



# Postgraduate Diploma Data Processing and Trading with Artificial Intelligence

» Modality: online

» Duration: 12 months

» Certificate: TECH Global University

» Accreditation: 18 ECTS

» Schedule: at your own pace

» Exams: online

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# tech 06 | Introduction

The use of Artificial Intelligence in data processing and trading is revolutionizing the financial landscape. Al-powered trading platforms can analyze huge volumes of data in real time, identifying patterns and predicting market trends with unprecedented accuracy. This not only improves trading efficiency, but also minimizes risk through the use of advanced algorithms.

This is how this Postgraduate Diploma was created, which will offer comprehensive training focused on the efficient management of large volumes of financial data. Through advanced technologies, such as Big Data, professionals will be able to store and process information in real time, allowing them to respond quickly to market fluctuations.

Likewise, skills will be acquired in Machine Learning techniques that enhance the efficiency of operations, as well as in the evaluation and optimization of strategies through advanced methodologies. This will include the use of backtesting to maximize performance in financial markets. In addition, emphasis will be placed on risk management, ensuring that the strategies implemented are profitable and maintain a safe and sustainable approach.

Finally, the importance of transparency, explainability and fairness in financial models will be discussed in depth. In turn, experts will become familiar with the global regulations that affect the implementation of these technologies, promoting responsible development that prioritizes economic and social welfare.

In this way, TECH has created a comprehensive, fully online program, which only requires an electronic device with an Internet connection to access all educational materials. This solves inconveniences such as the need to move to a physical location and the obligation to follow a fixed schedule. Additionally, it will be based on the revolutionary Relearning methodology, focused on the repetition of essential concepts to ensure a correct understanding of the contents.

The **Postgraduate Diploma in Data Processing and Trading with Artificial Intelligence** contains the most complete and up-to-date program on the market. The most important features include:

- The development of case studies presented by experts in Artificial Intelligence applied to Stock Exchanges and Financial Markets
- The graphic, schematic, and practical contents with which they are created, provide 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 technical skills to implement automated trading systems and respond nimbly to market fluctuations, hand in hand with the best online university in the world, according to Forbes: TECH"



You will delve into the challenges related to transparency and fairness in financial models, as well as the global regulations governing the use of these technologies. With all the TECH quality guarantees"

The program's teaching staff includes professionals from the field who contribute their work experience to this educational program, as well as renowned specialists from leading societies 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 immersive education programmed to learn in real situations.

This program is designed around Problem-Based Learning, whereby the professional must try to solve the different professional practice situations that arise during the course. For this purpose, students will be assisted by an innovative interactive video system created by renowned experts in the field of educational coaching with extensive experience.

You will optimize data analysis and decision making, ensuring the security and privacy of information, through the best teaching materials, at the forefront of technology and education.

You will acquire skills to evaluate and optimize trading strategies, using advanced methods such as backtesting, thanks to an extensive library of innovative multimedia resources.





trading systems"

# tech 10 | Objectives



# **General Objectives**

- Develop skills to apply advanced Artificial Intelligence techniques in the technical and fundamental analysis of financial markets, including the use of Machine Learning, Deep Learning and NLP
- Train students to design, implement and optimize algorithmic trading strategies, using Reinforcement Learning and Machine Learning techniques to improve efficiency and profitability in financial markets
- Acquire skills in processing and analyzing large volumes of financial data using Big Data technologies, such as Hadoop and Spark
- Foster the ability to create and apply Artificial Intelligence models that are explainable and transparent, ensuring that Al-based financial decisions are understandable and justifiable
- Develop a thorough understanding of the ethical and regulatory challenges associated with the use of Artificial Intelligence in finance
- Equip students with the tools and knowledge necessary to develop innovative financial solutions that integrate Artificial Intelligence
- Create predictive models using Machine Learning techniques, such as LSTM and time-series models, to anticipate market movements and improve investment decision making
- Develop skills in portfolio optimization and financial risk management using genetic algorithms and other advanced Artificial Intelligence techniques to maximize return and minimize investment risk
- Provide the necessary tools and techniques to implement and optimize high-frequency trading strategies, using Machine Learning models to improve the speed and accuracy of order execution
- Apply Al technologies in finance in an ethical and responsible manner, incorporating fairness, transparency and privacy considerations into their solutions





