Postgraduate Diploma
Deep Learning

tech technological university

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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/in/engineering/postgraduate-diploma/postgraduate-diploma-deep-learning**

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01

Introduction

According to a LinkedIn report, Deep Learning is the number one skill on the list of technical skills that employers are currently looking for. Therefore, it has applications in a variety of areas, from medicine to the automotive industry. For example, in the automotive industry, it is used for real-time object detection and recognition in driver assistance systems. For this reason, TECH has assembled a team of experts in Deep Learning to compile the most cutting-edge tools so that the engineer can be up-to-date in neural networks as the basis of this area. Thanks to its 100% online format, students will not have to attend on-site classes or fixed schedules, and will be able to distribute the course load at their own pace.

Thanks to the solid knowledge provided by this program, you will enter into this important branch of artificial intelligence focused on the construction of algorithms inspired by the functioning of the human brain with an effective methodology and in a 100% online format"

Deep Learning is one of the main technologies behind artificial intelligence and has driven many advances in fields such as computer vision, natural language processing and robotics. For example, Amazon Alexa's voice recognition technology has a 95% accuracy rate based on this branch of AI. Therefore, it can be used to solve important problems in society, such as the early detection of diseases, the forecasting of natural disasters and the fight against climate change. For example, Deep Learning has been used to forecast the melting of glaciers with an accuracy of 96%.

In this context, TECH has designed a comprehensive program in which students will delve into the principles of Deep Learning and delve into its mathematical foundations. Therefore, taking this program is an excellent option for professional growth due to the growing demand for professionals qualified in the area, the increase in investment in AI, its diverse applications, the resources and support communities available, the intellectual challenge it presents, and its potential for innovation.

And to facilitate student learning, TECH has created this complete program based on the exclusive Relearning methodology. A teaching process designed for the graduate to integrate the fundamental concepts in a progressive and natural way through repetition. This way, they will acquire the necessary competencies by adjusting the study to their life style.

All this is presented in a totally online format. In this way, the professional focuses only on their learning, without the need to travel or adjust to a pre-established timing. In addition, you can access the theoretical and practical content from anywhere and at any time, you only need a device with an Internet connection.

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 experts in Deep Learning
- 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

Specialize in a booming sector with great projection and you will be able to excel in a wide variety of applications, such as computer vision, natural language processing, robotics and voice recognition"

With the Relearning methodology you will acquire knowledge progressively and with total flexibility. A program that adapts to you"

Combine your personal and work responsibilities with your studies thanks to this Postgraduate Diploma. 100% flexible and online.

Learn how to perform evaluation metrics and determine Deep Learning optimization methods thanks to this exclusive program.

