Postgraduate Diploma
Deep Learning

tech technological university

tech technological university

Postgraduate Diploma
Deep Learning

- Modality: **online**
- Duration: **6 months**
- Certificate: **TECH Technological University**
- Dedication: **16h/week**
- Schedule: **at your own pace**
- Exams: **online**

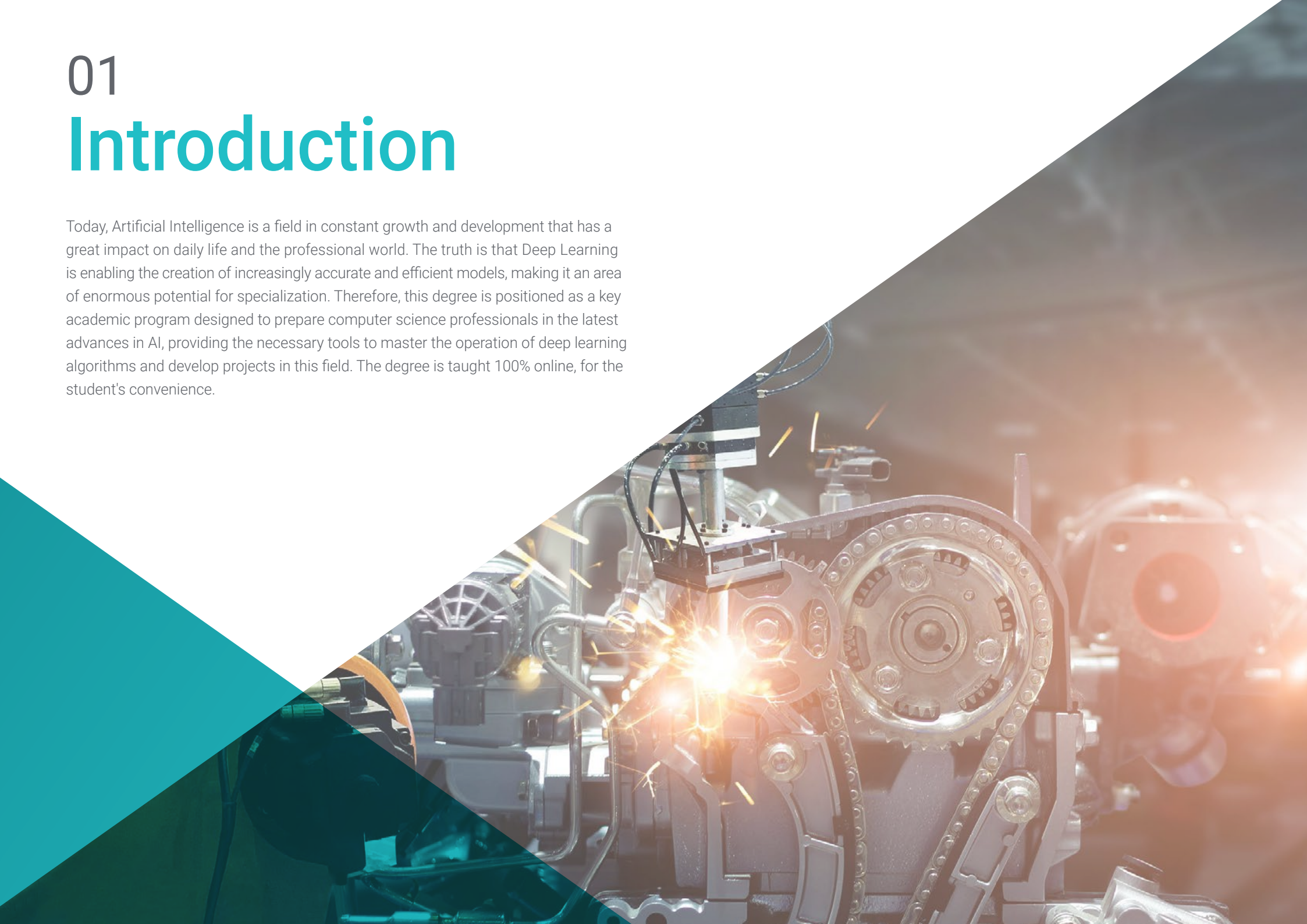
Website: www.techtitute.com/pk/information-technology/postgraduate-diploma/postgraduate-diploma-deep-learning