# **Specific Objectives**

### Module 1. Large Scale Financial Data Processing

- Master the use of Big Data technologies, such as Hadoop and Spark, for the storage and processing of large volumes of financial data, optimizing the capacity for analysis and decision making
- Implement tools and techniques for real-time processing of financial data, enabling fast and effective responses to market fluctuations
- Apply best practices to ensure the security and privacy of financial data, ensuring compliance with industry regulations

### Module 2. Algorithmic Trading Strategies

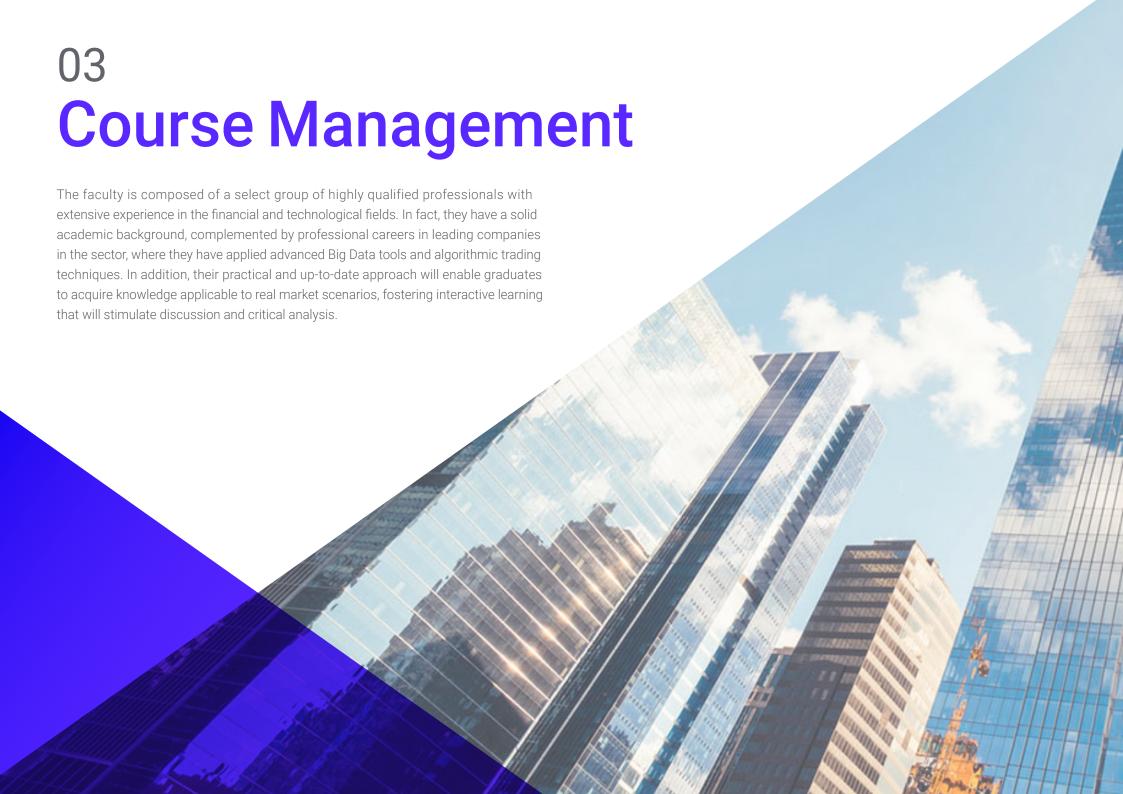
- Acquire the necessary skills to design and develop automated trading systems, integrating Machine Learning techniques to improve the efficiency and effectiveness of operations
- Learn to evaluate and optimize trading strategies using advanced techniques such as backtesting and Machine Learning, with the objective of maximizing performance in the financial markets
- Develop a thorough understanding of risk management techniques as applied to algorithmic trading, ensuring that strategies are both profitable and safe