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

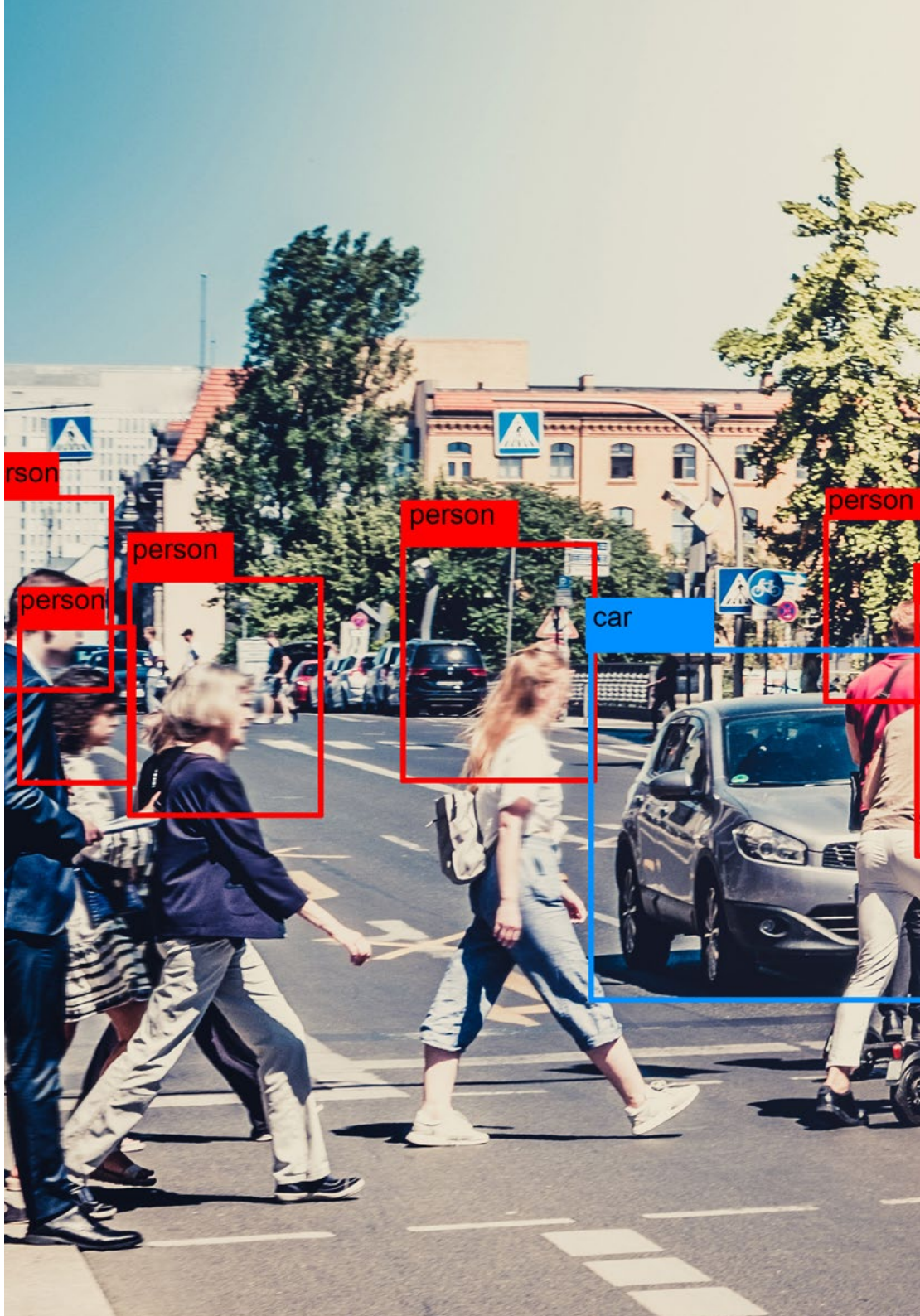
Objectives

The knowledge acquired through the syllabus will allow the graduate to acquire a global perspective and get up to date in the key aspects of Deep Learning to achieve the proposed objectives. In this way, they will develop comprehensive skills in a field of engineering that is essential, global and highly versatile, which will lead the student towards excellence in a booming sector. In order to ensure student satisfaction, TECH has established a series of general and specific objectives that will guide the student towards success.

Update your skills in supervised learning machines to improve your professional future. Now is always the best time"

General Objectives

- Lay the foundation for the key concepts of mathematical functions and their derivatives
- Apply these principles to deep learning algorithms to learn automatically
- 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
- Lay the foundation for the key concepts and main applications of deep learning
- Implement and optimizes neural networks with Keras
- Develop expertise in the training of deep neural networks
- Analyze the optimization and regularization mechanisms necessary for deep network training



Specific Objectives

Module 1. Deep Learning Mathematical Fundamentals

- Develop the chain rule for calculating derivatives of nested functions
- Analyze how new functions are created from existing functions and how the derivatives of these functions are computed
- Examine the concept of Backward Pass and how derivatives of vector functions are applied to learn automatically
- Learn how to use TensorFlow to build custom models
- Understand how to load and process data using TensorFlow tools
- Understand the key concepts of NLP natural language processing with RNN and attention mechanisms
- Explore the functionality of Hugging Face transformer libraries and other natural language processing tools to apply to vision problems
- Learn how 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
- Lay the foundations for optimizing hyperparameters 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 hyperparameters

You will achieve your objectives thanks to the aptitudes and skills that this Postgraduate Diploma provides you with, and you will be accompanied along the way by the best professionals"

03

Course Management

TECH as a prestigious academic institution has concentrated all its efforts in forming a team of highly qualified specialists in the field of Deep Learning and its application in various areas. This ensures that engineering professionals have access to a quality program and great value for their progress in a sector in constant growth. In addition, the teaching team brings to this program all the experience of years of work in this field, so you will learn from the most qualified and experienced professionals.

