

# Postgraduate Diploma Data Analysis with Python



## Postgraduate Diploma Data Analysis with Python

- » Modality: online
- » Duration: 6 months
- » Certificate: TECH Global University
- » Credits: 24 ECTS
- » Schedule: at your own pace
- » Exams: online

Website: [www.techtitute.com/us/information-technology/postgraduate-diploma/postgraduate-diploma-data-analysis-python](http://www.techtitute.com/us/information-technology/postgraduate-diploma/postgraduate-diploma-data-analysis-python)

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# 01

# Introduction

Data Analysis with Python offers a variety of benefits that make it a fundamental tool in the field of data science and business decision making. The versatility and simplicity of the Python language allows analysts to manipulate and explore data sets efficiently, facilitating the identification of patterns and trends. In addition, the wide range of specialized libraries, such as NumPy, Pandas and Matplotlib, enhances statistical analysis, data cleaning and visualization capabilities, making it easy to interpret results in a clear and understandable way. For this reason, TECH has developed this comprehensive 100% online program, based on the innovative *Relearning* methodology.



“

*With this 100% online Postgraduate Diploma, you will gain a solid foundation in the use of Python for data science and analysis, including the configuration of development environments and the use of essential libraries”*

Data Analysis with Python is indispensable in business and science due, first, to its specialized libraries, such as Pandas, NumPy and Matplotlib, providing a robust and versatile platform to efficiently manipulate, visualize and analyze data. In addition, the active Python community is constantly contributing new libraries and resources, keeping pace with trends in data analysis.

This is how this Postgraduate Diploma was born, which will offer an extensive program focused on the development of key competencies for efficient data management and analysis. In this way, the professionals will focus on the fundamentals, covering from variables and data types, to control structures and best coding practices.

Likewise, the computer scientist will delve into data structures and advanced functions, addressing file management and modeling techniques in Python. In this context, the practical application of structures, such as arrays and dictionaries, along with function handling and efficient file processing will be emphasized. Not to mention the advanced use of NumPy, Pandas and Matplotlib, providing advanced skills in *arrays* manipulation, efficient structured data handling and advanced visualization techniques.

Finally, the syllabus will address advanced data management with NumPy and Pandas, with a focus on performance and storage optimization strategies. In this way, data loading and warehousing from various sources, advanced cleansing and transformation strategies, as well as time series and complex data analysis will be covered.

TECH will provide experts with an adaptable certification, giving them greater autonomy to manage their periods of participation, making it easier for them to reconcile their day-to-day responsibilities, whether personal or work-related. This method will be based on the *Relearning* methodology, which involves the repetition of key concepts to enhance the assimilation of the contents.

This **Postgraduate Diploma in Data Analysis with Python** contains the most complete and up-to-date program on the market. The most important features include:

- ♦ Practical cases studies are presented by experts in Data Analysis with Python
- ♦ The graphic, schematic and practical contents of the book provide theoretical and practical information on those 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 master Data Analytics with Python, streamlining the analysis process and improving the quality and interpretation of information, giving organizations a significant competitive advantage”*

“

*From basic operations, to advanced visualization techniques, you will acquire skills to perform advanced data analysis and effective visualizations. What are you waiting for to enroll?"*

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 academic year. For this purpose, the students will be assisted by an innovative interactive video system created by renowned and experienced experts.

*You will delve into advanced data management with NumPy and Pandas, with an emphasis on performance and storage optimization strategies, thanks to didactic resources at the forefront of technology and education.*

*Bet on TECH! You will cover fundamental aspects such as variables and control structures, as well as advanced techniques such as the use of IPython and Jupyter Notebooks.*



# 02 Objectives

The main objectives of this academic program are to provide graduates with the necessary skills and knowledge to lead in the field of data analysis. Through a comprehensive approach, the program will cultivate diverse competencies, from basic fundamentals to more advanced techniques, providing computer scientists with the essential tools to face real challenges in data science. And, in addition to fostering mastery of key libraries such as NumPy, Pandas and Matplotlib, the program will promote coding practices and the efficient use of tools such as Jupyter Notebooks.





