweet anything – people in crypto will understand. That would be my advice.

Read the full interview with Alen here.

CQF Institute

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 geopolitical and macroeconomic risks are evolving dramatically, recruiters anticipate a new 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. 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.

> "It's your career. You need to take some ownership about what's going to happen, you should be the one who takes the lead. They're looking for the right sort of grounding that they can train someone in, not someone they can just plug in and get productivity out of straight away."
>
> **Richard Booty,**
> **Managing Partner, Testwood Partners**

Risk Management

Typical Job Areas

Risk Analyst

A risk analyst evaluates individual assets, portfolios, and external industry and economic conditions to help organizations 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.

Risk Management
Investment Bank

	North America		Europe		Asia	
	Base	**Total Comp**	**Base**	**Total Comp**	**Base**	**Total Comp**
Risk Analyst **Associate**	$100,000 - $150,000	$110000 - $165,000	$80,000 - $100,000	$90,000 - $110,000	$50,000 - $80,000	$55,000 - $90,000
Risk Manager **VP**	$150,000 - $200,000	$165,000 - $220,000	$100,000 - $160,000	$110,000 - $175,000	$80,000 - $150,000	$90,000 - $180,000
Risk Manager **Senior VP / Director**	$200,000 - $260,000	$220,000 - $290,000	$160,000 - $200,000	$175,000 - $220,000	$150,000 - $200,000	$180,000 - $220,000

CQF Corner

The CQF equips risk managers with advanced skills in modern **risk models** incorporating techniques such as Monte Carlo simulation, machine learning for risk prediction, stochastic modeling, stress testing, and dynamic portfolio optimization to address today's complex financial challenges.

An Interview with a Risk Manager

UK-based CQF alumnus, Samyak Jain, is a Vice President in Market Risk for JPMorgan Chase & Co., one of the world's oldest and largest financial institutions. We spoke to him about the skills needed for a career in risk, his career highlights, and his advice for aspiring risk professionals.

> "The CQF has given me valuable insights [...] which have augmented my on-job learning and advanced my career in this industry."

Tell us about your current role?

I work as a Quant Modeling Lead (VP) at JPMorgan Chase Bank, in their Model Risk Governance and Review team, which is the second line of defence for model risk. I am a part of the Market Risk subdivision of this team, which is responsible for the independent review and maintenance of models used for calculating regulatory market risk capital requirements and for internal risk management, such as Value at Risk (VaR), stressed VaR (SVaR), Expected Shortfall (ES), and Risks Not in VaR (RNiV) models.

Where did you start your career and how did you progress?

I started my career at NatWest Markets in India, in a similar Market Risk Methodology department, first as an intern and then as a full-time professional. The role helped me understand the nuances of market risk modeling and the various tests to analyze the performance of a market risk model. I then moved to Bank of America to work in the second line of defence, where I obtained my initial exposure to model validation. After 2 years, I then moved to London to work in my current role at JPMorgan, which was inspired by an off-site to London that I was offered during my stint at NatWest Markets. I believe all these experiences have played a key role in my career and in shaping the professional I am today. Additionally, I kept applying for certifications and examinations related to my work which helped me hone my skills.

What are some of the highlights and challenges in your field?

The highlight of working in such esteemed organizations is the exposure they offer for someone fresh out of college. I have met and worked with some highly talented individuals with a plethora of work experience. I have been lucky to encounter people who were approachable and enthusiastic about sharing their knowledge. A challenge can be adapting to a new institute's infrastructure, governance procedures, and model repository when you move roles, as they could be quite different within banks. However, given the internal training and resources most of these banks have to offer, it does not last long.

Could you describe what a typical working day looks like for you?

I could be at any stage of the review process, which may involve assessing the model documentation submitted by the developers, performing our independent tests, or writing up our assessment of the submission and test conclusions, which usually result in raising some issues for the developers to resolve. The model developers are frequently contacted for questions that may come up during the review, and to discuss the outcomes. We could also be involved in various ad-hoc tasks to maintain and improve the models.

What are the most important skills for professionals in your field to have?

This role requires you to have a good grasp of probability and statistics, mathematics, and finance, in addition to a decent coding proficiency. Communication skills are highly valuable, as documentation is a key component of the review process, and understanding of regulatory concepts is a plus. If you are new to this industry, there are various books and certifications which can give you an insight into risk and quant finance.

You earned the Certificate in Quantitative Finance (CQF). Why did you decide to enroll and where has the CQF added value to your career?

I enrolled in the CQF after my first job change. I wanted to get a better understanding of quant finance concepts, and had heard positive things about this certification, such as the Lifelong Learning element and networking opportunities. It was 2020 and we were working remotely, which also meant I had more time on my hands to balance work and study. The certification has given me valuable insights into stochastic calculus, portfolio and VaR modeling, and derivatives pricing, which have augmented my on-job learning and advanced my career in this industry.

Do you think the industry has changed since you started, and how do you see it changing in the next few years?

Absolutely. A lot of focus is being placed on AI and automation. Being acquainted with and adapting to these skills is vital to advance in one's career. However, regulatory expectations have also levelled up, and additional guidelines are being enforced on models which use these techniques, so it is imperative to understand both.

What would your advice be to someone starting a career in your field today?

My advice would be to learn as much as you can from any available resource, stay curious, and build both your quant skills and communication and regulation skills. Practice coding, possibly through guided or unguided projects, and dive into machine learning. Most importantly, don't be afraid to start small and learn on the job. Every model you validate, every error you debug, and every report you write-up and get feedback on will build your proficiency in this field and shape you into a sought-after risk management professional.

Read the full interview with Samyak here.

CQF Institute

Quant Strategies and Research

Professionals in quant strategies and research blend traditional quant skills – like statistical analysis, mathematical modeling, and rigorous backtesting – with modern techniques from machine learning and data science to devise and validate investment strategies. Strategists and researchers leverage their expertise to pursue alpha, while maintaining diligent risk control.

The field of quantitative finance favors candidates who combine classical training in financial theory and econometrics with proficiency in cutting-edge computational methods. Mastery of machine learning and Python are highly valued these days due to the ever-growing data-centric, high-tech approach to investment 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++. They have strong data management skills, including data cleaning and processing. Expertise in machine learning and natural language processing techniques is in demand.

> "Whether it be on the quant dev or quant research side, machine learning is now a front runner in terms of desirables, as it lends it weight to hidden correlations and market trends that may not be apparent through traditional statistical methods."
>
> **Jermaine Barnes,**
> **Director, J. K. Barnes Ltd.**

Quant Strategies and Research

Typical job areas

Quant Researcher

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

Quant Strategist

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

Quant Analyst

Quant analysts use a range of techniques to price assets, manage risk, and identify opportunities. They work in the front or middle offices, with the front office being closer to clients and trading, and the middle office focusing on risk management and model validation.