Succeed with the best and acquire the knowledge and skills you need to embark on the Deep Learning sector"

Management

Mr. Gil Contreras, Armando

- Lead Big Data Scientist-Big Data at Jhonson Controls
- Data Scientist-Big Data at Opensistemas
- Fund Auditor at Creativity and Technology and PricewaterhouseCoopers
- Professor at EAE Business School
- Degree in Economics from the Instituto Tecnológico de Santo Domingo INTEC
- Master's Degree in Data Science at Centro Universitario de Tecnología y Arte
- Master MBA in International Relations and Business at Centro de Estudios Financieros CEF
- Postgraduate Degree in Corporate Finance at the Instituto Tecnológico de Santo Domingo

Professors

Mr. Delgado Panadero, Ángel

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

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
- Máster Big Data and Analytics /Project Management(Minor) at EAE Business School

Mr. Villar Valor, Javier

- Director and Founder Partner Impulsa2
- Chief Operating Officer of Summa Insurance Brokers
- Responsible for identifying improvement opportunities at Liberty Seguros
- Director of Transformation and Professional Excellence at Johnson Controls Iberia
- Responsible for the organization of the company Groupama Seguros
- Responsible for Lean Six Sigma methodology at Honeywell
- Director of Quality and Purchasing at SP & PO
- Professor at the European Business School

