

Postgraduate Certificate

Quantitative Analysis and Machine Learning in Algorithmic Trading



Postgraduate Certificate Quantitative Analysis and Machine Learning in Algorithmic Trading

- » Modality: online
- » Duration: 6 weeks
- » Certificate: TECH Global University
- » Accreditation: 6 ECTS
- » Schedule: at your own pace
- » Exams: online

Website: www.techtitute.com/us/school-of-business/postgraduate-certificate/quantitative-analysis-machine-learning-algorithmic-trading

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The background features a blurred image of a person in a white shirt, possibly a professional, looking down. The image is overlaid with geometric shapes: a dark blue triangle in the bottom left corner and a light orange triangle in the top right corner.

01

Introduction to the Program

Financial institutions are increasingly recognizing the importance of incorporating advanced Quantitative models into their decision-making processes within the stock market environment. In this regard, the CFA Institute reports that more than 70% of global operations in financial markets are currently executed using automated algorithms based on data. In light of this scenario, mastering statistical and mathematical techniques becomes a key element in analyzing large volumes of information and constructing effective investment strategies. To foster the development of these competencies, TECH has designed this comprehensive university program. Through a dynamic 100% online format, professionals will acquire the necessary knowledge to excel efficiently in this sector.

“

With this exhaustive 100% online Postgraduate Certificate, you will acquire the knowledge and tools needed to stand out in the field of Quantitative Analysis and Machine Learning in Algorithmic Trading”

Quantitative analysis applied to trading requires mastering mathematical tools that allow modeling behavioral patterns in financial markets. For example, a deep understanding of probability and statistics fundamentals is key to building indicators that improve decision-making accuracy. In this regard, financial professionals must be updated on time series, linear regression, and correlation models applied to financial assets.

In this context, TECH presents an innovative Postgraduate Certificate in Quantitative Analysis and Machine Learning in Algorithmic Trading. Designed by industry experts, the syllabus will focus on objectivity, replicability, and intensive data usage. Aligned with this, the course content will dive into probabilistic models applied to trading, which are essential for estimating risks, evaluating returns, and making decisions under uncertainty. Moreover, the didactic materials will equip professionals with the tools to build solid statistical models tailored to real data. This will allow them to develop competencies for interpreting complex market scenarios with greater precision.

Those who complete this program will be prepared to lead Algorithmic Trading projects in banks, investment funds, or fintechs, as well as to develop their own automated investment strategies. By mastering both the theoretical principles and the computational aspects of quantitative analysis, they will be able to effectively respond to the challenges of global markets, expanding their professional opportunities in a highly competitive and constantly evolving sector.

Additionally, the course will be offered in a 100% online format, making it easy for professionals to adapt their training to their own pace and responsibilities. All they need is a device with a stable internet connection. The academic proposal will also incorporate the innovative Relearning system, ensuring that professionals progressively internalize key concepts of quantitative analysis in a practical and applied way. Furthermore, they will have access to various multimedia resources such as specialized video lectures and practical exercises.

This **Postgraduate Certificate in Quantitative Analysis and Machine Learning in Algorithmic Trading** contains the most complete and up-to-date program on the market. The most important features include:

- ♦ The development of practical cases presented by experts in Quantitative Analysis and Machine Learning in Algorithmic Trading
- ♦ The graphic, schematic, and practical contents with which they are created, provide scientific and practical information on the disciplines that are essential for professional practice
- ♦ Practical exercises where the self-assessment process can be carried out to improve learning
- ♦ Its special emphasis on innovative methodologies
- ♦ Theoretical lessons, questions to the expert, debate forums on controversial topics, and individual reflection assignments
- ♦ Content that is accessible from any fixed or portable device with an internet connection



You will strengthen your knowledge in the use of volatility models to identify, estimate, and anticipate changes in the variability of financial asset prices”

“

The multitude of practical resources provided in this postgraduate certificate will allow you to apply advanced statistical techniques to analyze financial data”

The faculty includes professionals from the field of Quantitative Analysis and Machine Learning in Algorithmic Trading, who bring their practical experience, along with recognized specialists from leading organizations and prestigious universities.