Quant Strategies and Research
Buy Side

	North America		Europe		Asia	
	Base	**Total Comp**	**Base**	**Total Comp**	**Base**	**Total Comp**
Quant Researcher **Associate**	$155,000 - $180,000	$260,000 - $325,000	$130,000 - $155,000	$210,000 - $310,000	$95,000 - $130,000	$170,000 - $190,000
Quant Researcher **VP**	$180,000 - $230,000	$335,000 - $520,000	$155,000 - $210,000	$310,000 - $520,000	$130,000 - $190,000	$230,000 - $310,000
Quant Researcher **Senior VP / Director**	$230,000 - $340,000	$520,000 - $830,000	$210,000 - $260,000	$520,000 - $725,000	$190,000 - $260,000	$310,000 - $520,000

CQF Corner

The CQF provides a comprehensive foundation in quant strategies and research, covering traditional areas and emerging techniques. Delegates gain a robust understanding of essential **mathematical and statistical models,** alongside advanced machine learning methods, equipping them to innovate and excel.

Switzerland-based CQF alumna, Aleksandra Spendel, is a Quantitative Analyst for the Bank of International Settlements (BIS), a bank for central banks. We spoke to her about what a typical day in her role looks like, how she started her career, and her advice to aspiring quants.

> "The biggest value of the CQF was that it helped me transfer to a new role in the risk models team very smoothly."

An Interview with a Quantitative Analyst

Tell us about your current role?

I am a Quantitative Analyst in the risk models team at the Bank for International Settlements (BIS). This team is responsible for maintaining and improving the existing core risk models for market risk, credit risk, and liquidity risk. We also work on implementing enhancements to those models. At the same time, we oversee the pricing and valuation of various asset classes, and the methodology behind that. Finally, we support senior management, and various quant and IT teams.

Where did you start your career and how did you advance?

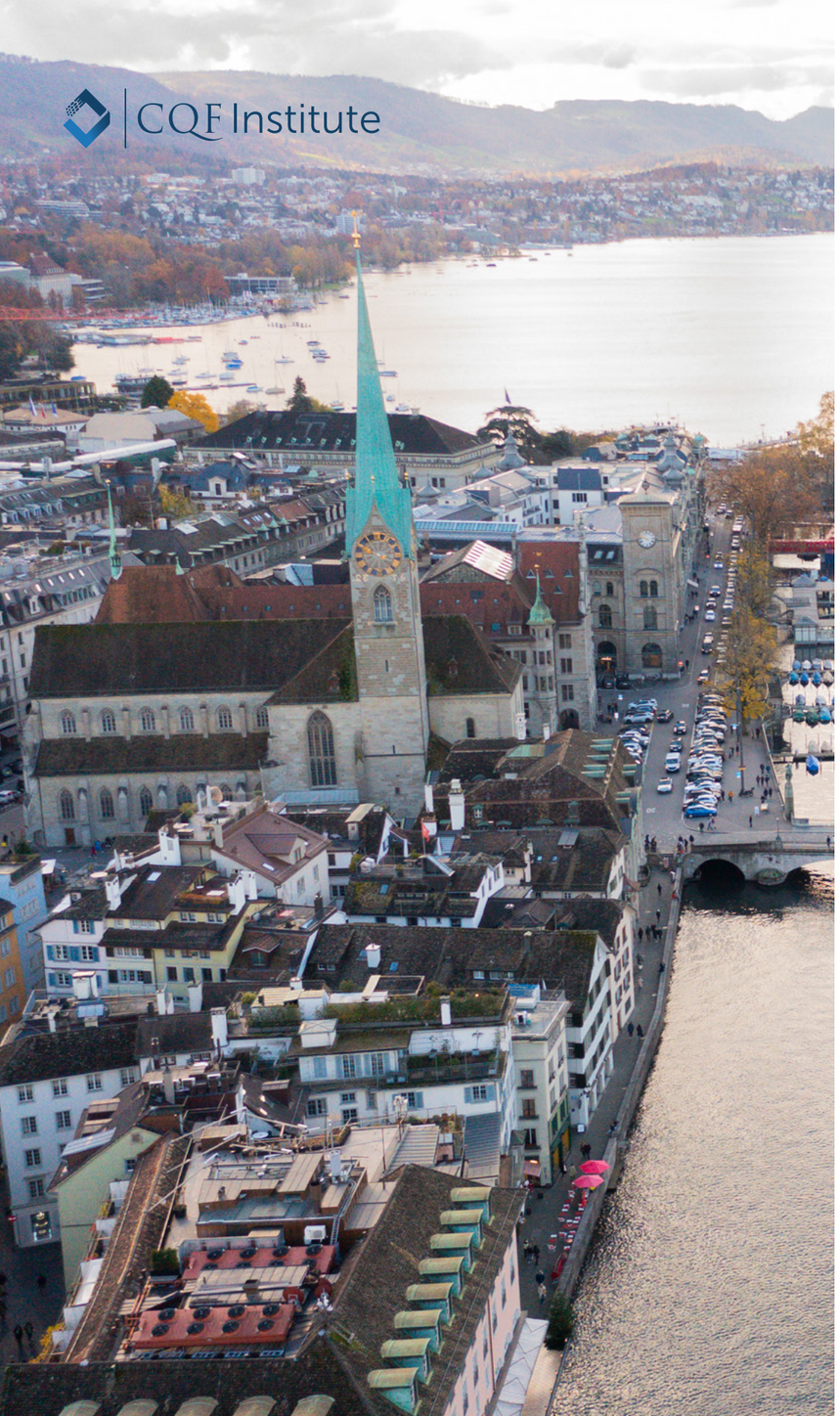
I started my career a little over 10 years ago at UBS in Poland in the market risk operations team. I was mostly responsible for supporting risk officers. After two years, I became a treasury risk officer and this was a very good opportunity for me to learn about the broader business, and to interact with the traders and other risk and financial control officers. I became very interested in moving to Switzerland and after some time, I found a risk analyst position at BIS. So, I transferred. Within my first two years there, my manager recommended the CQF to me, which was a significant moment in my career.

What are some of the highlights and challenges of working in the field?

The primary highlights are that we are a project team, and we have a very creative job with lots of collaboration. The job gives a sense of accomplishment because you normally create or enhance something, you are not just running something that already exists; you are also trying to improve it or find new solutions. The challenges come from the risk operations and risk analysis side. Personally, my challenge was always patience. I wanted to solve issues immediately and this is not always possible when you're working on a modeling task. This job requires both patience and expertise.

Could you describe what a typical working day looks like for you?

It's a good blend between various elements. On one hand, we have coding in Python and adjusting the models, fixing something that wasn't working, or addressing some concerns from the business users. There's also quite a bit of work now maintaining the current documentation and creating new documentation for models that have been developed. On the other hand, we have quite a bit of project work where we interact with others and either serve as experts in the modeling field, or we lead these projects. It's often a collaboration with IT teams and analysis teams as well as various other stakeholders, where we try to advance ideas and solutions that have a wider impact on the institution.



What are the most important skills for professionals in your field to have?