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*This Postgraduate Diploma is not only an investment in your knowledge, but also a gateway to new opportunities in the field of Data Analysis with Python”*



## General Objectives

- Teach the configuration and use of data development tools and environments
- Develop skills in data management and analysis with Python
- Delve into the use of data structures and functions in Python
- Acquire skills in advanced file handling and modeling in Python
- Learn advanced data visualization techniques with Matplotlib
- Develop skills in advanced data management with NumPy and Pandas
- Learn performance optimization and data warehousing strategies
- Delve into advanced data management with NumPy and Pandas



*Upon completion of this program, you will be equipped to perform advanced data analysis and tackle complex issues strategically and creatively, excelling as a professional*





## Specific Objectives

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### Module 1. Data Processing and *Big Data* with Python

- ◆ Handle flow control techniques and data handling functions
- ◆ Promote best practices for coding and error handling in Python
- ◆ Use essential Python data libraries

### Module 2. Data Structures and Functions in Python

- ◆ Create and use advanced functions
- ◆ Read and write files and their processing
- ◆ Apply different data structures in a practical way

### Module 3. Data Handling in Python with NumPy and Pandas

- ◆ Create and manipulate Arrays with NumPy
- ◆ Promote proficiency in data visualization with Matplotlib
- ◆ Use Pandas for structured data handling

### Module 4. Advanced Techniques and Practical Applications in NumPy and Pandas

- ◆ Develop expertise in loading and storing data from and to various sources
- ◆ Instruct in advanced data cleansing and transformation strategies
- ◆ Promote competencies in analysis and manipulation of time series and complex data

# 03

# Course Management

The faculty is strongly committed to academic excellence and knowledge sharing and is composed of data analytics experts with extensive practical experience in the field. Thanks to their guidance, graduates will not only acquire advanced technical skills in Python, NumPy, Pandas and Matplotlib, but will also benefit from the practical wisdom and valuable insights that only experienced professionals can provide.





“

*The faculty of this Postgraduate Diploma will guide you to success in the field of Data Analysis with Python”*

## Management



### Mr. Matos Rodríguez, Dionis

- ♦ *Data Engineer* at Wide Agency Sadexo
- ♦ *Data Consultant* at Tokiota
- ♦ *Data Engineer* at Devoteam
- ♦ *BI Developer* at Ibermática
- ♦ *Applications Engineer* at Johnson Controls
- ♦ *Database Developer* at Suncapital España
- ♦ *Senior Web Developer* at Deadlock Solutions
- ♦ *QA Analyst* at Metaconcept
- ♦ Professional Master's Degree in *Big Data & Analytics* by the EAE Business School
- ♦ Professional Master's Degree in Systems Analysis and Design
- ♦ Bachelor's Degree in Computer Engineering from APEC University

## Professors

### Mr. Villar Valor, Javier

- ◆ Director and Founding Partner of Impulsa2
- ◆ Chief Operations Officer (COO) at Summa Insurance Brokers
- ◆ Director of Transformation and Operational Excellence at Johnson Controls
- ◆ Professional Masters Degree in Professional Coaching
- ◆ Executive MBA from Emlyon Business School, France
- ◆ Professional Master's Degree in Quality Management from EOI, Spain
- ◆ Computer Engineering from the University Action Pro-Education and Culture (UNAPEC)

### Mr. Gil Contreras, Armando

- ◆ Lead Big Data Scientist at Jhonson Controls
- ◆ Data Scientist-Big Data at Opensistemas S.A
- ◆ Fund Auditor at Creatividad y Tecnología S.A. (CYTSA)
- ◆ Public Sector Auditor at PricewaterhouseCoopers Auditores
- ◆ Professional Master's Degree in Data Science at University Center of Technology and Art
- ◆ Professional Máster Degree MBA in International Relations and Business from the Center for Financial Studies (CEF)
- ◆ Bachelor's Degree in Economics from the Technological Institute of Santo Domingo

### Ms. Gil Contreras, Milagros

- ◆ Content Creator at MPCTech LLC
- ◆ Project Manager
- ◆ Freelance IT Writer
- ◆ MBA from the Complutense University of Madrid
- ◆ Degree/Graduate in Business Administration from the Technological Institute of Santo Domingo