Index

01

Introduction

Today, Artificial Intelligence is a field in constant growth and development that has a great impact on daily life and the professional world. The truth is that Deep Learning is enabling the creation of increasingly accurate and efficient models, making it an area of enormous potential for specialization. Therefore, this degree is positioned as a key academic program designed to prepare computer science professionals in the latest advances in AI, providing the necessary tools to master the operation of deep learning algorithms and develop projects in this field. The degree is taught 100% online, for the student's convenience.



Update yourself on the latest trends in Artificial Intelligence and specialize in creating advanced models with the University Expert in Deep Learning"

Artificial Intelligence is one of the most promising areas in the world of technology and is rapidly transforming the world. Deep Learning is being used in more and more fields, from computer vision to machine translation, and its demand in the job market is growing rapidly. However, it entails great algorithmic complexity and, given the rapid pace of advances in this area, a large number of academic degrees have become obsolete, to the detriment of IT professionals.

Fortunately, the Postgraduate Diploma in Deep Learning is a fully updated academic program that offers a high level of preparation in the field of Artificial Intelligence, with a specific focus on Deep Learning. The degree is designed to provide students with the knowledge and skills necessary to develop projects in this area and to master the operation of deep learning algorithms. For this, they will walk through the use of TensorFlow to build custom models or the derivatives of vector functions for automatic learning, as well as explore the functionality of Hugging Face's Transformers libraries.

The course is 100% online and uses the innovative pedagogical methodology of Relearning, which is based on constant feedback and adaptation to the individual needs of students on the basis of targeted repetition. The Postgraduate Diploma in Deep Learning also offers flexibility in organizing academic resources, allowing students to adapt their educational cycle to their own needs and schedules.

This **Postgraduate Diploma in Deep Learning** contains the most complete and up-to-date program on the market. The most important features include:

- The development of case studies presented by Deep Learning experts
- The graphic, schematic and eminently practical contents of the book provide technological 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
- The availability of access to content from any fixed or portable device with an Internet connection

Dive into the fascinating world of deep learning algorithms and gain expertise that will allow you to excel in the field of Data Science"

Take the opportunity to specialize with the best professionals in Artificial Intelligence"

Benefit from cutting-edge training that will allow you to be part of the digital revolution and make a difference in your professional future.

Get updated on the architecture of neural networks and their different types to solve everyday problems through Deep Learning.

The program's teaching staff includes professionals from sector who contribute their work experience to this educational program, as well as renowned specialists from leading societies and prestigious universities.

Its 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 education programmed to learn in real situations.

The design of this program focuses on Problem-Based Learning, by means of which the professional must try to solve the different professional practice situations that are presented throughout the academic course. For this purpose, the student will be assisted by an innovative interactive video system created by renowned experts.

02

Objectives

Students who enroll in this educational proposal of 450 teaching hours will have the possibility of acquiring skills and knowledge that will significantly improve their opportunities for progression in the technological field, especially in the development of Artificial Intelligence. In order to help students achieve their goals, this academic institution provides innovative pedagogical tools that are easily accessible and has an outstanding team of professors who are leaders in Deep Learning.

