Postgraduate Certificate

Programming and Development of Algorithms in Trading

tech global university

Postgraduate Certificate
Programming and Development of Algorithms in 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/programming-development-algorithms-trading**

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01

Introduction to the Program

Financial professionals are increasingly recognizing the importance of integrating programming and data analysis skills to tackle the challenges of modern trading. In this regard, the International Federation of Stock Exchanges reports that more than 65% of global trading volume in financial markets is currently executed through algorithmic systems. In light of this scenario, the ability to develop and automate investment strategies has become a key factor in improving operational precision and reducing human error risk. To provide the necessary tools for professionals to strengthen these skills, TECH has designed this university program. All of this is offered through a dynamic, 100% online, and innovative learning format.

Through this 100% online Postgraduate Certificate, you will develop skills in the fundamentals of Programming applied to Trading, mastering languages like Python and R to design algorithmic solutions"

The development of Algorithms in Trading requires mastering specific programming languages that allow for the structuring of automated and efficient financial strategies. For example, staying informed about the most widely used Development environments in the sector is crucial to ensure an optimized and secure workflow. In this sense, financial professionals must possess updated knowledge of specialized libraries and version control tools. Additionally, considering the adaptability of the code to different platforms and market conditions provides a competitive advantage that enhances operational performance.

In this context, TECH presents an innovative program in Programming and Algorithm Development in Trading. Designed by experts in the field, the curriculum will cover key fundamentals to automate strategies and optimize the execution of operations in global markets. In line with this, the course will delve into the development of scripts that enable the automatic implementation of buy and sell signals. Additionally, the educational materials will provide financial professionals with practical resources to improve operational efficiency and minimize manual errors. As a result, graduates will develop the competencies to build Algorithms capable of acting in real-time based on quantitative criteria. Thanks to this, professionals will optimize their performance with technological solutions tailored to current financial environments.

The program will be offered in a 100% online modality, allowing financial professionals to organize their learning time flexibly. In fact, all you will need is a device with internet access to log into the academic platform. Additionally, the academic proposal will incorporate the innovative Relearning system, which ensures the progressive understanding of key concepts. This system avoids traditional methods focused on memorization without practical application. Moreover, you will have access to various multimedia resources such as video lectures and infographics.

This **Postgraduate Certificate in Programming and Development of Algorithms in 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 Business
- 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 self-assessment can be used 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 develop the ability to analyze large volumes of financial data and visually represent them using tools like Matplotlib and Seaborn"

A 100% online university program that allows you to train from anywhere in the world, developing technical skills to create, test, and optimize financial algorithms that automate investment decisions"

The numerous practical resources offered in this university program will allow you to design, program, and deploy trading bots capable of executing operations autonomously.

With TECH, you will acquire the necessary skills to compare and implement SQL and NoSQL databases in algorithmic trading environments.

The program includes faculty members from the field of stock market analysis in Algorithmic Trading, bringing their work experience to this program, along with renowned specialists from leading companies 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.

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.

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.