### Mr. Delgado Panadero, Ángel

- ◆ ML Engenieer at Paradigma Digital
- ◆ Computer Vision Engineer at NTT Disruption
- ◆ Data Scientist at Singular People
- ◆ Data Analyst at Parclick
- ◆ Specialist in Data Engineering on GPC
- ◆ Specialist in Deep Learning
- ◆ Degree in Physics at the University of Salamanca

### Ms. Delgado Feliz, Benedit

- ◆ Administrative Assistant and Electronic Surveillance Operator for the National Drug Control Directorate (DNCD)
- ◆ Customer Service at Cáceres y Equipos
- ◆ Claims and Customer Service at Express Parcel Services (EPS)
- ◆ Microsoft Office Specialist at the National School of Informatics (Escuela Nacional de Informática)
- ◆ Social Communicator from the Catholic University of Santo Domingo



*Take the opportunity to learn about the latest advances in this field in order to apply it to your daily practice"*

# 04

# Structure and Content

The content has been meticulously designed, from essential fundamentals to advanced techniques, for professionals to acquire robust Python skills. Through immersion in vital libraries, such as NumPy, Pandas and Matplotlib, graduates will not only gain technical skills, but also develop the ability to approach complex challenges with creativity and confidence. In this regard, the program will also seek to cultivate an analytical mindset, foster best practices, and provide students with a deep understanding of how to apply these skills in real-world scenarios.





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*Dive into the fascinating world of Data Analytics with Python, and equip yourself with the tools and insights needed to excel in a data-driven era”*

## Module 1. Data Processing and *Big Data* with Python

- 1.1. Using Python on Data
  - 1.1.1. Python in Data Science and Analysis
  - 1.1.2. Essential Libraries for Data
  - 1.1.3. Applications and Examples
- 1.2. Setting Up the Python Development Environment
  - 1.2.1. Python Installation and Tools
  - 1.2.2. Configuration of Virtual Environments
  - 1.2.3. Integrated Development Tools (IDE)
- 1.3. Variables, Data Types and Operators in Python
  - 1.3.1. Variables and Primitive Data Types
  - 1.3.2. Data Structures
  - 1.3.3. Arithmetic and Logical Operators
- 1.4. Flow Control: Conditionals and Loops
  - 1.4.1. Conditional Control Structures (if, else, elif)
  - 1.4.2. Loops (for, while) and Flow Control
  - 1.4.3. List Comprehensions and Generator Expressions
- 1.5. Functions and Modularity with Python
  - 1.5.1. Use of Functions
  - 1.5.2. Parameters, Arguments and Return Values
  - 1.5.3. Modularity and Code Reuse
- 1.6. Error and Exception Handling with Python
  - 1.6.1. Errors and Exceptions
  - 1.6.2. Exception Handling with Try-Except
  - 1.6.3. Creating Custom Exceptions
- 1.7. IPython Tool
  - 1.7.1. IPython Tool
  - 1.7.2. Using IPython for Data Analysis
  - 1.7.3. Differences with the Standard Python Interpreter
- 1.8. Jupyter Notebooks
  - 1.8.1. Jupyter Notebooks
  - 1.8.2. Use of Notebooks for Data Analysis
  - 1.8.3. Publication of Jupyter Notebooks



- 1.9. Python Coding Best Practices
  - 1.9.1. Style and Conventions (WBS 8)
  - 1.9.2. Documentation and Comments
  - 1.9.3. Testing and Debugging Strategies
- 1.10. Python Resources and Communities
  - 1.10.1. Online Resources and Documentation
  - 1.10.2. Communities and Forums
  - 1.10.3. Learning and Updating in Python

## Module 2. Data Structures and Functions in Python

- 2.1. Sets in Python
  - 2.1.1. Operations and Methods
  - 2.1.2. Differences and Practical Application
  - 2.1.3. Iteration and Comprehensions
- 2.2. Dictionaries and their Use in Python
  - 2.2.1. Dictionary Creation and Manipulation
  - 2.2.2. Data Access and Management
  - 2.2.3. Patterns and Advanced Techniques
- 2.3. List and Dictionary Comprehensions in Python
  - 2.3.1. Syntax and Examples
  - 2.3.2. Efficiency and Readability
  - 2.3.3. Practical Applications
- 2.4. Functions on Data in Python
  - 2.4.1. Creating Functions
  - 2.4.2. Scope and Namespace
  - 2.4.3. Anonymous and Lambda Functions
- 2.5. Function Arguments and Return Values in Python
  - 2.5.1. Positional and Named Arguments
  - 2.5.2. Multiple Return Values
  - 2.5.3. Variable and Keyword Arguments
- 2.6. Lambda Functions and Higher-Order Functions in Python
  - 2.6.1. Use of Lambda Functions
  - 2.6.2. Map, Filter and Reduce Functions
  - 2.6.3. Data Processing Applications