### Module 3. Ethical and Regulatory Aspects of Al in Finance

- Explore the ethical challenges associated with the use of Artificial Intelligence in finance, including transparency, explainability, and fairness in financial modeling
- Understand the global regulations affecting the use of AI in financial markets, and learn how to develop solutions that meet these requirements
- Foster a culture of responsible development, integrating practices that ensure that AI technologies are used ethically, safely, and for the benefit of economic and social welfare



You will acquire a deep understanding of risk management and the ethical and regulatory implications of the use of Artificial Intelligence, always with the support of the revolutionary Relearning learning methodology"





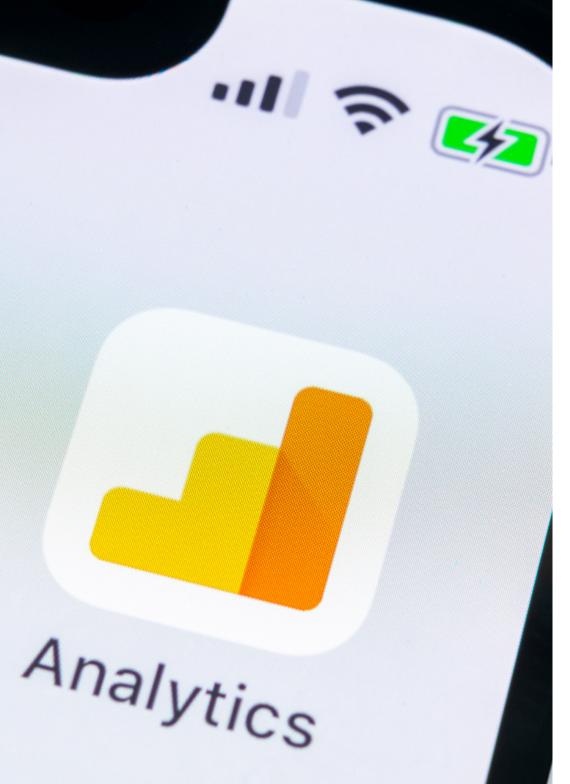
# tech 14 | Course Management

# Management



# Dr. Peralta Martín-Palomino, Arturo

- CEO and CTO at Prometeus Global Solutions
- CTO at Korporate Technologies
- CTO at Al Shepherds GmbH
- Consultant and Strategic Business Advisor at Alliance Medical
- Director of Design and Development at DocPath
- PhD in Psychology from the University of Castilla La Mancha
- PhD in Economics, Business and Finance from the Camilo José Cela University
- PhD in Psychology from the University of Castilla La Mancha
- Master's Degree in Executive MBA from the Isabel I University
- Master's Degree in Sales and Marketing Management, Isabel I University
- Expert Master's Degree in Big Data by Hadoop Training
- Master's Degree in Advanced Information Technologies from the University of Castilla La Mancha
- Member of: SMILE Research Group