The multimedia content, developed with the latest educational technology, will provide the professional with situated and contextual learning, i.e., a simulated environment that will provide an immersive learning experience designed to prepare for real-life situations.

This program is designed around Problem-Based Learning, whereby the student must try to solve the different professional practice situations that arise throughout the program. For this purpose, the professional will be assisted by an innovative interactive video system created by renowned and experienced experts.

With TECH, you will develop the ability to build and apply mathematical models focused on price analysis, trend projection, and optimization of Trading strategies.

A 100% online postgraduate certificate that allows you to learn from anywhere, using advanced Machine Learning techniques and Quantitative Analysis.



02

Why Study at TECH?

TECH is the world's largest online university. With an impressive catalog of more than 14,000 university programs available in 11 languages, it is positioned as a leader in employability, with a 99% job placement rate. In addition, it relies on an enormous faculty of more than 6,000 professors of the highest international renown.



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*Study at the world's largest online university
and guarantee your professional success.
The future starts at TECH”*

The world's best online university, according to FORBES

The prestigious Forbes magazine, specialized in business and finance, has highlighted TECH as "the best online university in the world" This is what they have recently stated in an article in their digital edition in which they echo the success story of this institution, "thanks to the academic offer it provides, the selection of its teaching staff, and an innovative learning method oriented to form the professionals of the future".

The best top international faculty

TECH's faculty is made up of more than 6,000 professors of the highest international prestige. Professors, researchers and top executives of multinational companies, including Isaiah Covington, performance coach of the Boston Celtics; Magda Romanska, principal investigator at Harvard MetaLAB; Ignacio Wistumba, chairman of the department of translational molecular pathology at MD Anderson Cancer Center; and D.W. Pine, creative director of TIME magazine, among others.

The world's largest online university

TECH is the world's largest online university. We are the largest educational institution, with the best and widest digital educational catalog, one hundred percent online and covering most areas of knowledge. We offer the largest selection of our own degrees and accredited online undergraduate and postgraduate degrees. In total, more than 14,000 university programs, in ten different languages, making us the largest educational institution in the world.



The most complete syllabuses on the university scene

TECH offers the most complete syllabuses on the university scene, with programs that cover fundamental concepts and, at the same time, the main scientific advances in their specific scientific areas. In addition, these programs are continuously updated to guarantee students the academic vanguard and the most demanded professional skills. and the most in-demand professional competencies. In this way, the university's qualifications provide its graduates with a significant advantage to propel their careers to success.

A unique learning method

TECH is the first university to use Relearning in all its programs. This is the best online learning methodology, accredited with international teaching quality certifications, provided by prestigious educational agencies. In addition, this innovative academic model is complemented by the "Case Method", thereby configuring a unique online teaching strategy. Innovative teaching resources are also implemented, including detailed videos, infographics and interactive summaries.

The official online university of the NBA

TECH is the official online university of the NBA. Thanks to our agreement with the biggest league in basketball, we offer our students exclusive university programs, as well as a wide variety of educational resources focused on the business of the league and other areas of the sports industry. Each program is made up of a uniquely designed syllabus and features exceptional guest hosts: professionals with a distinguished sports background who will offer their expertise on the most relevant topics.

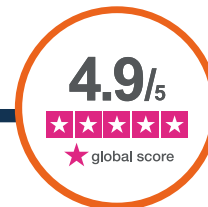
Leaders in employability

TECH has become the leading university in employability. Ninety-nine percent of its students obtain jobs in the academic field they have studied within one year of completing any of the university's programs. A similar number achieve immediate career enhancement. All this thanks to a study methodology that bases its effectiveness on the acquisition of practical skills, which are absolutely necessary for professional development.



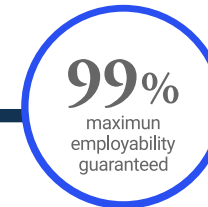
Google Premier Partner

The American technology giant has awarded TECH the Google Premier Partner badge. This award, which is only available to 3% of the world's companies, highlights the efficient, flexible and tailored experience that this university provides to students. The recognition not only accredits the maximum rigor, performance and investment in TECH's digital infrastructures, but also places this university as one of the world's leading technology companies.