It's a little bit challenging because the industry is changing so quickly. You are still required to have more traditional quant skills like asset pricing, risk measurement, and time series modeling. Now, there is also machine learning and AI, which are becoming industry standard. So, quants entering the field would need to know how to handle large language models and how to utilize data science. Climate risk modeling through ESG is also becoming prominent. I would say that the most important technical skill, alongside the basic quant skillset, is Python. It's replacing the traditional analysis tools and without some programming skill in Python, it would be very difficult to progress in a career in quantitative finance.

You earned the CQF. Why did you decide to enroll and where has the CQF added value to your career?

My manager at BIS told me about the program and I was intrigued by what I saw right away. The biggest value was that it helped me transfer to a new role in the risk models team very smoothly because this skillset was exactly what I needed to make that move. It also brings all aspects of quant finance together in a very coherent and compelling way.

Do you think the industry has changed since you started, and how do you see it changing in the next few years?

I think it has changed quite a bit. First, we moved from a low-interest rate environment to a higher interest rate environment. We went through the pandemic and economic tensions, as well as global and geopolitical tensions. Mostly, I think there is a growing need to strengthen the regulation in some fields. We just finished implementing Basel 3 and there's a need for more regulatory scrutiny. We also have ongoing technological and digital transformation. AI is automating a lot of processes, and with the growth of online banking services, finance is becoming more decentralized. Over the next few years, I believe that data science and AI will be at the center. It's going to be at the heart of future development.

What would your advice be to someone starting a career in your field today?

The default skillset would be finance, mathematics, statistics, and Python. So, one needs to obtain a good knowledge in these fields. I think it would also be beneficial for someone to complete studies on machine learning and AI technologies and think about how they could be leveraged in many areas - algorithmic trading, risk modeling, predictions and valuation of instruments, for example. Moving away from these technical skills, I think it's also very important to think about collaboration. Where remote working is part of our day-to-day jobs, I think it's important to master online and offline interactions with people. It's not only about doing the job, but it's also about how you interact with others when you do your job. It manifests through efficient communication and being innovative in presenting your ideas.

Read the full interview with Aleksandra here.

CQF Institute

Data Science and Machine Learning

Professionals working in data science and machine learning are responsible for research, modeling, and testing. They work with both traditional and alternative data sets to uncover relationships and patterns in empirical information.

In the rapidly evolving landscape of data science and machine learning, financial institutions are searching for candidates that have strong technical skills, including programming and machine learning techniques, alongside industry-specific knowledge. Recruiters note that Python is the most desirable programming language in the field, with many organizations listing it as an essential skill within their 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, natural language processing, and signal processing, to identify and evaluate patterns in the data. They must possess strong quantitative analysis skills, a solid grasp of AI and machine learning techniques, and strong programming skills, with Python being the leader at this time. Familiarity with big data technologies is crucial for handling large-scale data processing, while data visualization skills are essential for communicating insights. They should also have expertise in deploying and monitoring machine learning models in production, ensuring they remain effective and accurate. Understanding ethical considerations for responsible AI use and the ability to collaborate cross-functionally with IT, risk, and other business units is also important.

> "Funds have already started hiring and creating new departments with 'Heads of AI' or 'Heads of ML' at a far more frequent rate than before, with budgets to build out extensively over the course of the year."
>
> **Jermaine Barnes,**
> **Director, J. K. Barnes Ltd.**

Data Science and Machine Learning

Typical Job Areas

Data Scientist

Data scientists apply their analytical skills to extract insights from large datasets, using machine learning techniques and statistical methods to inform decision-making and drive investment strategies.

Machine Learning Engineer

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

Data Analyst

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

Data Science / Machine Learning
Investment Bank

	North America		Europe		Asia	
	Base	**Total Comp**	**Base**	**Total Comp**	**Base**	**Total Comp**
Data Analyst **Associate**	$105,000 - $180,000	$130,000 - $210,000	$80,000 - $130,000	$105,000 - $155,000	$80,000 - $115,000	$90,000 - $125,000
Data Scientist **VP**	$180,000 - $260,000	$230,000 - $285,000	$130,000 - $210,000	$155,000 - $235,000	$115,000 - $135,000	$125,000 - $145,000
Data Scientist **Senior VP / Director**	$260,000 - $285,000	$285,000 - $415,000	$210,000 - $260,000	$235,000 - $310,000	$135,000 - $210,000	$145,000 - $230,000

CQF Corner

With multiple modules on **data science and machine learning**, the CQF explores in-depth machine learning methods to solve real-world financial problems and provides the tools and support for delegates to practice their skills and implementation via live online Python Labs.

UK-based CQF alumnus, Aran Khaira, is a Data Scientist at Nomura, a global financial services group. We spoke to Aran about starting out in the field, career highlights, and his advice to aspiring professionals.

> "The CQF has also allowed me to have more fruitful discussions with stakeholders."

An Interview with a Data Scientist

Tell us about your current role?

I work as a Data Scientist at Nomura where I support the Chief Data Office. My work focuses on advanced analytics for various use cases, building and deploying machine learning models to support governance processes, and detecting anomalies within various data pipelines. A key part of my role involves collaborating with stakeholders from various functions, whether it is risk or global markets to better understand the data and domain of the problem at hand.

Where did you start your career and how did you progress?

I started my career with a consultancy company. They trained me in data governance with data analytics on the side. However, when placed on site at Nomura, I quickly found that I preferred the analytics side of things, and actively sought to upskill in coding and mathematics in a way that would allow me to apply this to my role. I was fortunate enough to have my managing director recognize these efforts and push me towards becoming a data scientist.

What are some of the highlights and challenges in your field?

I'd say the main highlight is that it is intellectually stimulating. As juvenile as it may sound, it is just fun to build solutions and products to solve data related problems. There is so much to learn, which is a double-edged sword. Whenever you feel like you know something, there is a greater mountain to climb. The biggest challenge is the business side of things. It is not as glamorous as working away on some obscure dataset, finding amazing insights, developing a model and saving the day. Often there is a lot of back and forth with the business, realignment of priorities and pivots. Often it is less about the technical skill and more so about knowing what problem to solve and why. In addition, real life data is often extremely poor. A lot of time is spent cleaning and trying to gain intuition on whether something makes sense in the dataset and why. Without this step, you run the risk of having extremely poor models.

Could you describe what a typical working day looks like for you?

I'm currently studying a part-time MSc in Artificial Intelligence, so my days start a little earlier at 6-7am as I like to study before the day starts. Recently I have escaped the need for daily stand-ups and updates happen as and when needed. That means I get a lot of time to consider solutions and analyze the complex datasets that are given to me. This time is quite crucial given then range of stakeholders we work with and the variety of datasets.

What are the most important skills for professionals in your field to have?

The obvious ones are statistics, coding, and knowledge of the lifecycle of a trade. On the soft skill side of things, the ability to articulate your ideas is key. It doesn't matter how dazzling your solutions are, if you cannot explain them, or justify why certain approaches were taken, then you can run into problems. Explaining technical solutions in plain language is crucial and the only way to do that is to really know your stuff. There are so many ways to develop these skills. I have had a lot of success with using GPT to outline certain concepts I want to learn and then providing me resources to study from. I can then iterate

over that. You must be careful though with the possible mistakes GPT will make. Always double-check facts and go deeper. It can seem daunting at first, but if you do something every day or average out a good amount of studying over a week, you will begin to build a solid foundation in the required areas. You can use multiple resources to learn about the same thing (in fact I'd advise it) and then stitch it all together in your mind. Projects also help a lot - you learn most when you are building something.