04

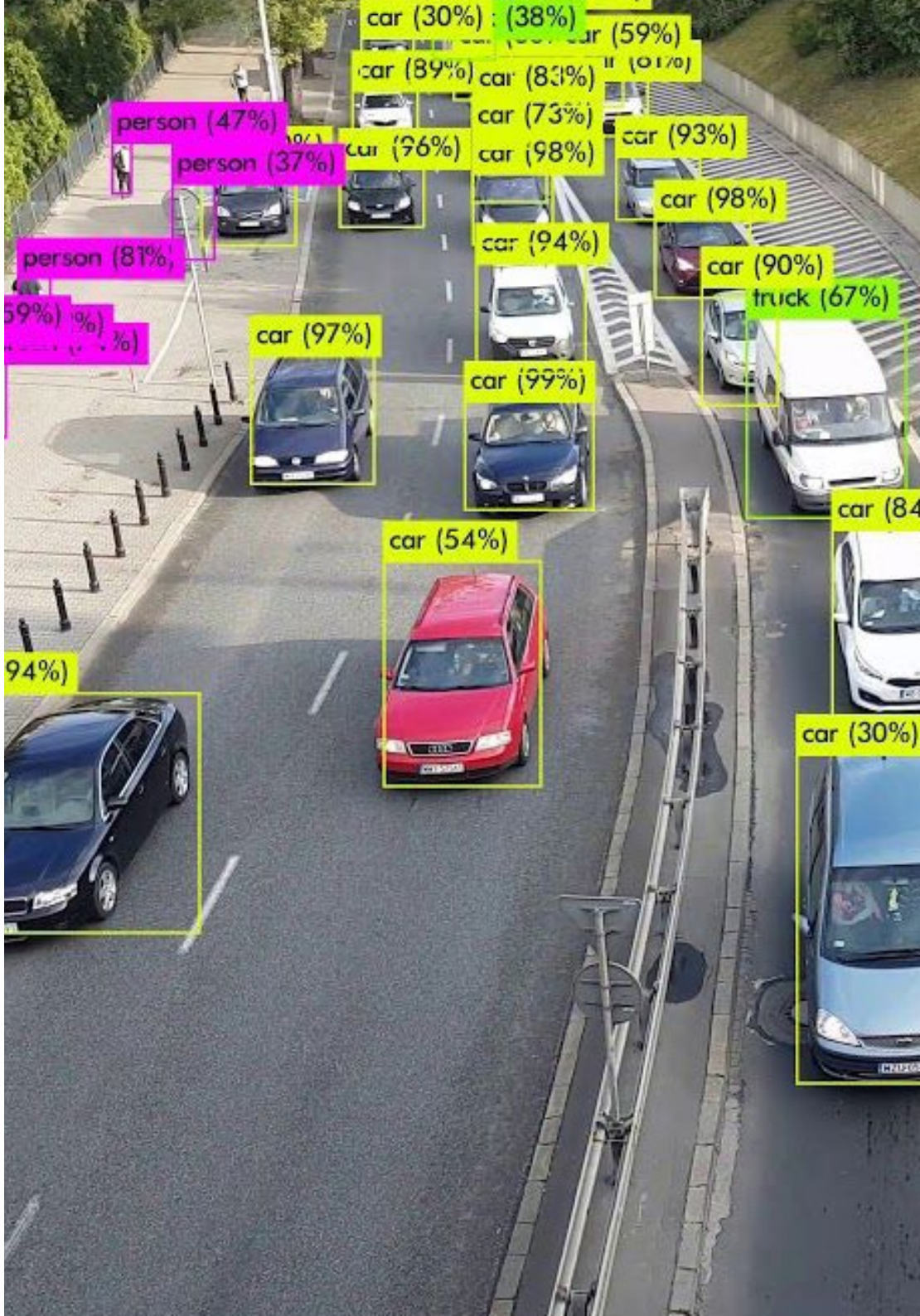
Structure and Content

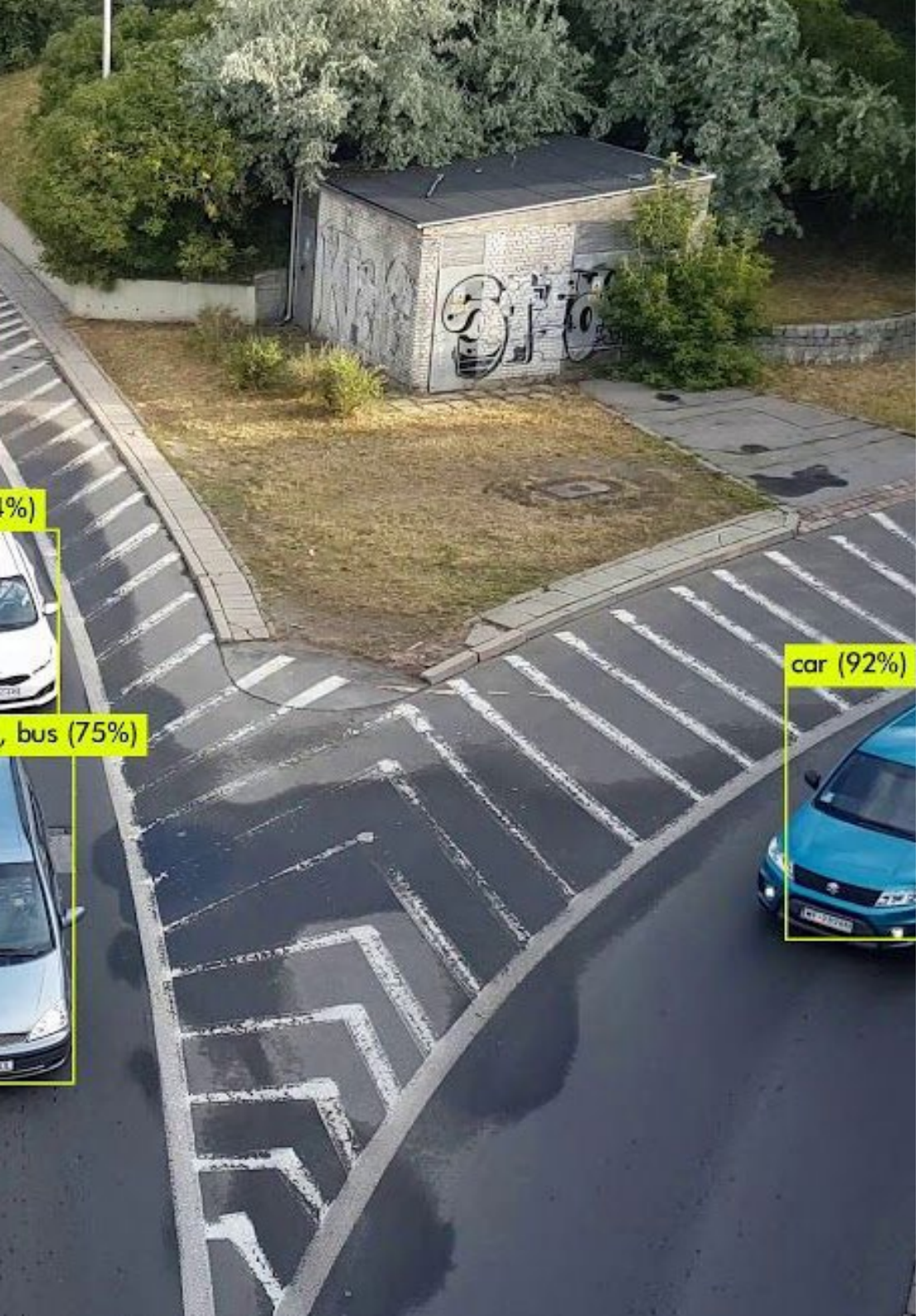
The Relearning method, which is based on the constant repetition of key concepts throughout the course, will allow the engineer to obtain advanced and effective learning without having to dedicate long hours of study. In this way, the professional will be able to delve into a complete syllabus on nested functions, neural network models or deep learning applications.