Get the keys to optimize the performance of advanced AI models thanks to this Postgraduate Diploma"

General Objectives

- Support the key concepts of mathematical functions and their derivatives
- Apply these principles to deep learning algorithms for machine learning
- Examine the key concepts of Supervised Learning and how they apply to neural network models
- Analyze the training, evaluation and analysis of neural network models
- Provide a rationale for the key concepts and main applications of deep learning
- Implement and optimize neural networks with Keras
- Develop expertise in deep neural network training
- Analyze the optimization and regularization mechanisms required for deep network training

Specific objectives

Module 1. Mathematical Foundations of Deep Learning

- Develop the chain rule for calculating derivatives of nested functions
- Analyze how to create new functions from existing functions and how to calculate their derivatives
- Examine the concept of Backward Pass and how the derivatives of vector functions are applied to automatic learning
- Learn about how to use TensorFlow to build custom models
- Understand how to load and process data using TensorFlow tools
- Foundation of key concepts of NLP natural language processing with RNN and attention mechanisms
- Explore the functionality of Hugging Face's transformer libraries and other natural language processing tools for application to vision problems
- Learn to build and train autoencoder models, GANs and diffusion models
- Understand how autoencoders can be used to efficiently encode data

Module 2. Deep Learning Principles

- Analyze how linear regression works and how it can be applied to neural network models
- Fundamentals of hyperparameter optimization to improve the performance of neural network models
- Determine how the performance of neural network models can be evaluated using the training set and the test set

Module 3. Neural Networks, the basis of Deep Learning

- Analyze the architecture of neural networks and their principles of operation
- Determine how neural networks can be applied to a variety of problems
- Establish how to optimize the performance of deep learning models by tuning the hyperparameters

Evaluate the performance of neural network models by using the training set and test set"

03

Course Management

The Postgraduate Diploma in Deep Learning has a team of highly qualified and experienced teachers in the field of Artificial Intelligence. All professionals are experts in their fields and are committed to providing a high level of quality training based on academic excellence and practical experience. The teachers will accompany the students in their updating process, providing personalized attention and guiding them in their professional development.

Enjoy the support and guidance of a world-class teaching team that will give you the keys to become an AI expert"

Management

Mr. Gil Contreras, Armando

- Lead Big Data Scientist-Big Data at Jhonson Controls
- Data Scientist-Big Data at Opensistemas
- Creativity and Technology Fund Auditor and PricewaterhouseCoopers
- Lecturer at EAE Business School
- Degree in Economics from the Santo Domingo Technology Institute INTEC
- Master in Data Science at the Technology and Arts University Center
- Master MBA in International Relations and Business at the Center for Financial Studies CEF
- Postgraduate in Corporate Finance at the Santo Domingo Institute of Technology

Professors

Mr. Delgado Panadero, Angel

- ML Engenieer at Paradigma Digital
- Computer Vision Engineer at NTT Disruption
- Data Scientist at Singular People
- Data Analys at Parclick
- Tutor in the Master in Big Data and Analytics at EAE Business School
- Degree in Physics from the Salamanca University

Mr. Matos, Dionis

- Data Engineer at Wide Agency Sodexo
- Data Consultant at Tokiota Site
- Data Engineer at Devoteam Testa Home
- Business Intelligence Developer at Ibermatica Daimler
- Master Big Data and Analytics /Project Management(Minor) at EAE Business School

Mr. Villar Valor, Javier

- Director and founding partner Impulsa2
- Chief Operating Officer of Summa Insurance Brokers
- Responsible for identifying opportunities for improvement at Liberty Insurance
- Director of Transformation and Professional Excellence at Johnson Controls Iberia
- Responsible for the organization of Groupama Insurance Company
- Lean Six Sigma methodology manager at Honeywell
- Quality and Purchasing Manager at SP & PO
- Lecturer at the European Business School

04

Structure and Content

The educational program of this Postgraduate Diploma will guide students through a broad academic path from the mathematical principles of Deep Learning to the training of deep neural networks, the evaluation of deep learning models and the visualization of results. The curriculum is comprehensive and is complemented by a variety of innovative teaching resources available on the degree's Virtual Campus.