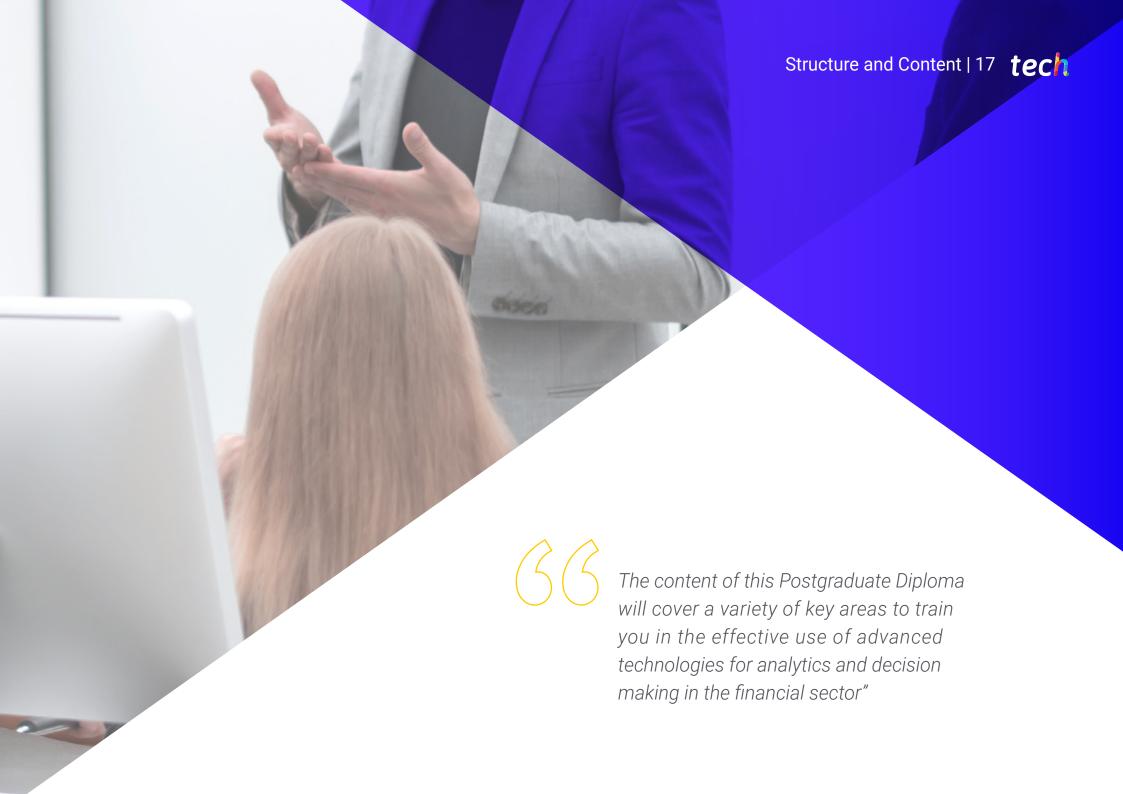
# Course Management | 15 tech

### **Professors**

### Mr. Sánchez Mansilla, Rodrigo

- Digital Advisor at Al Shepherds GmbH
- Digital Account Manager at Kill Draper
- Head of Digital at Kuarere
- Digital Marketing Manager at Arconi Solutions, Deltoid Energy and Brinergy Tech
- Founder and National Sales and Marketing Manager
- Master's Degree in Digital Marketing (MDM) by The Power Business School
- Bachelor's Degree in Business Administration (BBA) from the University of Buenos Aires





# tech 18 | Structure and Content

### Module 1. Large Scale Financial Data Processing

- 1.1. Big Data in the Financial Context
  - 1.1.1. Key Characteristics of Big Data in Finance
  - 1.1.2. Importance of the 5 Vs (Volume, Velocity, Variety, Veracity, Value) in Financial Data
  - 1.1.3. Use Cases of Big Data in Risk Analysis and Compliance
- 1.2. Technologies for Storage and Management of Financial Big Data
  - 1.2.1. NoSQL Database Systems for Financial Warehousing
  - 1.2.2. Using Data Warehouses and Data Lakes in the Financial Sector
  - 1.2.3. Comparison between On-Premises and Cloud-Based Solutions
- 1.3. Real-Time Processing Tools for Financial Data
  - 1.3.1. Introduction to Tools such as Apache Kafka and Apache Storm
  - 1.3.2. Real-Time Processing Applications for Fraud Detection
  - 1.3.3. Benefits of Real-Time Processing in Algorithmic Trading
- 1.4. Integration and Data Cleaning in Finance
  - 1.4.1. Methods and Tools for Integrating Data from Multiple Sources
  - 1.4.2. Data Cleaning Techniques to Ensure Data Quality and Accuracy
  - .4.3. Challenges in the Standardization of Financial Data
- 1.5. Data Mining Techniques Applied to The Financial Markets
  - 1.5.1. Classification and Prediction Algorithms in Market Data
  - 1.5.2. Sentiment Analysis in Social Networks for Predicting Market Movements
  - 1.5.3. Data Mining to Identify Trading Patterns and Investor Behavior
- 1.6. Advanced Data Visualization for Financial Analysis
  - 1.6.1. Visualization Tools and Software for Financial Data
  - 1.6.2. Design of Interactive Dashboards for Market Monitoring
  - 1.6.3. The Role of Visualization in Risk Analysis Communication