The top-rated university by its students

Students have positioned TECH as the world's top-rated university on the main review websites, with a highest rating of 4.9 out of 5, obtained from more than 1,000 reviews. These results consolidate TECH as the benchmark university institution at an international level, reflecting the excellence and positive impact of its educational model.



03 Syllabus

This Postgraduate Certificate will provide financial professionals with an advanced understanding of the fundamentals and techniques of Machine Learning applied to the stock market. The syllabus will cover supervised learning algorithms, which allow the construction of predictive models based on historical data. Additionally, the academic content will offer technical criteria for selecting and optimizing models that improve accuracy in price prediction and trading signals. The syllabus will also delve into methodologies that reduce the risk of overfitting and improve the generalization of models.





“

You will apply reinforcement learning algorithms to develop and optimize adaptive trading strategies that enhance your performance”

Module 1. Quantitative Analysis and Machine Learning in Algorithmic Trading

- 1.1. Fundamentals of Quantitative Analysis
 - 1.1.1. Key Characteristics of Quantitative Analysis
 - 1.1.2. Probabilistic Models in Trading
 - 1.1.3. Use of Statistics in Financial Markets
- 1.2. Mathematical Models Applied to Trading
 - 1.2.1. Time Series Models
 - 1.2.2. Regression and Correlations
 - 1.2.3. Volatility Models
- 1.3. Machine Learning in Algorithmic Trading
 - 1.3.1. Advanced Understanding of Machine Learning
 - 1.3.2. Supervised Learning Algorithms
 - 1.3.3. Unsupervised Learning Algorithms
 - 1.3.4. Reinforcement Learning Algorithms
 - 1.3.5. Benefits and Risks
- 1.4. Neural Networks and Deep Learning in Algorithmic Trading
 - 1.4.1. Applications of Neural Networks
 - 1.4.2. Price Prediction Models
 - 1.4.3. Limitations and Challenges
- 1.5. Advanced Backtesting with Machine Learning
 - 1.5.1. Evaluation of Predictive Models
 - 1.5.2. Cross-Validation
 - 1.5.3. Avoiding Overfitting
- 1.6. Optimization of Strategies with Artificial Intelligence
 - 1.6.1. Genetic Algorithms
 - 1.6.2. Reinforcement in Trading
 - 1.6.3. AutoML in Finance
- 1.7. Risk Factors in Quantitative Models
 - 1.7.1. Biases in Data
 - 1.7.2. Overfitting and Noisy Data
 - 1.7.3. Model Robustness



- 1.8. Implementation of ML Strategies in Real Environments
 - 1.8.1. Deployment in Production
 - 1.8.2. Model Monitoring
 - 1.8.3. Adapting to Market Changes
- 1.9. Use of Alternative Data in Trading
 - 1.9.1. Social Media and Market Sentiment
 - 1.9.2. Satellite and Alternative Data
 - 1.9.3. Other Sentiment Indicators
- 1.10. Ethics and Regulation in the Use of AI in Trading
 - 1.10.1. Algorithmic Biases
 - 1.10.2. Emerging Regulations
 - 1.10.3. Responsibility in Decision Making

“You will have the skills to implement unsupervised learning algorithms that identify hidden patterns and segment complex financial data”

04 Teaching Objectives

This Postgraduate Certificate will provide financial professionals with the most effective tools to evaluate and refine automated investment strategies. In this way, graduates will develop advanced competencies to apply backtesting techniques with Machine Learning algorithms and validate the historical performance of their models. Additionally, they will be able to adjust their strategies based on quantitative metrics and changing market scenarios. Moreover, they will integrate Artificial Intelligence methods aimed at the automatic optimization of parameters, with the goal of maximizing results and minimizing operational risks.