You earned the Certificate in Quantitative Finance (CQF). Why did you decide to enroll and where has the CQF added value to your career?

I decided to enroll on the program because I have always been interested in the trading aspect of the financial markets, and I saw it as a great way to expose myself to that, whilst also developing my mathematics and coding skills. The way it has shaped my mathematical thinking, has helped me tremendously and inspired me to take my studies further - helping me get into a MSc program for Artificial Intelligence. It has also allowed me to have more fruitful discussions with stakeholders and have discussions related to financial products.

Do you think the industry has changed since you started, and how do you see it changing in the next few years?

The industry has changed massively particularly with the proliferation of generative AI. I cannot really say where I see the industry changing in the next few years, but it seems unlikely that we will have agents completely automating away our jobs, due to the regulatory and explainability requirements in banking. Then again, I could be completely wrong. All I know is that it is important to continuously upskill to make sure that when big changes do happen, you are ready.

What would your advice be to someone starting a career in your field today?

Focus on getting your foundations right - strong mathematics, clean coding, and financial intuition. Build small meaningful projects and learn by doing. Read widely and, overall, enjoy it. It is a stimulating field, and you do not need to know it all from day one. Fall in love with not knowing and the process of acquiring information. Consistency matters a lot more than speed!

Read the full interview with Aran here.

CQF Institute

Technology

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

Recruiters state that demand for quantitative developers is strong, fueled by advancements in AI, machine learning, and the evolving landscape of financial technology. Python is increasingly popular, but skills in C and C++ are still desirable for quant developers due to performance, memory control, and compatibility with legacy systems. Such programming languages also play a critical role in algorithmic and high-frequency trading environments.

Skills for Technology

Quants in technology should have excellent coding skills in languages such as Python, C, C++, or C#, along with a strong foundation in computational mathematics to develop complex financial models and algorithms. Knowledge of software engineering principles ensures they can build robust and scalable systems. Familiarity with financial products is crucial for creating solutions tailored to the industry's needs. In today's markets, quant developers are often expected to integrate AI and machine learning technologies into their solutions, making it vital for them to have a strong understanding of these methods. In large organizations, they frequently work on projects that span multiple teams. This cross-functional teamwork necessitates strong communication skills and the ability to translate complex technical concepts into actionable insights for non-technical stakeholders.

> "In the past, C++ was the go-to language for many, but today, Python has become almost mandatory. Python is useful right across the quant, risk, and data space. However, for deeper development on more powerful risk and pricing engines, there is still a significant need for C++, C#, and Java. Typically, if you are proficient in C++, you can easily adapt to other languages."
>
> **Robin Frost,**
> **Director, Taylor Root**

Technology

Typical Job Areas

Quant Developer

Quantitative developers, 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 include maintaining programming libraries, developing high-performance numerical library components, and consulting on high-performance computing, optimization, and strategy.

Technology

	North America		Europe		Asia	
	Base	**Total Comp**	**Base**	**Total Comp**	**Base**	**Total Comp**
Quant Developer **Associate**	$155,000 - $210,000	$210,000 - $260,000	$105,000 - $130,000	$125,000 - $155,000	$70,000 - $105,000	$80,000 - $125,000
Quant Developer **VP**	$210,000 - $260,000	$260,000 - $360,000	$130,000 - $180,000	$155,000 - $210,000	$105,000 - $155,000	$125,000 - $175,000
Quant Developer **Senior VP / Director**	$260,000 - $310,000	$360,000 - $520,000	$180,000 - $235,000	$210,000 - $310,000	$155,000 - $190,000	$175,000 – $210,000

CQF Corner

The CQF provides the strong foundation in mathematical modeling and **hands-on implementation experience** that quant developers need. The program teaches advanced techniques for model calibration, validation, and backtesting. It emphasizes integrating financial logic into applications and adhering to industry best practices, preparing developers to create sophisticated solutions and advance in the quantitative finance field.

US-based CQF alumnus, Nicolás Sampietro, is a Senior Software Engineer at Waterfall Asset Management, an institutional asset manager focused on structured credit and private equity investments. We spoke to him about how to progress a career in the field, the challenges, and his advice to aspiring professionals.

> "I decided to enroll in the CQF to fill that knowledge gap and gain practical exposure to financial quant problems. The depth and breadth of the program is astonishing."

An Interview with a Senior Software Engineer

Tell us about your current role?

In 2021, I started my current role as a Senior Software Engineer at Waterfall Asset Management. Since last year, I have been overseeing the development team. We build and maintain cash flow models that are used to assess risk and bid on new opportunities. We are also responsible for the big data infrastructure (Delta Lake) that it's at the center of our technology strategy.

Where did you start your career and how did you progress?

I earned my Software Engineering degree. After that I got my first job at the Social Security Bank of Uruguay as a junior developer. Although I was not aware of it at the time, that role shaped my career in many ways. First, it gave me exposure to the banking sector, and second, I gained insight into several problems in big data science. In 2015, I was hired by Point 72 Asset Management as a back-office developer and moved to the US.

What are some of the highlights and what are the biggest challenges?

If you are interested in financial markets, like I am, you get to work with (and learn from) industry veterans. The challenge in software engineering is to have domain knowledge in order to have intelligent conversations with your users and build the models and tools they need to apply in order to succeed.

Could you describe what a typical working day looks like?

I have a daily stand up with the dev team where we go over questions, issues, or blockers. Then I have a few meetings with users to prioritize work and scope new requirements. I spend the rest of the day working on my own dev items. That would be a mix of SQL, Python, scripting, and so forth. I try to take on the project where we are testing a new technology or methodology. That will often require some research into the new technology, and I'll work with our CTO to determine how it fits into our technology stack and best practices guidelines.

What do you think are the most important skills for professionals in your field to have?

There are a few basics, like attention to detail and focus. You also need to have capacity for self-learning, since the industry moves quickly, and new tools and processes are released every year. AI is a good example. You also need soft skills, since you'll be building models for other people, and you'll need a good working relationship with them.

You earned the CQF. Why did you decide to enroll in the program and where has the CQF added value to your career?

It was clear to me that I wanted to pursue a career in the financial industry as a Software Engineer. It also became clear that I needed to build up my financial knowledge if I wanted to succeed. My background in computer science and math was not enough. I needed to understand the fundamentals of the problems my users were trying to solve. I decided to enroll in the CQF to fill that knowledge gap and gain practical exposure to financial quant problems. The depth and breadth of the program is astonishing.

It's challenging (as it should be), but it gives you all the tools and materials to take you forward successfully. As an example, the pre-program material alone covers Math, Finance, and Programming in-depth, and it's designed to set a level playing field for people with different backgrounds. The learning platform gave me access to the classes' recordings, so I could follow the program at my own pace. This was key since I was working full-time. Lecturers are available to answer any questions you might have. You'll learn the theory, but with a practical focus i.e., understanding the assumptions that go into each model and how they correlate to real life.