# Structure and Content | 19 tech

- 1.7. Use of Hadoop and Related Ecosystems in Finance
  - 1.7.1. Key Components of the Hadoop Ecosystem and Their Application in Finance
  - 1.7.2. Hadoop Use Cases for Large Transaction Volume Analysis
  - 1.7.3. Advantages and Challenges of Integrating Hadoop into Existing Financial Infrastructures
- 1.8. Spark Applications in Financial Analytics
  - 1.8.1. Spark for Real-Time and Batch Data Analytics
  - 1.8.2. Predictive Model Building Using Spark MLlib
  - 1.8.3. Integration of Spark with Other Big Data Tools in Finance
- 1.9. Data Security and Privacy in the Financial Sector
  - 1.9.1. Data Protection Rules and Regulations (GDPR, CCPA)
  - 1.9.2. Encryption and Access Management Strategies for Sensitive Data
  - 1.9.3. Impact of Data Breaches on Financial Institutions
- 1.10. Impact of Cloud Computing on Large-Scale Financial Analysis
  - 1.10.1. Advantages of the Cloud for Scalability and Efficiency in Financial Analysis
  - 1.10.2. Comparison of Cloud Providers and Their Specific Financial Services
  - 1.10.3. Case Studies on Migration to the Cloud in Large Financial Institutions

# Module 2. Algorithmic Trading Strategies

- 2.1. Fundamentals of Algorithmic Trading
  - 2.1.1. Algorithmic Trading Strategies
  - 2.1.2. Key Technologies and Platforms for the Development of Algorithmic Trading Algorithms
  - 2.1.3. Advantages and Challenges of Automated Trading versus Manual Trading
- 2.2. Design of Automated Trading Systems
  - 2.2.1. Structure and Components of an Automated Trading System
  - 2.2.2. Algorithm Programming: from the Idea to the Implementation
  - 2.2.3. Latency and Hardware Considerations in Trading Systems
- 2.3. Backtesting and Evaluation of Trading Strategies
  - 2.3.1. Methodologies for Effective Backtesting of Algorithmic Strategies
  - 2.3.2. Importance of Quality Historical Data in Backtesting
  - 2.3.3. Key Performance Indicators for Evaluating Trading Strategies