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You will confidently handle the design and training of neural networks applied to Algorithmic Trading, using your ability to model non-linear relationships”



General Objectives

- Apply quantitative analysis techniques to assess automated investment opportunities
- Design algorithmic trading strategies based on mathematical and statistical models
- Use programming tools to implement financial algorithms in real-world environments
- Integrate Machine Learning models to optimize decision-making in trading
- Analyze large volumes of financial data to identify predictive patterns
- Evaluate the efficiency and sustainability of developed strategies through backtesting
- Develop skills to interpret quantitative results with a practical and financial focus
- Understand the regulatory framework applicable to the use of algorithms in financial markets
- Use languages like Python and specialized libraries in the development of ML models
- Foster critical and ethical thinking in the creation of automated investment systems





Specific Objectives

- ♦ Apply data engineering techniques in the context of advanced backtesting with Machine Learning, ensuring the quality and consistency of the datasets used
- ♦ Evaluate dimensionality reduction and feature selection methods as part of the strategy optimization process with Artificial Intelligence
- ♦ Design automated development and execution workflows for implementing ML strategies in real-world environments, integrating specialized libraries, programming languages, and production deployment tools
- ♦ Compare cross-validation techniques applied to predictive models, recognizing their usefulness in improving the robustness of Quantitative models



Execute Deep Learning models in financial time series analysis, leveraging their architecture to detect complex patterns and improve accuracy"

05 Study Methodology

TECH is the world's first university to combine the **case study** methodology with **Relearning**, a 100% online learning system based on guided repetition.

This disruptive pedagogical strategy has been conceived to offer professionals the opportunity to update their knowledge and develop their skills in an intensive and rigorous way. A learning model that places students at the center of the educational process giving them the leading role, adapting to their needs and leaving aside more conventional methodologies.



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TECH will prepare you to face new challenges in uncertain environments and achieve success in your career”

The student: the priority of all TECH programs

In TECH's study methodology, the student is the main protagonist.

The teaching tools of each program have been selected taking into account the demands of time, availability and academic rigor that, today, not only students demand but also the most competitive positions in the market.

With TECH's asynchronous educational model, it is students who choose the time they dedicate to study, how they decide to establish their routines, and all this from the comfort of the electronic device of their choice. The student will not have to participate in live classes, which in many cases they will not be able to attend. The learning activities will be done when it is convenient for them. They can always decide when and from where they want to study.

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*At TECH you will NOT have live classes
(which you might not be able to attend)”*



The most comprehensive study plans at the international level

TECH is distinguished by offering the most complete academic itineraries on the university scene. This comprehensiveness is achieved through the creation of syllabi that not only cover the essential knowledge, but also the most recent innovations in each area.

By being constantly up to date, these programs allow students to keep up with market changes and acquire the skills most valued by employers. In this way, those who complete their studies at TECH receive a comprehensive education that provides them with a notable competitive advantage to further their careers.

And what's more, they will be able to do so from any device, pc, tablet or smartphone.

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TECH's model is asynchronous, so it allows you to study with your pc, tablet or your smartphone wherever you want, whenever you want and for as long as you want”

Case Studies and Case Method

The case method has been the learning system most used by the world's best business schools. Developed in 1912 so that law students would not only learn the law based on theoretical content, its function was also to present them with real complex situations. In this way, they could make informed decisions and value judgments about how to resolve them. In 1924, Harvard adopted it as a standard teaching method.

With this teaching model, it is students themselves who build their professional competence through strategies such as Learning by Doing or Design Thinking, used by other renowned institutions such as Yale or Stanford.

This action-oriented method will be applied throughout the entire academic itinerary that the student undertakes with TECH. Students will be confronted with multiple real-life situations and will have to integrate knowledge, research, discuss and defend their ideas and decisions. All this with the premise of answering the question of how they would act when facing specific events of complexity in their daily work.



Relearning Methodology

At TECH, case studies are enhanced with the best 100% online teaching method: Relearning.

This method breaks with traditional teaching techniques to put the student at the center of the equation, providing the best content in different formats. In this way, it manages to review and reiterate the key concepts of each subject and learn to apply them in a real context.

In the same line, and according to multiple scientific researches, reiteration is the best way to learn. For this reason, TECH offers between 8 and 16 repetitions of each key concept within the same lesson, presented in a different way, with the objective of ensuring that the knowledge is completely consolidated during the study process.