Access the curriculum with the most up-to-date and comprehensive view of Deep Learning"

Module 1. Mathematical Foundations of Deep Learning

1.1. Functions and Derivatives
  1.1.1. Linear Functions
  1.1.2. Partial Derivative
  1.1.3. Higher Order Derivatives
1.2. Nested Functions
  1.2.1. Compound Functions
  1.2.2. Inverse Functions
  1.2.3. Recursive Functions
1.3. Chain Rule
  1.3.1. Nested Function Derivatives
  1.3.2. Derivatives of Compound Functions
  1.3.3. Inverse Function Derivatives
1.4. Multiple Input Functions
  1.4.1. Multi-Variable Functions
  1.4.2. Vectorial Functions
  1.4.3. Matrix Functions
1.5. Derivatives of Multiple Input Functions
  1.5.1. Partial Derivative
  1.5.2. Directional Derivatives
  1.5.3. Mixed Derivatives
1.6. Functions with Multiple Vector Inputs
  1.6.1. Vector Linear Functions
  1.6.2. Nonlinear Vector Functions
  1.6.3. Matrix Vector Functions
1.7. Creation of New Functions from Existing Functions
  1.7.1. Function Sum
  1.7.2. Product Functions
  1.7.3. Function Composition
1.8. Derivatives of Functions with Multiple Vector Inputs
  1.8.1. Derivatives of Linear Functions
  1.8.2. Derivatives of Nonlinear Functions
  1.8.3. Derivatives of Compound Functions
1.9. Vector Functions and Their Derivatives: One Step Further
  1.9.1. Directional Derivatives
  1.9.2. Mixed Derivatives
  1.9.3. Matrix Derivatives
1.10. The Backward Pass
  1.10.1. Error Propagation
  1.10.2. Application of Update Rules
  1.10.3. Parameter Optimization

Module 2. Deep Learning Principles

2.1. Supervised Learning
  2.1.1. Supervised Learning Machines
  2.1.2. Supervised Learning Uses
  2.1.3. Differences Between Supervised and Unsupervised Learning
2.2. Supervised Learning Models
  2.2.1. Linear Models
  2.2.2. Decision Tree Models
  2.2.3. Neural Network Models
2.3. Linear Regression
  2.3.1. Simple Linear Regression
  2.3.2. Multiple Linear Regression
  2.3.3. Regression Analysis
2.4. Model Training
  2.4.1. Batch Learning
  2.4.2. Online Learning
  2.4.3. Optimization Methods
2.5. Model Evaluation: Training Set Versus Test Set
  2.5.1. Evaluation Metrics
  2.5.2. Cross Validation
  2.5.3. Comparison of Data Sets
2.6. Model Evaluation: The Code
  2.6.1. Prediction Generation
  2.6.2. Error Analysis
  2.6.3. Evaluation Metrics

2.7. Variables Analysis
- 2.7.1. Identification of Relevant Variables
- 2.7.2. Correlation Analysis
- 2.7.3. Regression Analysis

2.8. Explainability of Neural Network Models
- 2.8.1. Interpretable Models
- 2.8.2. Visualization Methods
- 2.8.3. Evaluation Methods

2.9. Optimization
- 2.9.1. Optimization Methods
- 2.9.2. Regularization Techniques
- 2.9.3. Use of Graphics

2.10. Hyperparameters
- 2.10.1. Hyperparameter Selection
- 2.10.2. Parameter Search
- 2.10.3. Hyperparameter Setting

Module 3. Neural Networks, the basis of Deep Learning

3.1. Deep Learning
- 3.1.1. Deep Learning Types
- 3.1.2. Deep Learning Applications
- 3.1.3. Advantages and Disadvantages of Deep Learning

3.2. Surgery
- 3.2.1. Sum
- 3.2.2. Product
- 3.2.3. Transfer

3.3. Layers
- 3.3.1. Input Layer
- 3.3.2. Hidden Layer
- 3.3.3. Output Layer

3.4. Layer Bonding and Operations
- 3.4.1. Architectural Design
- 3.4.2. Interlayer Connection
- 3.4.3. Forward Propagation