- 2.7. File Handling in Python
  - 2.7.1. Reading and Writing Files
  - 2.7.2. Handling Binary and Text Files
  - 2.7.3. Best Practices and Exception Handling
- 2.8. Reading and Writing Text and Binary Files in Python
  - 2.8.1. File Formats and Encoding
  - 2.8.2. Handling Large Files
  - 2.8.3. Serialization and Deserialization (JSON, pickle)
- 2.9. Contexts and File Operations
  - 2.9.1. Using the Context Manager (with)
  - 2.9.2. File Processing Techniques
  - 2.9.3. Security and Error Handling
- 2.10. Python Modeling Libraries
  - 2.10.1. Scikit-learn
  - 2.10.2. TensorFlow
  - 2.10.3. PyTorch

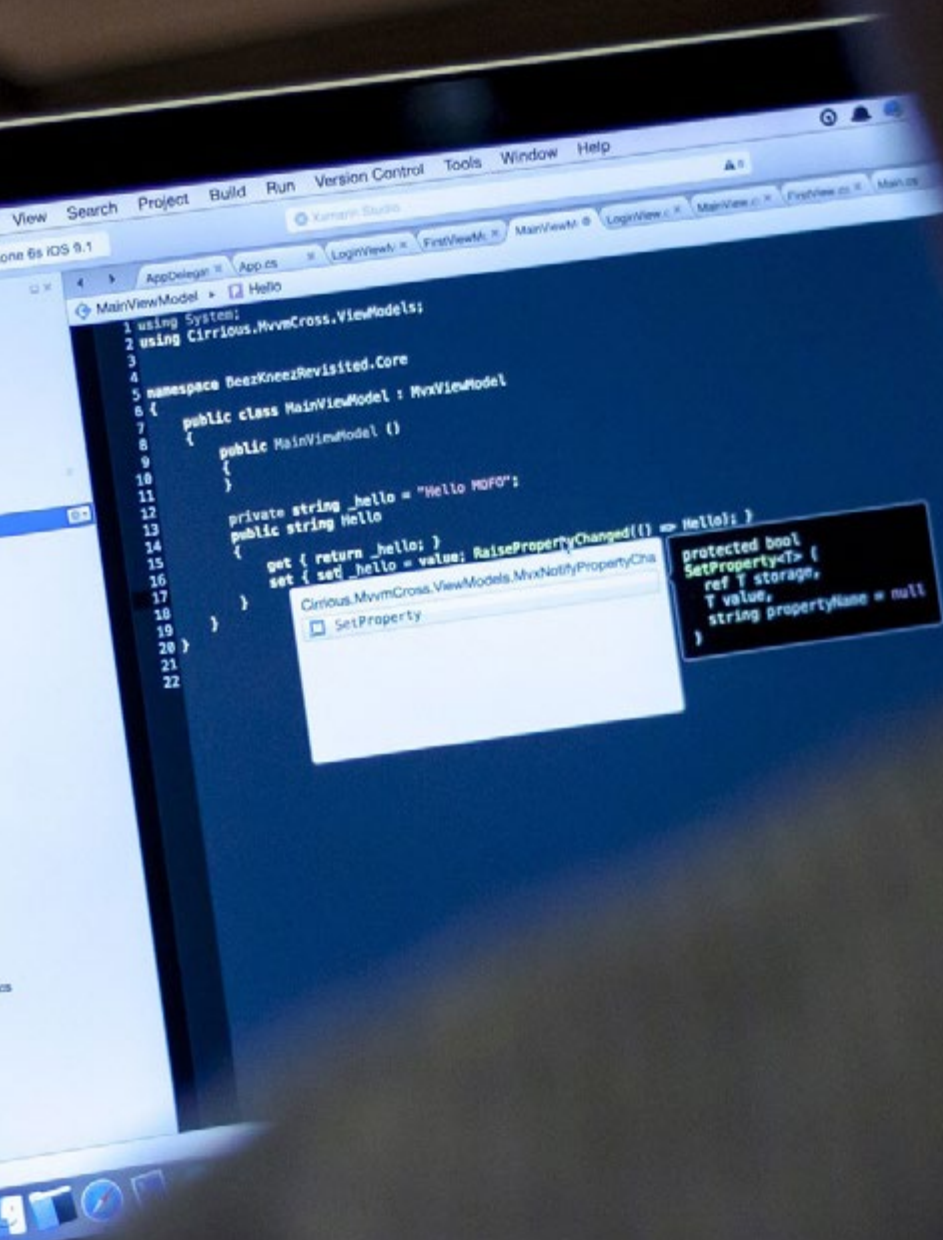
## Module 3. Data Handling in Python with NumPy and Pandas