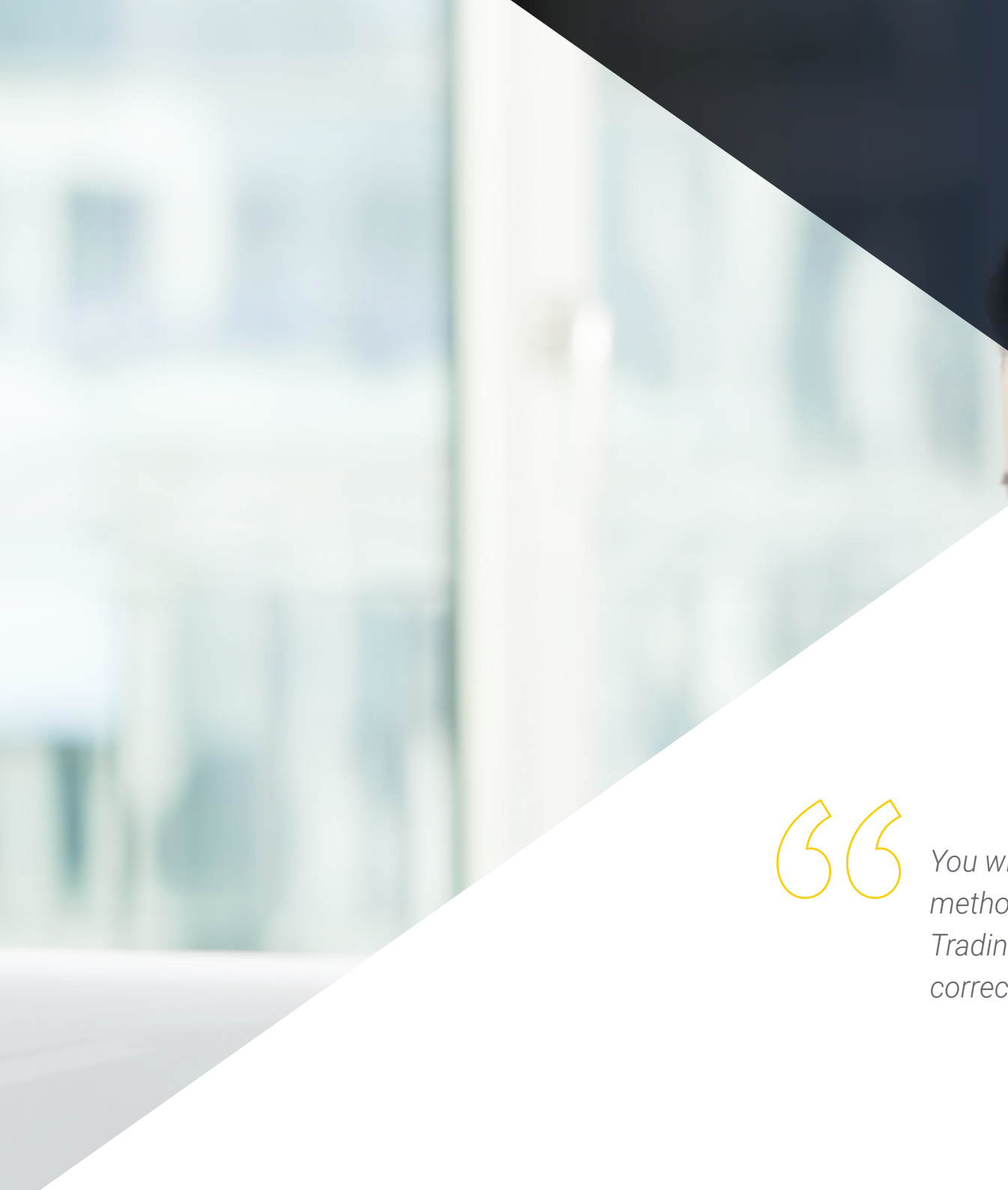
The top-rated university by its students

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 a detailed understanding of financial data processing using Programming languages. The syllabus will cover the most widely used development environments and tools for structuring efficient algorithmic trading projects. Additionally, the academic content will provide technical criteria for manipulating, cleaning, and transforming historical data using specialized Python libraries. The syllabus will also delve into the key functions that allow data preparation for quantitative analysis. In this way, specialists will gain essential competencies to build robust analytical solutions that support strategic decision-making.



You will apply testing and debugging methodologies to identify errors in Trading Algorithms, ensuring their correct functionality"

Module 1. Programming and Development of Algorithms in Trading

1.1. Fundamentals of Programming for Trading
- 1.1.1. Most Common Programming Languages (Python, R, etc.)
- 1.1.2. Development Environments and Tools
- 1.1.3. Version Control

1.2. Financial Data Manipulation with Python
- 1.2.1. Essential Libraries (Pandas, NumPy, etc.)
- 1.2.2. Loading and Processing Historical Data
- 1.2.3. Analysis and Visualization