- 2.4. Optimizing Strategies with Machine Learning
  - 2.4.1. Applying Supervised Learning Techniques in Strategy Improvement
  - 2.4.2. Using Particle Swarm Optimization and Genetic Algorithms
  - 2.4.3. Challenges of Overfitting in Trading Strategy Optimization
- 2.5. High Frequency Trading (HFT)
  - 2.5.1. Principles and Technologies behind HFT
  - 2.5.2. Impact of HFT on Market Liquidity and Volatility
  - 2.5.3. Common HFT Strategies and Their Effectiveness
- 2.6. Order Execution Algorithms
  - 2.6.1. Types of Execution Algorithms and Their Practical Application
  - 2.6.2. Algorithms for Minimizing the Market Impact
  - 2.6.3. Using Simulations to Improve Order Execution
- 2.7. Arbitration Strategies in Financial Markets
  - 2.7.1. Statistical Arbitrage and Price Merger in Markets
  - 2.7.2. Index and ETF Arbitrage
  - 2.7.3. Technical and Legal Challenges of Arbitrage in Modern Trading
- 2.8. Risk Management in Algorithmic Trading
  - 2.8.1. Risk Measures for Algorithmic Trading
  - 2.8.2. Integrating Risk Limits and Stop-Loss in Algorithms
  - 2.8.3. Specific Risks of Algorithmic Trading and How to Mitigate Them
- 2.9. Regulatory Aspects and Compliance in Algorithmic Trading
  - 2.9.1. Global Regulations Impacting Algorithmic Trading
  - 2.9.2. Regulatory Compliance and Reporting in an Automated Environment
  - 2.9.3. Ethical Implications of Automated Trading
- 2.10. Future of Algorithmic Trading and Emerging Trends
  - 2.10.1. Impact of Artificial Intelligence on the Future Development of Algorithmic Trading
  - 2.10.2. New Blockchain Technologies and Their Application in Algorithmic Trading
  - 2.10.3. Trends in Adaptability and Customization of Trading Algorithms

# tech 20 | Structure and Content

### Module 3. Ethical and Regulatory Aspects of AI in Finance

- 3.1. Ethics in Artificial Intelligence Applied to Finance
  - 3.1.1. Fundamental Ethical Principles for the Development and Use of Al in Finance
  - 3.1.2. Case Studies on Ethical Dilemmas in Financial Al Applications
  - 3.1.3. Developing Ethical Codes of Conduct for Financial Technology Professionals
- 3.2. Global Regulations Affecting the Use of AI in Financial Markets
  - 3.2.1. Overview of the Main International Financial Regulations on Al
  - 3.2.2. Comparison of Al Regulatory Policies among Different Jurisdictions
  - 3.2.3. Implications of AI Regulation on Financial Innovation
- 3.3. Transparency and Explainability of Al Models in Finance
  - 3.3.1. Importance of Transparency in Al Algorithms for User Confidence
  - 3.3.2. Techniques and Tools to Improve the Explainability of Al Models
  - 3.3.3. Challenges of Implementing Interpretable Models in Complex Financial Environments
- 3.4. Risk Management and Ethical Compliance in the Use of Al
  - 3.4.1. Risk Mitigation Strategies Associated with the Deployment of Al in Finance
  - 3.4.2. Ethics Compliance in the Development and Application of Al Technologies
  - 3.4.3. Ethical Oversight and Audits of Al Systems in Financial Operations
- 3.5. Social and Economic Impact of AI in Financial Markets
  - 3.5.1. Effects of AI on the Stability and Efficiency of Financial Markets
  - 3.5.2. All and Its Impact on Employment and Professional Skills in Finance
  - 3.5.3. Benefits and Social Risks of Large-Scale Financial Automation
- 3.6. Data Privacy and Protection in Al Financial Applications
  - 3.6.1. Data Privacy Regulations Applicable to Al Technologies in Finance
  - 3.6.2. Personal Data Protection Techniques in Al-Based Financial Systems
  - 3.6.3. Challenges in Managing Sensitive Data in Predictive and Analytics Models
- 3.7. Algorithmic Bias and Fairness in Al Financial Models
  - 3.7.1. Identification and Mitigation of Bias in Financial Al Algorithms
  - 3.7.2. Strategies to Ensure Fairness in Automated Decision-Making Models
  - 3.7.3. Impact of Algorithmic Bias on Financial Inclusion and Equity