Relearning will allow you to learn with less effort and better performance, involving you more in your specialization, developing a critical mindset, defending arguments, and contrasting opinions: a direct equation to success.



A 100% online Virtual Campus with the best teaching resources

In order to apply its methodology effectively, TECH focuses on providing graduates with teaching materials in different formats: texts, interactive videos, illustrations and knowledge maps, among others. All of them are designed by qualified teachers who focus their work on combining real cases with the resolution of complex situations through simulation, the study of contexts applied to each professional career and learning based on repetition, through audios, presentations, animations, images, etc.

The latest scientific evidence in the field of Neuroscience points to the importance of taking into account the place and context where the content is accessed before starting a new learning process. Being able to adjust these variables in a personalized way helps people to remember and store knowledge in the hippocampus to retain it in the long term. This is a model called Neurocognitive context-dependent e-learning that is consciously applied in this university qualification.

In order to facilitate tutor-student contact as much as possible, you will have a wide range of communication possibilities, both in real time and delayed (internal messaging, telephone answering service, email contact with the technical secretary, chat and videoconferences).

Likewise, this very complete Virtual Campus will allow TECH students to organize their study schedules according to their personal availability or work obligations. In this way, they will have global control of the academic content and teaching tools, based on their fast-paced professional update.



The online study mode of this program will allow you to organize your time and learning pace, adapting it to your schedule”

The effectiveness of the method is justified by four fundamental achievements:

1. Students who follow this method not only achieve the assimilation of concepts, but also a development of their mental capacity, through exercises that assess real situations and the application of knowledge.
2. Learning is solidly translated into practical skills that allow the student to better integrate into the real world.
3. Ideas and concepts are understood more efficiently, given that the example situations are based on real-life.
4. Students like to feel that the effort they put into their studies is worthwhile. This then translates into a greater interest in learning and more time dedicated to working on the course.

The university methodology top-rated by its students

The results of this innovative teaching model can be seen in the overall satisfaction levels of TECH graduates.

The students' assessment of the teaching quality, the quality of the materials, the structure of the program and its objectives is excellent. Not surprisingly, the institution became the top-rated university by its students according to the global score index, obtaining a 4.9 out of 5.

Access the study contents from any device with an Internet connection (computer, tablet, smartphone) thanks to the fact that TECH is at the forefront of technology and teaching.

You will be able to learn with the advantages that come with having access to simulated learning environments and the learning by observation approach, that is, Learning from an expert.



As such, the best educational materials, thoroughly prepared, will be available in this program:



Study Material

All teaching material is produced by the specialists who teach the course, specifically for the course, so that the teaching content is highly specific and precise.

This content is then adapted in an audiovisual format that will create our way of working online, with the latest techniques that allow us to offer you high quality in all of the material that we provide you with.



Practicing Skills and Abilities

You will carry out activities to develop specific competencies and skills in each thematic field. Exercises and activities to acquire and develop the skills and abilities that a specialist needs to develop within the framework of the globalization we live in.



Interactive Summaries

We present the contents attractively and dynamically in multimedia lessons that include audio, videos, images, diagrams, and concept maps in order to reinforce knowledge.