Do you think the industry has changed since you started, and how do you see it changing in the next few years?

Yes, it has changed a lot with the exponential growth of data and AI. The growth of data means that the tools we used to have storage or modeling are no longer effective. A new set of tools are required, like Delta Lakes, for example.

What would your advice be to someone starting a career in your field today?

I'd recommend focusing in on one area and go deep into it. It takes time and dedication to learn the ins and out of a particular language or technology but learning how things really work will come in handy when you need to figure out why they don't.

Everyone can write code, but the question is what to write. You'll need domain knowledge to answer that question. You'll have to learn how to make decisions with incomplete information, stay organized, communicate effectively, and cultivate a positive mindset. Learn from more experienced colleagues and never be afraid to ask questions.

Read the full interview with Nicolás here.

CQF Institute

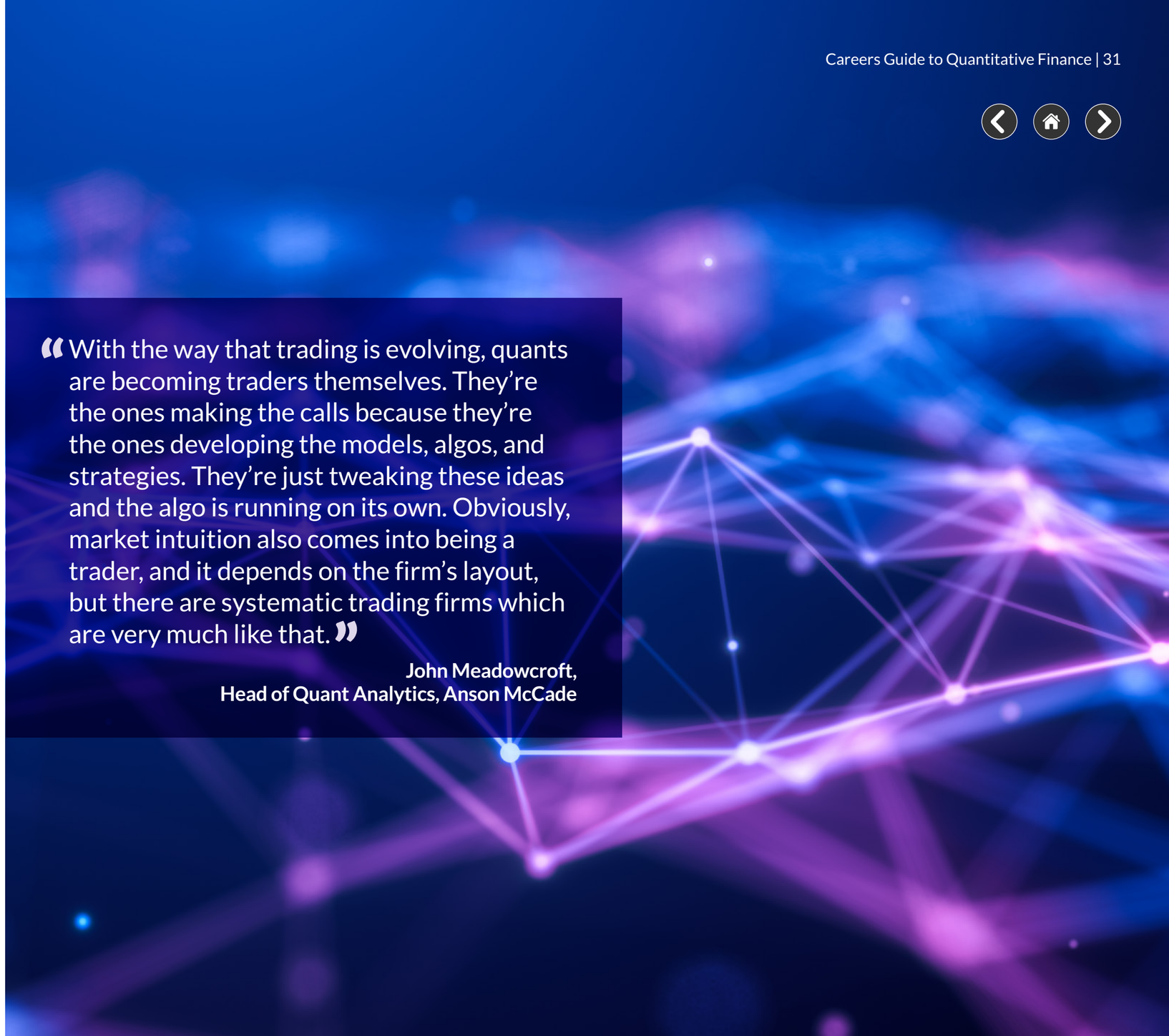
Quant Trading

Professionals working in quant trading employ mathematical and statistical models to identify profitable trading strategies and to execute trades. They focus on developing strategies through backtesting, analysis, and optimization, and may be involved in areas such as statistical arbitrage, algorithmic trading, and high-frequency trading.

Quant trading emphasizes the efficient and insightful use of market data to develop profitable and enduring trading strategies. As the field has evolved towards technology-driven and market microstructure-based strategies, investment organizations seek candidates capable of analyzing vast datasets to uncover actionable insights. Successful quant traders possess strong mathematical and programming skills, with proficiency in languages such as Python, C, or C++. They also have a solid understanding of domain-specific areas like machine learning and high-frequency trading, blending traditional financial acumen with data science and programming expertise.

Skills for Quant Trading

Quant traders must have deep knowledge of quantitative and statistical analysis, enabling them to develop complex trading models. Strong programming skills in languages like Python, C, or C++ are essential for implementing and optimizing these models. They must thrive in highly competitive and high-pressure environments. They need excellent problem-solving skills and the ability to make quick, data-driven decisions. Strong communication skills to effectively convey complex insights and strategies to stakeholders is beneficial. AI and machine learning techniques have become increasingly important for developing sophisticated trading models and gaining a competitive edge.



> "With the way that trading is evolving, quants are becoming traders themselves. They're the ones making the calls because they're the ones developing the models, algos, and strategies. They're just tweaking these ideas and the algo is running on its own. Obviously, market intuition also comes into being a trader, and it depends on the firm's layout, but there are systematic trading firms which are very much like that."
>
> **John Meadowcroft,**
> **Head of Quant Analytics, Anson McCade**

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 organizations, 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 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 tend to have experience with Q/KDB and time series databases.

Trading

	North America		Europe		Asia	
	Base	**Total Comp**	**Base**	**Total Comp**	**Base**	**Total Comp**
Quant Trader **Junior Trader**	$130,000 - $155,000	$155,000 - $190,000	$105,000 - $135,000	$125,000 - $160,000	$70,000 - $125,000	$85,000 - $145,000
Quant Trader **Senior Trader**	$155,000 - $210,000	30-50% of PnL	$135,000 - $235,000	10-40% of PnL	$155,000 - $175,000	10-40% of PnL
Quant Trader **Head of Trading**	$260,000 - $310,000	$570,000 - $725,000	$235,000 - $310,000	$270,000 - $545,000	$220,000 - $260,000	$325,000 - $390,000

CQF Corner

The CQF is essential for mastering derivatives and **quant trading**, equipping traders with skills in programming, mathematical models, and statistical analysis. It supports the generation and execution of trade ideas, and the management of options portfolios, ensuring success in the competitive world of quantitative finance.