# Structure and Content | 21 tech

- 3.8. Challenges of Regulatory Oversight in Financial Al
  - 3.8.1. Difficulties in the Supervision and Control of Advanced Al Technologies
  - 3.8.2. Role of Financial Authorities in the Ongoing Supervision of Al
  - 3.8.3. Need for Regulatory Adaptation in the Face of Advancing Al Technology
- 3.9. Strategies for Responsible Development of Al Technologies in Finance
  - 3.9.1. Best Practices for Sustainable and Responsible Al Development in the Financial Sector
  - 3.9.2. Initiatives and Frameworks for Ethical Assessment of AI Projects in Finance
  - 3.9.3. Collaboration between Regulators and Businesses to Encourage Responsible Practices
- 3.10. Future of Al Regulation in the Financial Sector
  - 3.10.1. Emerging Trends and Future Challenges in Al Regulation in Finance
  - 3.10.2. Preparation of Legal Frameworks for Disruptive Innovations in Financial Technology
  - 3.10.3. International Dialogue and Cooperation for Effective and Unified Regulation of AI in Finance



You will be prepared to make informed and strategic decisions, enhancing your employability and leadership potential in an increasingly digitized and data-driven environment. What are you waiting for to enroll"





# tech 24 | Methodology

# Case Study to contextualize all content

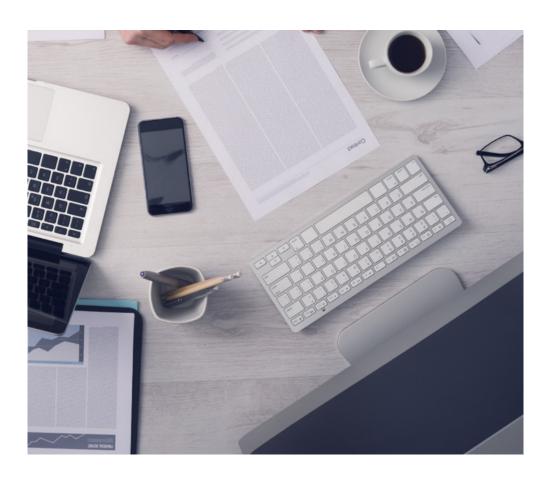
Our program offers a revolutionary approach to developing skills and knowledge. Our goal is to strengthen skills in a changing, competitive, and highly demanding environment.



At TECH, you will experience a learning methodology that is shaking the foundations of traditional universities around the world"



You will have access to a learning system based on repetition, with natural and progressive teaching throughout the entire syllabus.



The student will learn to solve complex situations in real business environments through collaborative activities and real cases.

# A learning method that is different and innovative

This TECH program is an intensive educational program, created from scratch, which presents the most demanding challenges and decisions in this field, both nationally and internationally. This methodology promotes personal and professional growth, representing a significant step towards success. The case method, a technique that lays the foundation for this content, ensures that the most current economic, social and professional reality is taken into account.



Our program prepares you to face new challenges in uncertain environments and achieve success in your career"

The case method has been the most widely used learning system among the world's leading Information Technology schools for as long as they have existed. The case method was developed in 1912 so that law students would not only learn the law based on theoretical content. It consisted of presenting students with real-life, complex situations for them to make informed decisions and value judgments on how to resolve them. In 1924, Harvard adopted it as a standard teaching method.

What should a professional do in a given situation? This is the question that you are presented with in the case method, an action-oriented learning method. Throughout the course, students will be presented with multiple real cases. They will have to combine all their knowledge and research, and argue and defend their ideas and decisions.



# Relearning Methodology

TECH effectively combines the Case Study methodology with a 100% online learning system based on repetition, which combines different teaching elements in each lesson.

We enhance the Case Study with the best 100% online teaching method: Relearning.

In 2019, we obtained the best learning results of all online universities in the world.

At TECH you will learn using a cutting-edge methodology designed to train the executives of the future. This method, at the forefront of international teaching, is called Relearning.

Our university is the only one in the world authorized to employ this successful method. In 2019, we managed to improve our students' overall satisfaction levels (teaching quality, quality of materials, course structure, objectives...) based on the best online university indicators.



# Methodology | 27 tech

In our program, learning is not a linear process, but rather a spiral (learn, unlearn, forget, and re-learn). Therefore, we combine each of these elements concentrically. This methodology has trained more than 650,000 university graduates with unprecedented success in fields as diverse as biochemistry, genetics, surgery, international law, management skills, sports science, philosophy, law, engineering, journalism, history, and financial markets and instruments. All this in a highly demanding environment, where the students have a strong socio-economic profile and an average age of 43.5 years.