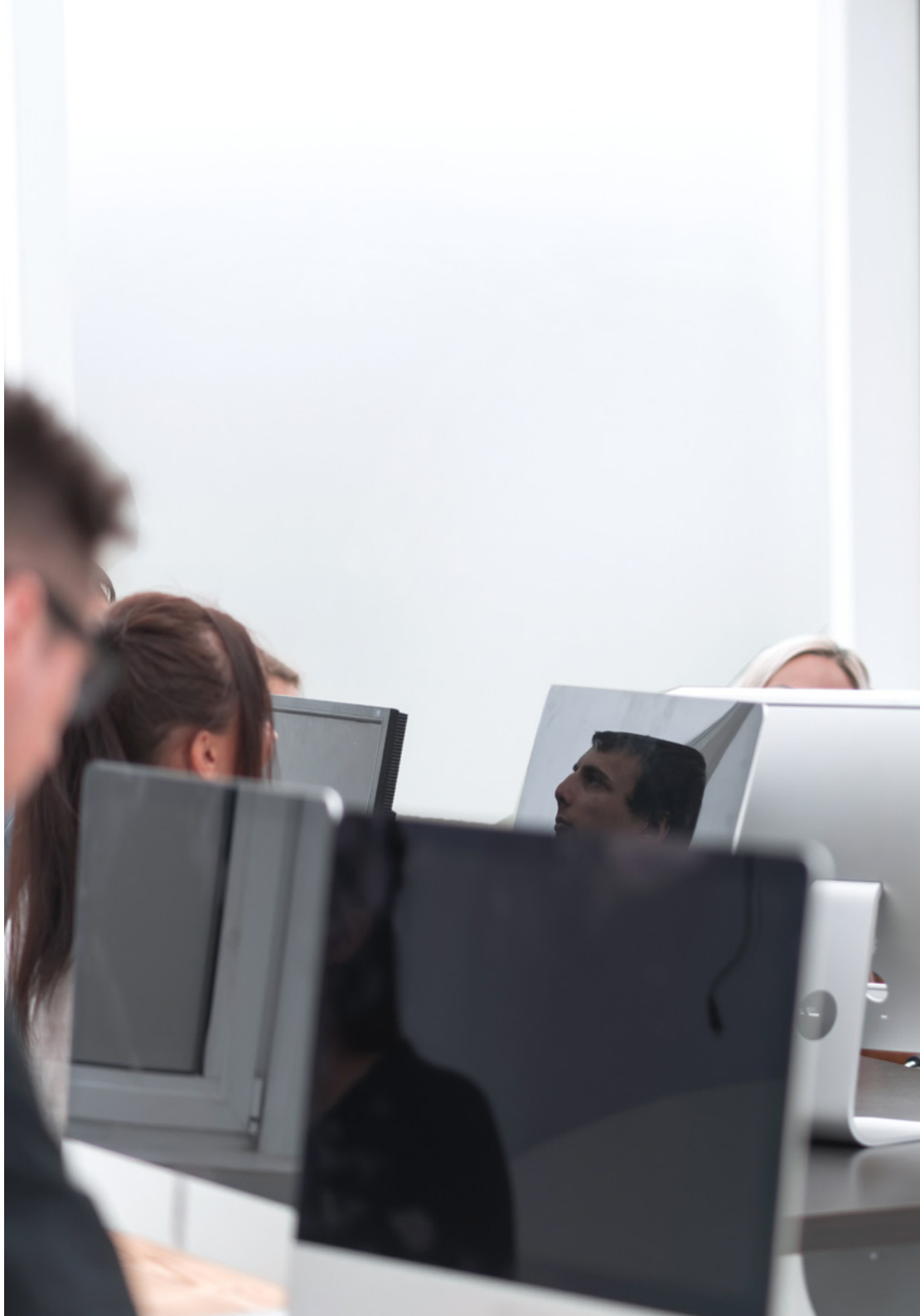
1.3. Automation of Trading Strategies
- 1.3.1. Developing Scripts for Automated Execution
- 1.3.2. Broker APIs and Market Connections
- 1.3.3. Automation of Analysis and Reporting

1.4. Design of Custom Indicators
- 1.4.1. Creating Custom Technical Indicators
- 1.4.2. Combining Multiple Signals
- 1.4.3. Implementation in Code

1.5. Development of Trading Bots
- 1.5.1. Architecture of a Trading Bot
- 1.5.2. Order Execution and Management
- 1.5.3. Simulation of Trades

1.6. Testing and Debugging Algorithms
- 1.6.1. Identifying Common Errors
- 1.6.2. Debugging Tools
- 1.6.3. Unit Testing and Quality Control

1.7. Use of Databases in Algorithmic Trading
- 1.7.1. SQL vs. NoSQL in Trading
- 1.7.2. Efficient Storage of Historical Data
- 1.7.3. Query Optimization