3.5. Construction of the First Neural Network
- 3.5.1. Network Design
- 3.5.2. Establish Weights
- 3.5.3. Network Training

3.6. Trainer and Optimizer
- 3.6.1. Optimizer Selection
- 3.6.2. Establishment of a Loss Function
- 3.6.3. Establishment of a Metric

3.7. Application of Neural Network Principles
- 3.7.1. Activation Functions
- 3.7.2. Backward Propagation
- 3.7.3. Parameter Setting

3.8. From Biological to Artificial Neurons
- 3.8.1. Functioning of a Biological Neuron
- 3.8.2. Knowledge Transfer to Artificial Neurons
- 3.8.3. Establish Relationships Between Both

3.9. Implementation of MLP (Multilayer Perceptron) with Keras
- 3.9.1. Network Structure Definition
- 3.9.2. Model Compilation
- 3.9.3. Model Training

3.10. Fine Tuning Hyperparameters for Neural Networks
- 3.10.1. Selection of the Activation Function
- 3.10.2. Setting the Learning Rate
- 3.10.3. Weight Adjustment

Specialize in the application of Fine Tuning to AI models through the innovative contents of the Postgraduate Diploma"

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.

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

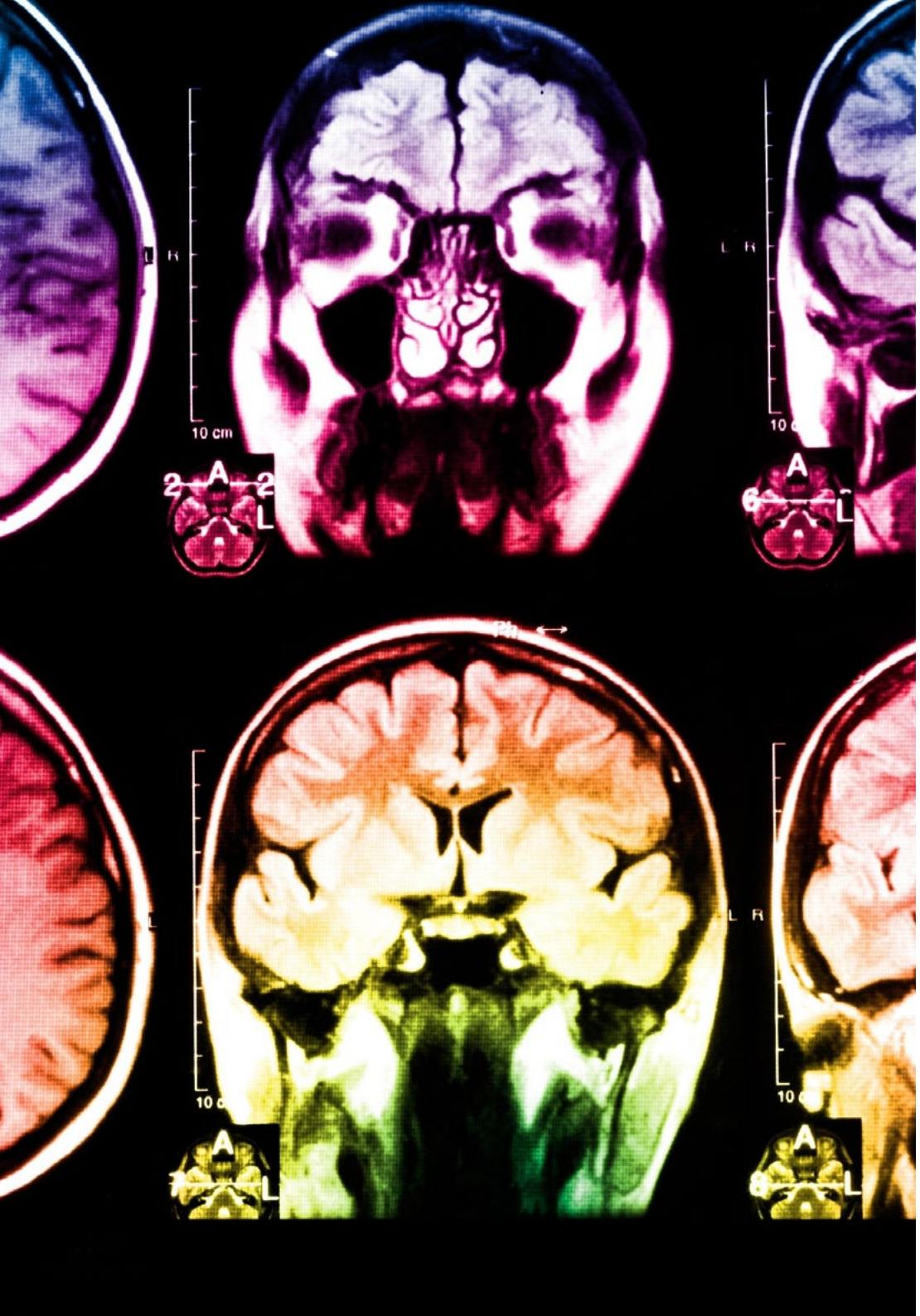
TECH effectively combines the Case Study methodology with a 100% online learning system based on repetition, which combines different teaching elements in each lesson.