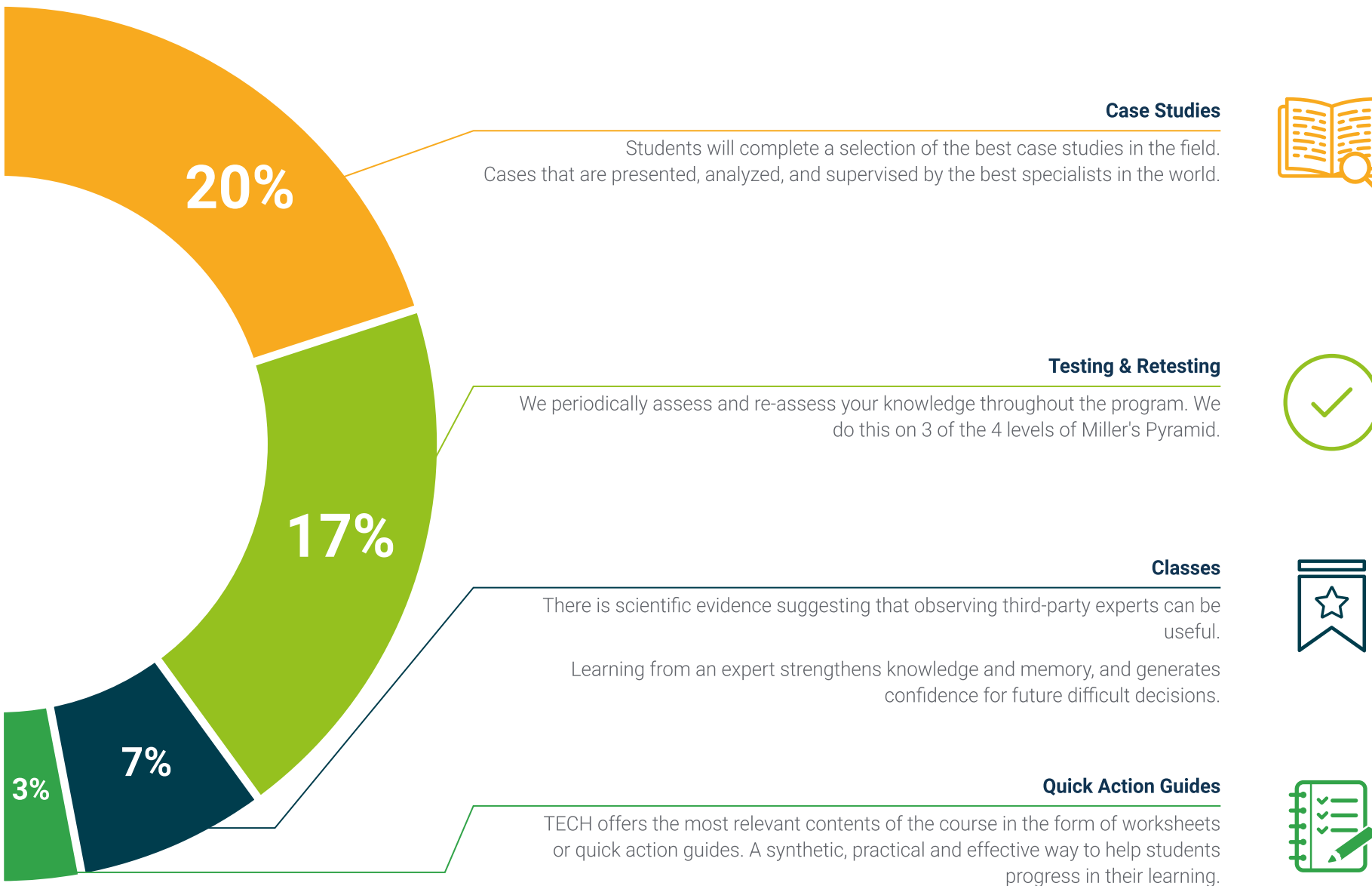
This exclusive educational system for presenting multimedia content was awarded by Microsoft as a "European Success Story".



Additional Reading

Recent articles, consensus documents, international guides... In our virtual library you will have access to everything you need to complete your education.





06

Teaching Staff

The teachers selected by TECH for this university program have solid experience in Quantitative Finance and Machine Learning applied to financial markets. In this way, they have participated in research and development projects for algorithms in algorithmic trading and the optimization of automated strategies. As a result, they have designed content focused on the practical application of mathematical models and advanced Artificial Intelligence techniques in financial analysis. Thanks to this, graduates will receive specialized training that will allow them to implement effective solutions tailored to the challenges of the global market.