- 3.1. Creating and Manipulating Arrays in NumPy
  - 3.1.1. NumPy
  - 3.1.2. Basic Operations with Arrays
  - 3.1.3. Arrays Manipulation and Transformation
- 3.2. Vectorized Operations with Arrays
  - 3.2.1. Vectorization
  - 3.2.2. Universal Functions (ufunc)
  - 3.2.3. Efficiency and Performance
- 3.3. Indexing and Segmentation in NumPy
  - 3.3.1. Access to Elements and Slicing
  - 3.3.2. Advanced and Boolean Indexing
  - 3.3.3. Reordering and Selection
- 3.4. Pandas Series and DataFrames
  - 3.4.1. Pandas
  - 3.4.2. Data Structures in Pandas
  - 3.4.3. DataFrames Manipulation

- 3.5. Indexing and Selection in Pandas
  - 3.5.1. Access to Data in Series and DataFrames
  - 3.5.2. Selection and Filtering Methods
  - 3.5.3. Use of `loc` e `iloc`
- 3.6. Operations with Pandas
  - 3.6.1. Arithmetic Operations and Alignment
  - 3.6.2. Aggregation and Statistics Functions
  - 3.6.3. Transformations and Application of Functions
- 3.7. Handling Incomplete Data in Pandas
  - 3.7.1. Detection and Handling of Null Values
  - 3.7.2. Filling and Elimination of Incomplete Data
  - 3.7.3. Strategies for Handling Incomplete Data
- 3.8. Strategies for Handling Incomplete Data
  - 3.8.1. Concatenation and Data Merging
  - 3.8.2. Grouping and Aggregation (`groupby`)
  - 3.8.3. Pivot Tables and Crosstabs
- 3.9. Visualization with Matplotlib
  - 3.9.1. Matplotlib
  - 3.9.2. Graphics Creation and Customization
  - 3.9.3. Integration with Pandas
- 3.10. Customizing Graphics in Matplotlib
  - 3.10.1. Styles and Settings
  - 3.10.2. Advanced Graphics (scatter, bar, etc.)
  - 3.10.3. Creating Complex Visualizations

## Module 4. Advanced Techniques and Practical Applications in NumPy and Pandas

- 4.1. Loading Data from Different Sources
  - 4.1.1. Importing from CSV, Excel and Databases
  - 4.1.2. Reading Data from APIs and Web
  - 4.1.3. Big Data Management Strategies
- 4.2. Data Storage in Python
  - 4.2.1. Exporting to Different Formats
  - 4.2.2. Storage Efficiency
  - 4.2.3. Data Security and Privacy
- 4.3. Data Cleansing Strategies in Python
  - 4.3.1. Identification and Correction of Inconsistencies
  - 4.3.2. Data Normalization and Transformation
  - 4.3.3. Automation of Cleaning Processes
- 4.4. Advanced Data Transformation in Pandas
  - 4.4.1. Manipulation and Transformation Techniques
  - 4.4.2. Combining and Restructuring `DataFrames`
  - 4.4.3. Use of Regular Expressions in Pandas
- 4.5. Combination of `DataFrames` in Pandas
  - 4.5.1. *Merge*, *Join* and Concatenation
  - 4.5.2. Handling of Conflicts and Keys
  - 4.5.3. Efficient Combination Strategies
- 4.6. Advanced Transformation and Pivoting of Data in Pandas
  - 4.6.1. *Pivot* and *Melt*
  - 4.6.2. *Reshaping* and Transposition Techniques
  - 4.6.3. Applications in Data Analysis