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.

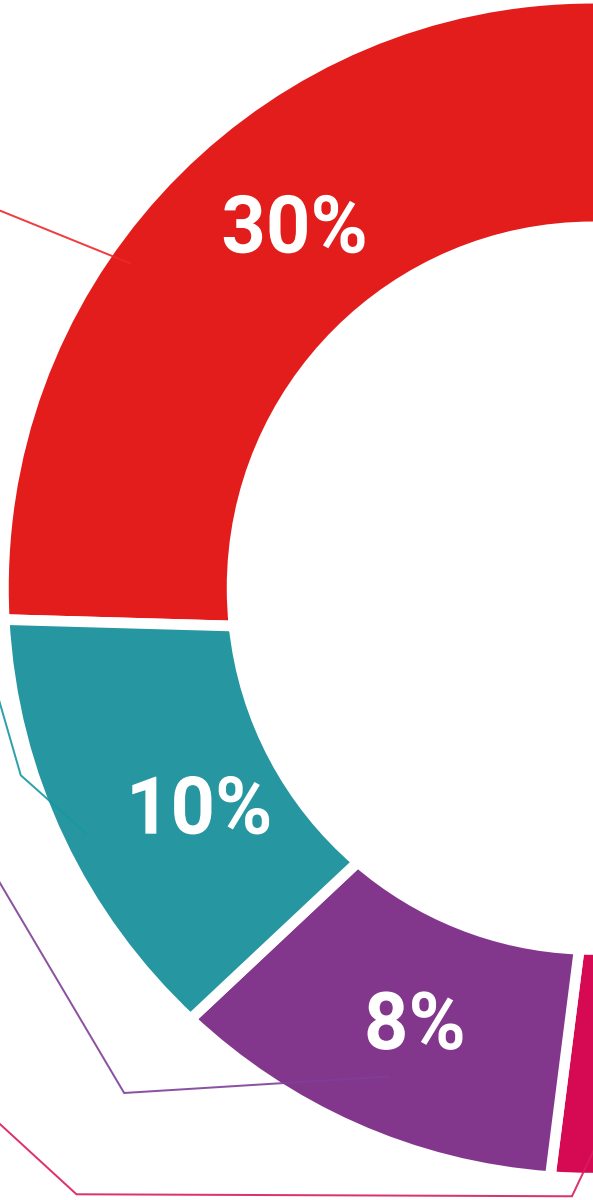
Learning from an Expert strengthens knowledge and memory, and generates confidence in future difficult decisions.