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You will specialize under the guidance of a teaching team made up of experts in Quantitative Analysis and Machine Learning in Algorithmic Trading to develop advanced technical skills in financial modeling”

Management



Dr. Gómez Martínez, Raúl

- ♦ Founding Partner and CEO of Open 4 Blockchain Fintech
- ♦ Founding Partner of *InvestMood Fintech*
- ♦ Apara's CEO
- ♦ PhD in Business Economics and Finance from the University Rey Juan Carlos de Madrid
- ♦ Bachelor's Degree in Economics and Business Administration, Complutense University of Madrid
- ♦ Master's Degree in Economic Analysis and Financial Economics, Complutense University of Madrid



Dr. Lara Bocanegra, Ana María

- ♦ Company Owner (Financial)
- ♦ Ph.D. from the University of Seville
- ♦ Trader of NYSE Stocks at World Trade Securities
- ♦ Junior Trader at Swiftrad
- ♦ Mechanical Behaviour of Materials from University of Seville
- ♦ Experimental Techniques II from University of Seville
- ♦ Materials Science from University of Seville
- ♦ Advanced Trading Stocks Techniques from University of Seville

Teachers

Dr. Medrano García, María Luisa

- Director of university graduate programs
- Technical advisor for public institutions
- Professor in university degrees, courses and postgraduate programs.
- Ph.D. in Senior Management from the Rey Juan Carlos University
- Degree in Business Administration from the Complutense University of Madrid
- Economic and Social Council of the Community of Madrid Research Award

Dr. Guerra Moruno, Lucía

- Responsible for content planning and technical strategies at Scientia System S.L.U
- Ph.D. in Big Data and Quantitative Finance
- Head of Content Creation and Programming Strategies at Scientia System S.L
- Technical Consultant and Programmer at Incubadora de Traders S.L.U
- Master's Degree in Banking and Quantitative Finance
- Graduate in Physics

Mr. Martín Moreno, David

- Specialist in Financial Management by European University Miguel de Cervantes Business School
- Master's Degree in Financial Planning and Advice from the Rey Juan Carlos University
- Bachelor's Degree in Accounting and Finance from Rey Juan Carlos University

Mr. Segura Pachó, Felipe Marcelo

- Back Office at Indra BPO Services SLU
- Accountant at JC Segura Construcciones SA
- Specialist in Corporate Finance at the Catholic University of Salta
- Master's Degree in Financial Planning and Advice from the Rey Juan Carlos University
- Master's Degree in Business Management from the Public University of Navarra
- Collaborator of the project "Trading in Stock Exchange and Financial Markets"



A unique, essential and decisive learning experience to boost your professional development"

07 Certificate

The Postgraduate Certificate in Quantitative Analysis and Machine Learning in Algorithmic Trading guarantees students, in addition to the most rigorous and up-to-date education, access to a diploma for the Postgraduate Certificate issued by TECH Global University.



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Successfully complete this program and receive your university qualification without having to travel or fill out laborious paperwork”

This private qualification will allow you to obtain a diploma for the **Postgraduate Certificate in Quantitative Analysis and Machine Learning in Algorithmic Trading** endorsed by TECH Global University, the world's largest online university.

TECH Global University, is an official European University publicly recognized by the Government of Andorra ([official bulletin](#)). Andorra is part of the European Higher Education Area (EHEA) since 2003. The EHEA is an initiative promoted by the European Union that aims to organize the international training framework and harmonize the higher education systems of the member countries of this space. The project promotes common values, the implementation of collaborative tools and strengthening its quality assurance mechanisms to enhance collaboration and mobility among students, researchers and academics.

This **TECH Global University** private qualification, is a European program of continuing education and professional updating that guarantees the acquisition of competencies in its area of knowledge, providing a high curricular value to the student who completes the program.

Title: **Postgraduate Certificate in Quantitative Analysis and Machine Learning in Algorithmic Trading**

Modality: **online**

Duration: **6 weeks**

Accreditation: **6 ECTS**





Postgraduate Certificate Quantitative Analysis and Machine Learning in Algorithmic Trading

- » Modality: online
- » Duration: 6 weeks
- » Certificate: TECH Global University
- » Accreditation: 6 ECTS
- » Schedule: at your own pace
- » Exams: online

Postgraduate Certificate Quantitative Analysis and Machine Learning in Algorithmic Trading