Brazil-based CQF alumnus, Igor Seiji, is a Volatility Trader for Gauss Capital, an independent asset management firm. We spoke to him about a typical working day and important skills for traders.

Since completing this interview, Igor has moved into a new role at BTG Pactual, one of the largest investment banks in Brazil.

> "Taking the CQF has definitely added value to my career, particularly in the ability to transition from risk management to trading. I wouldn't be where I am today without it."

An Interview with a Volatility Trader

Tell us about your role?

I work as a Volatility Trader for Gauss Capital. We're focused mainly on macro hedge funds, although we also have equity and credit funds. It is a huge market with lots of liquidity on almost all maturities. I'm also starting to look more at equity derivatives.

My work involves the generation and execution of trade ideas for the markets I cover. I also assist in managing the options portfolio in our flagship and matrix funds. Basically, I monitor the Greeks and our exposure data to ensure that we are in the right assets.

Where did you start your career and how did you progress?

At the beginning of my career, I wanted to develop my quant skills, and risk was a good place to learn. Over time, I went from more manual operational work to developing new models and tools for applying risk management solutions. During my tenure as a risk analyst, I worked very closely to the trading team, and I became interested in transitioning over to the trading desk. I was able to complete that move last fall.

What are some of the highlights and the biggest challenges?

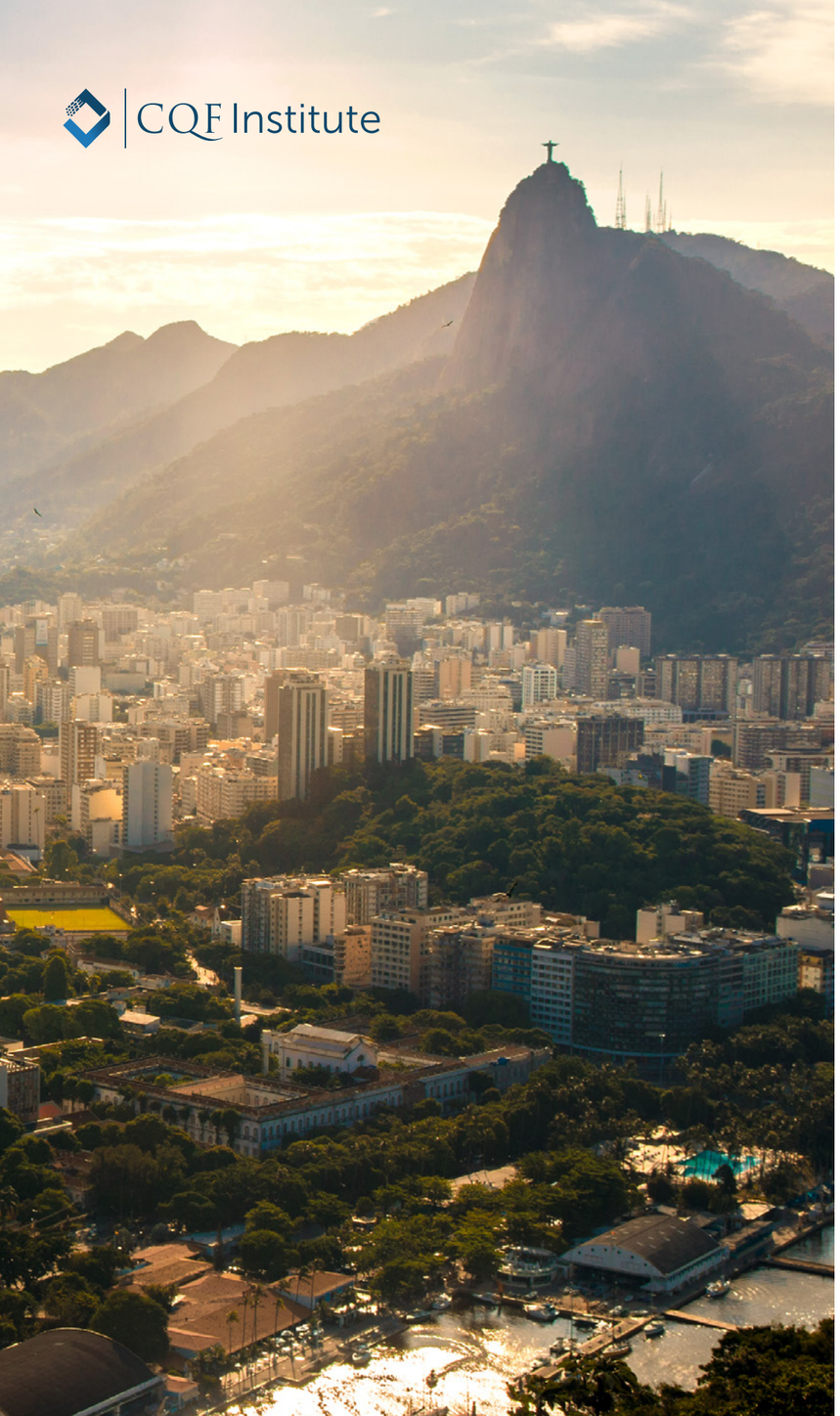
The greatest challenge is the level of technical knowledge you need. Once you start to understand the basics of option trading, you need to be comfortable with the notion of probability distributions and how they are used to price options. We use stochastic calculus too. You don't necessarily need to apply Ito's lemma, for example, to trade options, but you should have a good grip on the intuition behind it. Overall, this is one of the most exciting fields for applied math and this also ends up being the biggest challenge because finance is very competitive. You must stay up to date with the latest developments, so your personal improvement never stops. This is one of the greatest things that the CQF tries to address; as an alumnus I have unlimited access to all the material that's being added to the curriculum, not to mention events and workshops.

Could you describe what a typical working day looks like?

I usually arrive at the office before the local market opens in Brazil. I take a look at the news and see what happened overnight in. Then I run my trading models with the most recent market data. I look at the output signals and compare those signals with the current positions to see if the overall portfolio positions are aligned with the models. Throughout the day, I monitor the Greeks in the options portfolio since I do the delta hedging as needed. I also read new papers and technical books to sharpen my knowledge.

What do you think are the most important skills for professionals in your field to have?

I think the most fundamental ability these days centers on programming, particularly in terms of data libraries and object-oriented programming. It's important to complement those skills with mathematics and statistics. These are the technical foundations that you need to deal. If you can showcase your coding skills, but also demonstrate that you have a structured way of thinking, there will be demand for your work.



You earned the CQF. Why did you decide to enroll in the program and where has the CQF added value to your career?