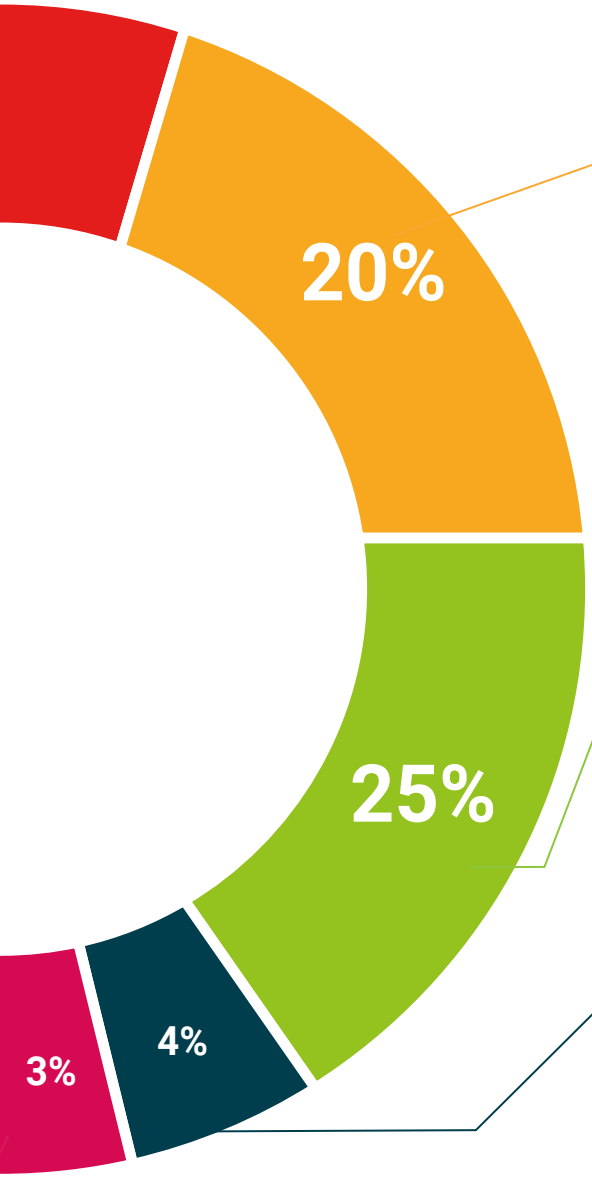
Practising Skills and Abilities

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.

05

Certificate

The Postgraduate Diploma in Deep Learning guarantees students, in addition to the most rigorous and up-to-date education, access to a Postgraduate Certificate issued by TECH Technological University.

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

This **Postgraduate Diploma in Deep Learning** contains the most complete and up-to-date program on the market.

After the student has passed the assessments, they will receive their corresponding **Postgraduate Diploma**, issued by **TECH Technological University** via tracked delivery*.

The certificate issued by **TECH Technological University** will reflect the qualification obtained in the Postgraduate Diploma, and meets the requirements commonly demanded by labor exchanges, competitive examinations, and professional career evaluation committees.

Title: **Postgraduate Diploma in Deep Learning**

Official Nº of Hours: **450 h.**


tech technological university

Awards the followi ng

CERTIFICATE

to

Mr./Ms. _____, with identification number _____ .

For having passed and accredited the following progra m

POSTGRADUATE DIPLOMA

in

Deep Learning

This is a qualification awarded by this University, equivalent to 500 hours, with a start date of dd/mm/yyyy and an end date of dd/mm/yyyy .

TECH is a Private Institution of Higher Education recognized by the Ministry of Public Education as of June 28, 2018.

June 17, 2020

Tere Guevara Navarr o

Dean

Unique TECH Code: AFWORD23S techtitute.com/certificates

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

tech technological university

Postgraduate Diploma
Deep Learning

- Modality: **online**
- Duration: **6 months**
- Certificate: **TECH Technological University**
- Dedication: **16h/week**
- Schedule: **at your own pace**
- Exams: **online**

Postgraduate Diploma
Deep Learning

tech technological university