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

From the latest scientific evidence in the field of neuroscience, not only do we know how to organize information, ideas, images and memories, but we know that the place and context where we have learned something is fundamental for us to be able to remember it and store it in the hippocampus, to retain it in our long-term memory.

In this way, and in what is called neurocognitive context-dependent e-learning, the different elements in our program are connected to the context where the individual carries out their professional activity.

This program offers the best educational material, prepared with professionals in mind:



### **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.

These contents are then applied to the audiovisual format, to create the TECH online working method. All this, with the latest techniques that offer high quality pieces in each and every one of the materials that are made available to the student.



### 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 in future difficult decisions.



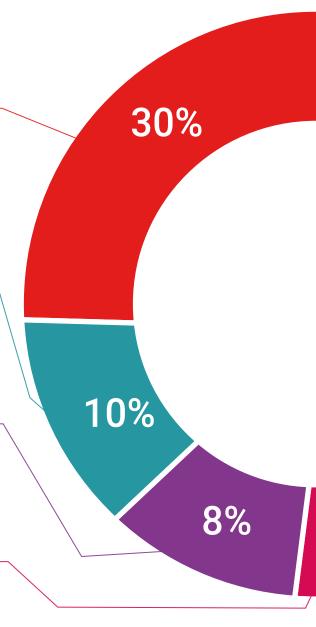
### **Practising Skills and Abilities**

They will carry out activities to develop specific skills and abilities in each subject area. Exercises and activities to acquire and develop the skills and abilities that a specialist needs to develop in the context of the globalization that we are experiencing.



### **Additional Reading**

Recent articles, consensus documents and international guidelines, among others. In TECH's virtual library, students will have access to everything they need to complete their course.





Students will complete a selection of the best case studies chosen specifically for this program. Cases that are presented, analyzed, and supervised by the best specialists in the world.



### **Interactive Summaries**

The TECH team presents the contents attractively and dynamically in multimedia lessons that include audio, videos, images, diagrams, and concept maps in order to reinforce knowledge.

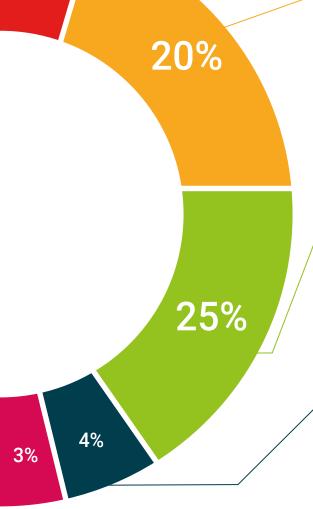


This exclusive educational system for presenting multimedia content was awarded by Microsoft as a "European Success Story".

## **Testing & Retesting**

We periodically evaluate and re-evaluate students' knowledge throughout the program, through assessment and self-assessment activities and exercises, so that they can see how they are achieving their goals.









# tech 32 | Certificate

This private qualification will allow you to obtain a **Postgraduate Diploma in Data Processing and Trading with Artificial Intelligence** 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.

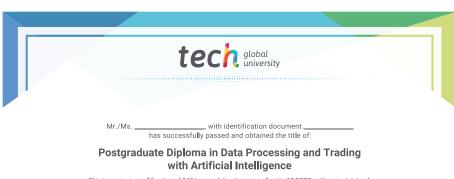
This **TECH Global University** private qualification is a European program of continuing education and professional updating that guarantees the acquisition of competencies in its area of knowledge, providing a high curricular value to the student who completes the program.

Title: Postgraduate Diploma in Data Processing and Trading with Artificial Intelligence

Modality: online

Duration: 12 months

Accreditation: 18 ECTS



This is a private qualification of 540 hours of duration equivalent to 18 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



tech, global university

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