1.8. Integration with Market Data APIs
  1.8.1. APIs with Brokers and Data Feeders
  1.8.2. Real-Time Data Extraction and Updates
  1.8.3. Web Scraping and Alternative Data Sources
1.9. Infrastructure and Deployment of Algorithms
  1.9.1. Local Servers vs. *Cloud Computing*
  1.9.2. Deployment in Major Clouds (AWS, Google Cloud, Azure)
  1.9.3. Security and Maintenance
1.10. Optimization and Scalability of Algorithms
  1.10.1. Code Performance Improvement
  1.10.2. Parallelization and Distributed Processing
  1.10.3. Latency Management and Execution Times

You will manage the integration of broker APIs and connections to real-time financial markets, automating trade execution"

04

Teaching Objectives

This Postgraduate Certificate is designed to provide financial professionals with the most effective tools to operate in advanced technological environments. In this regard, graduates will develop the skills necessary to deploy their algorithms on cloud platforms such as AWS, Google Cloud, or Azure. Furthermore, they will be trained to configure scalable environments that ensure stability and real-time performance. Additionally, they will integrate optimization techniques that will allow them to reduce latency and improve execution times in operations sensitive to milliseconds.

You will have the ability to evaluate the advantages and limitations of local servers versus Cloud Computing solutions"

General Objectives

- Develop efficient trading algorithms tailored to different financial markets
- Program automated strategies using languages such as Python and specialized platforms
- Apply principles of computational logic to build robust investment systems
- Analyze real-time market data to feed algorithmic models
- Integrate technical and quantitative analysis techniques into trading algorithm design
- Validate strategy performance through backtesting
- Understand the architecture of automated trading systems and their key components
- Optimize algorithms based on performance, latency, and risk management
- Implement control structures and automated execution with high operational precision
- Adapt algorithms to regulatory environments and ethical criteria in the financial market

Specific Objectives

- Apply software engineering techniques, such as modular design and version control, to structure and document trading algorithm development projects
- Evaluate the effectiveness of algorithmic strategies using financial metrics such as Sharpe Ratio, Drawdown, and accuracy rate, through backtesting
- Incorporate principles of algorithmic ethics and regulatory compliance in the development and deployment of trading bots
- Employ optimization and validation methods, such as grid search and cross-validation, to improve the accuracy, stability, and scalability of algorithms

You will use advanced Web Scraping techniques to extract and process financial data from unstructured sources, facilitating the integration of alternative data"

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.

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.

"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.

> *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.

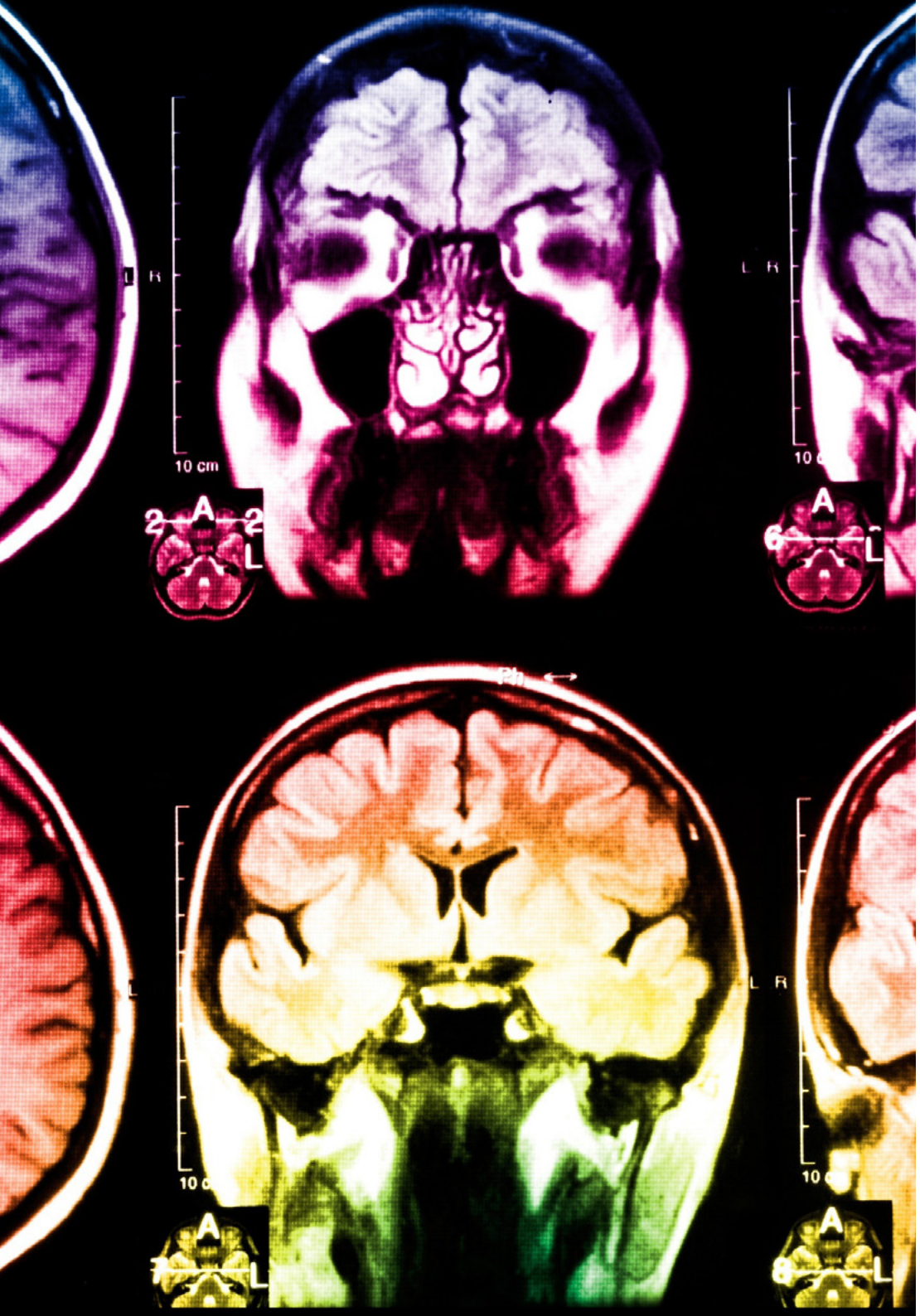
In order to facilitate tutor-student contact as much as possible, you will have a wide range of communication possibilities, both in real time and delayed (internal messaging, telephone answering service, email contact with the technical secretary, chat and videoconferences).