- 4.7. Time Series in Pandas
  - 4.7.1. Handling of Dates and Times
  - 4.7.2. Resampling and Window Functions
  - 4.7.3. Trend and Seasonality Analysis
- 4.8. Advanced Index Management in Pandas
  - 4.8.1. Multilevel and Hierarchical Indexes
  - 4.8.2. Advanced Selection and Manipulation
  - 4.8.3. Query Optimization
- 4.9. Performance Optimization Strategies
  - 4.9.1. Speed and Efficiency Improvements
  - 4.9.2. Use of Cython and Numba
  - 4.9.3. Parallelization and Distributed Processing
- 4.10. Practical Data Manipulation Projects
  - 4.10.1. Development of Real Examples of Use
  - 4.10.2. Integration of Python Techniques
  - 4.10.3. Strategies for Solving Complex Data Problems

“

*This program represents not only an investment in knowledge, but an exciting opportunity to transform your full potential into Postgraduate Diploma qualification”*

# 05 Methodology

This academic program offers students a different way of learning. Our methodology uses a cyclical learning approach: **Relearning**.

This teaching system is used, for example, in the most prestigious medical schools in the world, and major publications such as the **New England Journal of Medicine** have considered it to be one of the most effective.





*Discover Relearning, a system that abandons conventional linear learning, to take you through cyclical teaching systems: a way of learning that has proven to be extremely effective, especially in subjects that require memorization"*

## 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.

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*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.



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.





#### Case Studies

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.



# 06 Certificate

The Postgraduate Diploma in with Data Analysis with Python guarantees students, in addition to the most rigorous and up-to-date education, access to a qualification 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 program will allow you to obtain your **Postgraduate Diploma in Data Analysis with Python** 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.

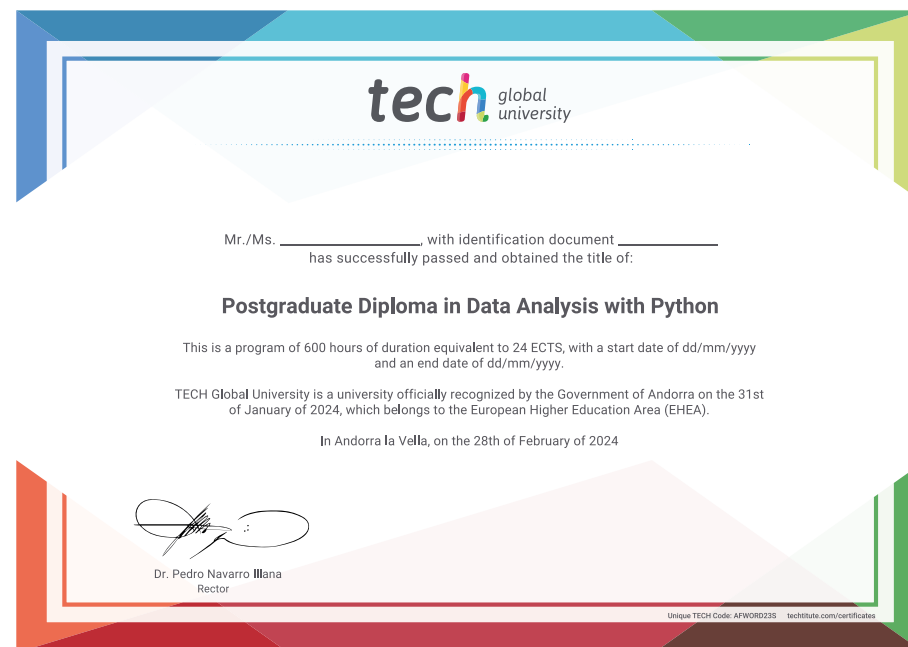
This **TECH Global University** title is a European program of continuing education and professional updating that guarantees the acquisition of competencies in its area of knowledge, providing a high curricular value to the student who completes the program.

Title: **Postgraduate Diploma in Data Analysis with Python**

Modality: **online**

Duration: **6 months**

Accreditation: **24 ECTS**



\*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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