I decided to enroll in the CQF because I was looking for a way to accelerate my learning in quantitative finance. The traditional way might be to do a master's degree, but it would be very difficult to manage both the academic and professional demands at the same time. In the CQF, I was able to cover all those subjects in a short period of time and still held my job as well. Taking this path has definitely added value to my career, particularly in the ability to transition from risk management to trading. I wouldn't be where I am today without it.

Do you think the industry has changed and how do you see it changing in the next few years?

When I started, programming was necessary for back and middle office positions. Nowadays, most positions require some degree of programming knowledge. I also think about how accessible information is today, but the ability to process and analyze huge data sets and find the patterns still takes considerable knowledge and skill and you can only scale this kind of process if you have good programming skills. So, it is all interrelated.

What would your advice be to someone starting a career in your field?

Being genuinely curious about the problems you have to solve, and falling in love with solving the problems, rather than with the tools you use to solve them. Many quant projects get sidelined or postponed because people tend to use overly complex techniques to solve simpler problems, when a simple logistic regression could get the job done. It is obviously important to have a deep knowledge on the models and their assumptions but focus on using the right tool for the right situation. If along the way, you notice that the model you are using is too complex/ simple, you can always shift the complexity down/up.

Additional Question: Did the skills acquired on the CQF help you to move to your new role at BTG Pactual?

Being a CQF alumni definitely helped me to get this job opportunity - besides being awarded with a well-known and respected certification, many quant projects at my previous job were supported by skills and models I learned on the CQF, and talking about these projects in a clear and structured way paved the way for me to get a job as a specialist at the quant modeling group at this bank.

Read the full interview with Igor here.

CQF Institute

2025 Market Insights: Predictions from Industry Leaders

2025 Market Insights: Predictions from Industry Leaders

As we move through 2025, quants find themselves navigating dynamic and complex market environments. We spoke to Aaron Brown, Professor Carol Alexander, and Professor Wim Schoutens to uncover the key trends and the strategic areas that quants should focus on.

From Software to Hardware

Aaron Brown highlights a transformative shift from software-driven innovations to hardware advancements. “Over the last 30 to 40 years, software has been the primary driver of market changes,” Brown reflects, noting its role in fueling major economic projects and market volatility. Yet, he anticipates that the era of hardware technologies - such as advancements in chip making, space exploration, and off-grid energy solutions - will usher in a new era. “These innovations are poised to become the new sources of volatility and value creation,” Brown suggests, pointing to the distinct dynamics of hardware that will require quants to adapt their methodologies.

This shift, Brown elaborates, necessitates a reimagining of quant models, as the dynamics of hardware differ significantly from those of software. “Being old enough to recall the earlier hardware days, I anticipate that this shift will require a substantial adjustment for most quants,” he notes, urging the community to prepare for the challenges and opportunities this transition will bring.

The Evolution of Decentralized Finance

Professor Carol Alexander draws attention to the quiet revolution unfolding in decentralized finance (DeFi). “The true innovations are happening in the digital economy through decentralized finance and exchanges on blockchains,” Alexander asserts. While centralized exchanges like Binance and Coinbase remain visible, Alexander emphasizes the profound implications of DeFi on financial markets.

She highlights innovations such as decentralized exchanges utilizing automated market makers and optimal order routing, which offer quants new mathematical challenges in pricing and hedging novel derivatives. “Quantitative analysts skilled in pricing exotic options will find their expertise applicable to the new decentralized finance products,” she enthuses. These developments, rooted in blockchain technology, promise to reshape financial markets, presenting both opportunities and challenges for quants eager to explore this evolving landscape.

A Return to Core Financial Risks

In the broader financial context, Wim Schoutens addresses a shift back to fundamental financial risks, such as credit risk and liquidity risk. He observes major asset managers altering their strategies in response to political changes, noting, “Changing course based on who occupies the White House underscores the political nature of these actions.” Schoutens advocates for investment decisions grounded in robust financial analysis rather than external constraints or subjective criteria.

> “These innovations are poised to become the new sources of volatility and value creation.”
>
> **Aaron Brown,**
> **Columnist, Bloomberg and Wilmott Magazine**

He stresses that many ESG-driven portfolios are suboptimal when additional constraints are imposed, explaining, “Mathematically, adding constraints to an optimization problem, such as ESG criteria, results in a suboptimal solution - a fact as undeniable as gravity.” Schoutens expresses optimism for a focus on traditional risk management, allowing more freedom in investment choices.

Navigating a Complex Global Landscape

Both Wim Schoutens and Aaron Brown emphasize that quants must remain vigilant in the face of political shifts and technological advancements, pointing to geopolitical tensions that could alter the global landscape significantly. Such developments would necessitate a re-evaluation of risk models and strategies.

Reflecting on technological advancements, Professor Carol Alexander emphasizes again the importance of innovations within decentralized finance, which she compares to an iceberg - much of it out of sight but profoundly impactful. “These developments are set to revolutionize financial markets, impacting us as significantly as generative AI did recently,” she explains. This underscores the importance for quants to stay ahead of technological advancements that could redefine market operations.

As the year continues to unfold, staying informed and adaptable will be key to success. Whether it’s embracing new technologies or revisiting core financial principles, quants have a pivotal role to play in shaping the future of finance.

Hear more from quantitative finance experts on our podcast, **QuantSpeak**, or by joining us at the upcoming Quant Insights Conferences. Become a **member of the CQF Institute** today to book your free tickets.

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About our Experts

Aaron Brown is a columnist for Bloomberg and Wilmott Magazine and teaches at multiple universities, including New York University. With 35 years of Wall Street experience, he has held roles in both trading and risk. He authored several books, including 'The Poker Face of Wall Street', and won the 2011 Risk Manager of the Year award. A former professional poker player, he remains active in gambling and has been involved in crypto trading and venture capital since 2011.

Carol Alexander is Professor of Finance at the University of Sussex, and Research Council for the Exponential Science Foundation. Carol has designed models for pricing and risk for major exchanges, banks and asset managers, served as editor of the Journal of Banking and Finance, and wrote the four-volume set of textbooks, 'Market Risk Analysis'. She has held notable corporate roles and acted as an expert witness in cases involving investment advice and crypto market abuse.

Wim Schoutens is a quantitative finance professor at the University of Leuven, with extensive experience in model implementation and validation. He is a consultant to the banking industry and institutions like the European Commission and the IMF. He is the author of several books and serves on the editorial boards of various international finance journals.

Spotlight on AI in Quantitative Finance

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Spotlight on AI in Quantitative Finance

AI is profoundly impacting quantitative finance and reshaping the industry. Its capabilities are enhancing traditional methodologies and creating new opportunities and challenges for professionals in the field.

Harnessing AI for Transformation

The integration of AI into quantitative finance is revolutionizing how financial institutions operate. As these technologies continue to evolve, they provide quant professionals with unprecedented tools to enhance their workflows and achieve competitive edges in the rapidly changing landscape.

Predictive Analytics

AI models can process large datasets to predict market trends, asset prices, and investment risks with greater accuracy. This capability allows quants to make more informed, faster decisions and develop strategies that optimize returns while managing risks.