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.

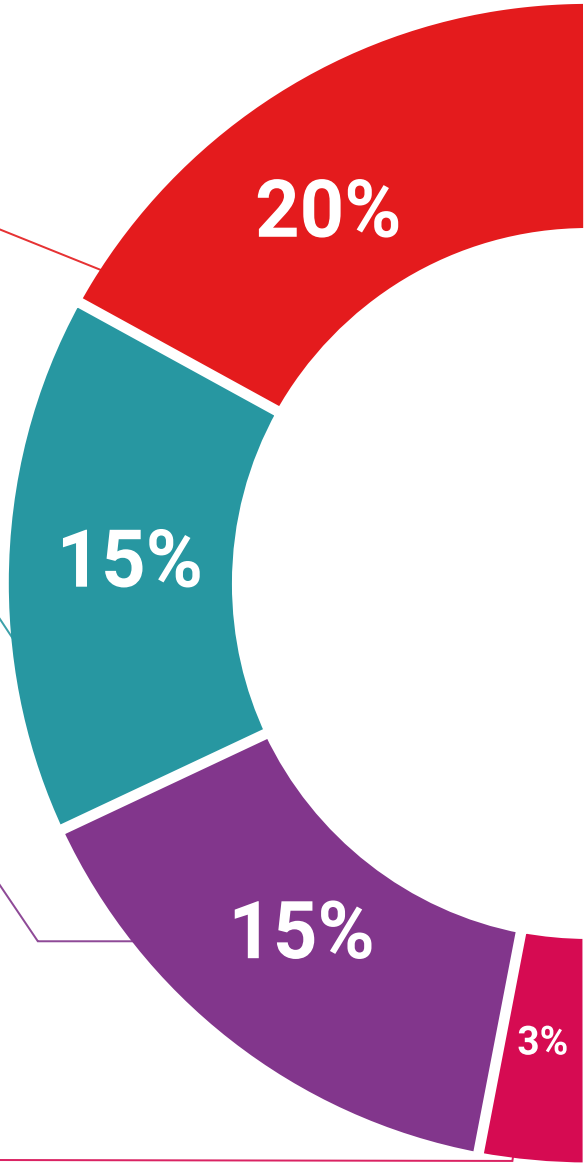
Interactive Summaries

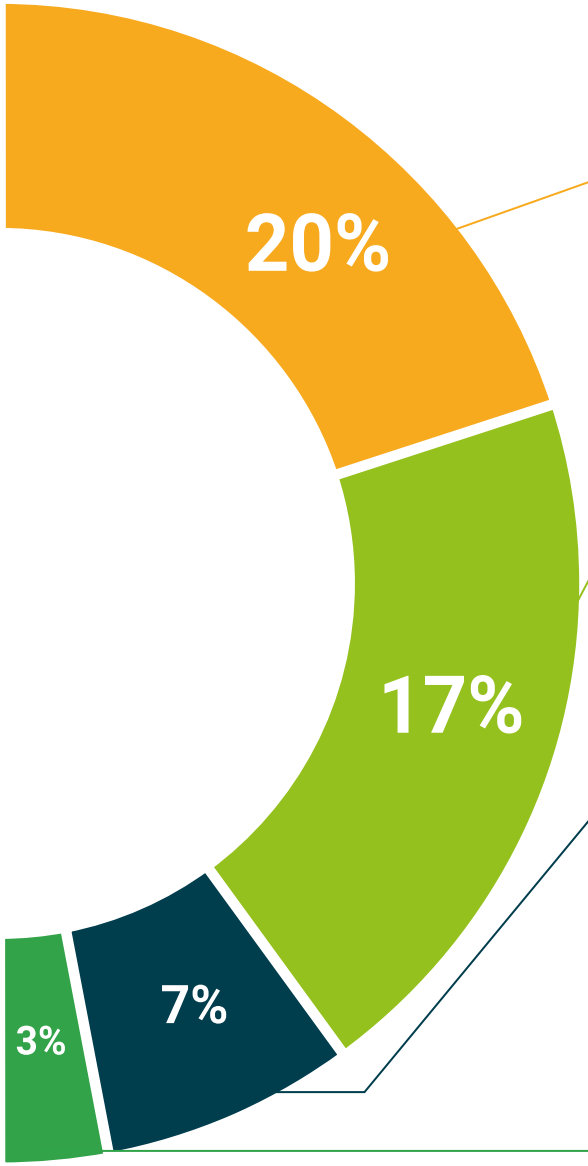
We present the contents attractively and dynamically in multimedia lessons that include audio, videos, images, diagrams, and concept maps in order to reinforce knowledge.

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.





Case Studies

Students will complete a selection of the best case studies in the field. Cases that are presented, analyzed, and supervised by the best specialists in the world.

Testing & Retesting

We periodically assess and re-assess your knowledge throughout the program. We do this on 3 of the 4 levels of Miller's Pyramid.

Classes

There is scientific evidence suggesting that observing third-party experts can be useful.

Learning from an expert strengthens knowledge and memory, and generates confidence for future difficult decisions.

Quick Action Guides

TECH offers the most relevant contents of the course in the form of worksheets or quick action guides. A synthetic, practical and effective way to help students progress in their learning.

06

Teaching Staff

The teachers selected by TECH for this Postgraduate Certificate have extensive practical and theoretical experience in Programming and Trading Algorithm Development. They have participated in projects involving the design, testing, and optimization of algorithms for dynamic markets. As such, they have developed content focused on the automation of strategies and the integration of broker APIs. Thanks to this, graduates will receive specialized training that will enable them to implement efficient technological solutions tailored to the challenges of current algorithmic trading.

You will specialize alongside a team of instructors composed of experts in Programming and Trading Algorithm Development, acquiring technical skills in the automation of trading operations"

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 Pacho, 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 Programming and Development of Algorithms in 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.

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 Programming and Development of Algorithms in 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 Programming and Development of Algorithms in Trading**

Modality: **online**

Duration: **6 weeks**

Accreditation: **6 ECTS**

tech global university

Mr./Ms. _____, with identification document _____
has successfully passed and obtained the title of:

Postgraduate Certificate in Programming and Development of Algorithms in Trading

This is a private qualification of 180 hours of duration equivalent to 6 ECTS, with a start date of dd/mm/yyyy and an end date of dd/mm/yyyy.

TECH Global University is a university officially recognized by the Government of Andorra on the 31st of January of 2024, which belongs to the European Higher Education Area (EHEA).

In Andorra la Vella, on the 28th of February of 2024

Dr. Pedro Navarro Illana
Dean

Unique TECH Code: AFWORD23S techtitute.com/certificates

*Apostille Convention. In the event that the student wishes to have their paper diploma issued with an apostille, TECH Global University will make the necessary arrangements to obtain it, at an additional cost.

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