Automation of Processes

AI is streamlining numerous processes, reducing the need for manual intervention. This includes tasks such as portfolio optimization, trading strategies, and operations. AI not only increases efficiency but also reduces costs, allowing teams to allocate resources more strategically.

Better Risk Management

AI is enhancing risk management capabilities. By leveraging advanced algorithms and machine learning, AI systems can analyze vast amounts of transaction data to manage financial risk by identifying potential threats and anomalies in the data. This not only improves security but also ensures increased regulatory compliance.

Improved Sentiment Analysis

AI is able to process vast amounts of financial news, earnings calls, and social media data to aid in sentiment analysis and forecasting. This helps traders and analysts identify shifts in market sentiment in real time, allowing for more precise investment decisions.

Enhanced Trading Strategies

AI-powered algorithms analyze vast datasets, from historical market data to current social media sentiment, in real time to identify trading opportunities, optimize trade execution, and reduce transaction costs. These algorithms can adapt to market changes swiftly, enhancing the effectiveness of trading strategies. AI is also instrumental in developing automated systems that execute trades based on pre-defined criteria without human intervention.

71% of respondents at the annual Quant Insights Conference 2024 felt that the biggest impact of AI would be in streamlining decision-making processes.

Together, these AI-driven innovations are reshaping the industry, enabling institutions to navigate complexities with agility and foresight. As AI continues to develop, its role in quantitative finance will only grow, further unlocking opportunities for innovation.

> "Machine learning and AI are areas that firms are integrating to help deal with a lot of data and help quant researchers find this alpha more efficiently. I think that those sorts of roles are going to continue as these things start to evolve even more."
>
> **John Meadowcroft, Head of Quant Analytics, Anson McCade**

Impact of AI on Quant Careers

As AI becomes more sophisticated and widely implemented, it is reshaping quant careers in several ways:

Evolving Role Dynamics

AI's transformative capabilities are reshaping traditional roles by empowering professionals to harness new insights. This shift enables them to focus on strategic tasks, such as developing innovative trading strategies and optimizing risk management frameworks. By leveraging AI, professionals can unlock new opportunities and enhance decision-making processes, driving greater value and innovation in their field.

Recruiters report that the demand for roles such as Machine Learning Researchers and Quant Developers is increasing, particularly in organizations focusing on high-frequency trading and systematic strategies, and that AI-related skills are essential for these positions. They have also seen a growing trend of creating new departments dedicated to AI and machine learning, with roles such as Head of AI or Head of Machine Learning being established more frequently, indicating the long-term commitment of organizations to these technologies.

Enhanced Collaboration

The integration of AI in finance encourages collaboration between technology and front office business teams. Other finance professionals are increasingly working alongside data scientists and AI specialists to implement solutions, fostering a multidisciplinary approach to business challenges. This collaboration reiterates the need for quants to ensure they have strong communication skills and can work effectively with non-technical teams.

Demand for Technical Expertise

AI is revolutionizing the landscape of quantitative finance by opening up new avenues for creativity and exploration. It empowers quants to innovate, developing cutting-edge models and strategies that push the boundaries of what's possible. By integrating AI, quants can leverage advanced analytical capabilities to uncover deeper insights and achieve superior outcomes, transforming how they approach challenges and opportunities in the financial world. This shift is leading to new job opportunities that emphasize technical proficiency alongside financial acumen. Recruiters state that candidates in quantitative finance roles are expected to understand AI and machine learning techniques, regardless of the level of their role.

In light of these developments, continuous learning is essential for quantitative finance professionals. As AI reshapes roles and introduces new technologies, staying updated with the latest advancements is crucial for maintaining relevance and competitiveness in the field.

The CQF helps professionals to acquire the essential quantitative finance and machine learning skills needed to succeed in this evolving environment. With two core modules that focus exclusively on data science and machine learning, the cutting-edge program is designed to ensure that delegates not only meet but exceed the technical and analytical demands of modern quant roles.

88% of respondents at the Annual Quant Insights Conference 2024 felt that the integration of AI and machine learning will bring the biggest change to the industry over the next 5 years.

> "Never has there been a bigger opportunity cost of taking yourself out of the market. If you press pause and spend two more years in grad school, you're going to come out behind. The pace of AI and other technological change is so fast. Professional development courses, like the CQF, where you can still work full-time is the way to go."
>
> **Dennis Grady,**
> **Managing Partner, Spire Search Partners**

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Advance Your Career with the CQF

CERTIFICATE IN QUANTITATIVE FINANCE
CQF

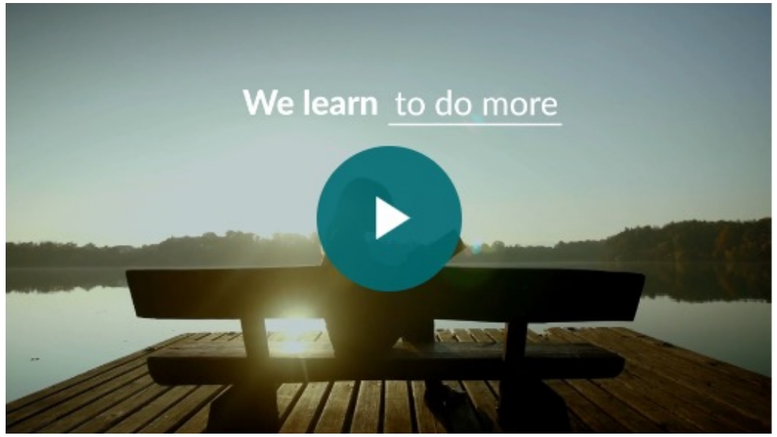
Advance Your Career with the CQF

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.



22+
years of shaping quant careers

11,500+
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. Daniel Bloch, Dr. Claus Huber, 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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Join the CQF Institute

The CQF Institute is the awarding body of the CQF program, and a global membership organization dedicated to empowering finance professionals by providing access to education, career guidance, and industry insights.

Become a member today to connect with a vibrant community of over 35,000 quantitative finance professionals worldwide, and gain access to:

Thought Leadership
Explore articles, videos, and podcasts

Exclusive Events
Gain expert insights at online and local events

Networking
Connect with quant professionals around the world

Career Insights
Access resources to accelerate your career

Become a member

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References

This guide includes polling data from the Quant Insights Conference hosted by the CQF Institute in November 2024.

Salary table sources include Robert Half's 2024 Salary Guide, Robert Half UK, Robert Walters' Salary Benchmarking Tool, and Selby Jennings' FinTech Salary Guide, Investment Banking Salary Guide 2024, Investment Management Salary Guide, Quant Analytics Salary Guides for the US and Europe, Risk Management Salary Guide Europe 2024/2025, and Southeast Asia Salary Guide, and Taylor Root Asia In-House Legal, Risk and Compliance Salary Guide 2024-2025. Additional resources include eFinancial Careers, Glassdoor, and Indeed.

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Certificate in Quantitative Finance

www.cqfinstitute.org

To discover how the CQF could help you master the cutting-edge skills you need to advance, contact your regional Learning Manager:

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