You will have access to a syllabus designed by experts and with high quality content for you to achieve successful learning"

Module 1. *Deep Learning* Mathematical Fundamentals

1.1. Functions and Derivatives
  1.1.1. Linear Functions
  1.1.2. Partial Derivative
  1.1.3. Higher Order Derivatives
1.2. Multiple Nested Functions
  1.2.1. Compound Functions
  1.2.2. Inverse Functions
  1.2.3. Recursive Functions
1.3. Chain Rule
  1.3.1. Derivatives of Nested Functions
  1.3.2. Derivatives of Compound Functions
  1.3.3. Derivatives of Inverse Functions
1.4. Functions with Multiple Inputs
  1.4.1. Multi-variable Functions
  1.4.2. Vectorial Functions
  1.4.3. Matrix Functions
1.5. Derivatives of Functions with Multiple Inputs
  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. Linear Vector Functions
  1.6.2. Non-linear Vector Functions
  1.6.3. Matrix Vector Functions
1.7. Creating New Functions from Existing Functions
  1.7.1. Function Addition
  1.7.2. Function Product
  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 Non-linear 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. Backward Pass
- 1.10.1. Error Propagation
- 1.10.2. Application of Updating Rules
- 1.10.3. Parameter Optimization

Module 2. Deep Learning Principles

2.1. Supervised Learning
- 2.1.1. Supervised Learning Machines
- 2.1.2. Uses of Supervised Learning
- 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 vs. 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. Forecast 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. The Use of Graphics

2.10. Hyperparameters
- 2.10.1. Hyperparameters Selection
- 2.10.2. Parameter Search
- 2.10.3. Hyperparameters Adjustment

Module 3. Neural Networks, the Basis of *Deep Learning*

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

3.2. Operations
- 3.2.1. Addition
- 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 Union and Operations
- 3.4.1. Design of Architectures
- 3.4.2. Connection between Layers
- 3.4.3. Forward Propagation

3.5. Construction of the First Neural Network
- 3.5.1. Network Design
- 3.5.2. Weights Establishment
- 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 the Neural Network Principles
- 3.7.1. Activation Functions
- 3.7.2. Backward Propagation
- 3.7.3. Parameter Adjustment

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. Establishing Relations between Both

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

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

A program designed to make you an expert in Deep Learning"

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 is the most widely used learning system in the best faculties in the world. 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 program, the studies 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

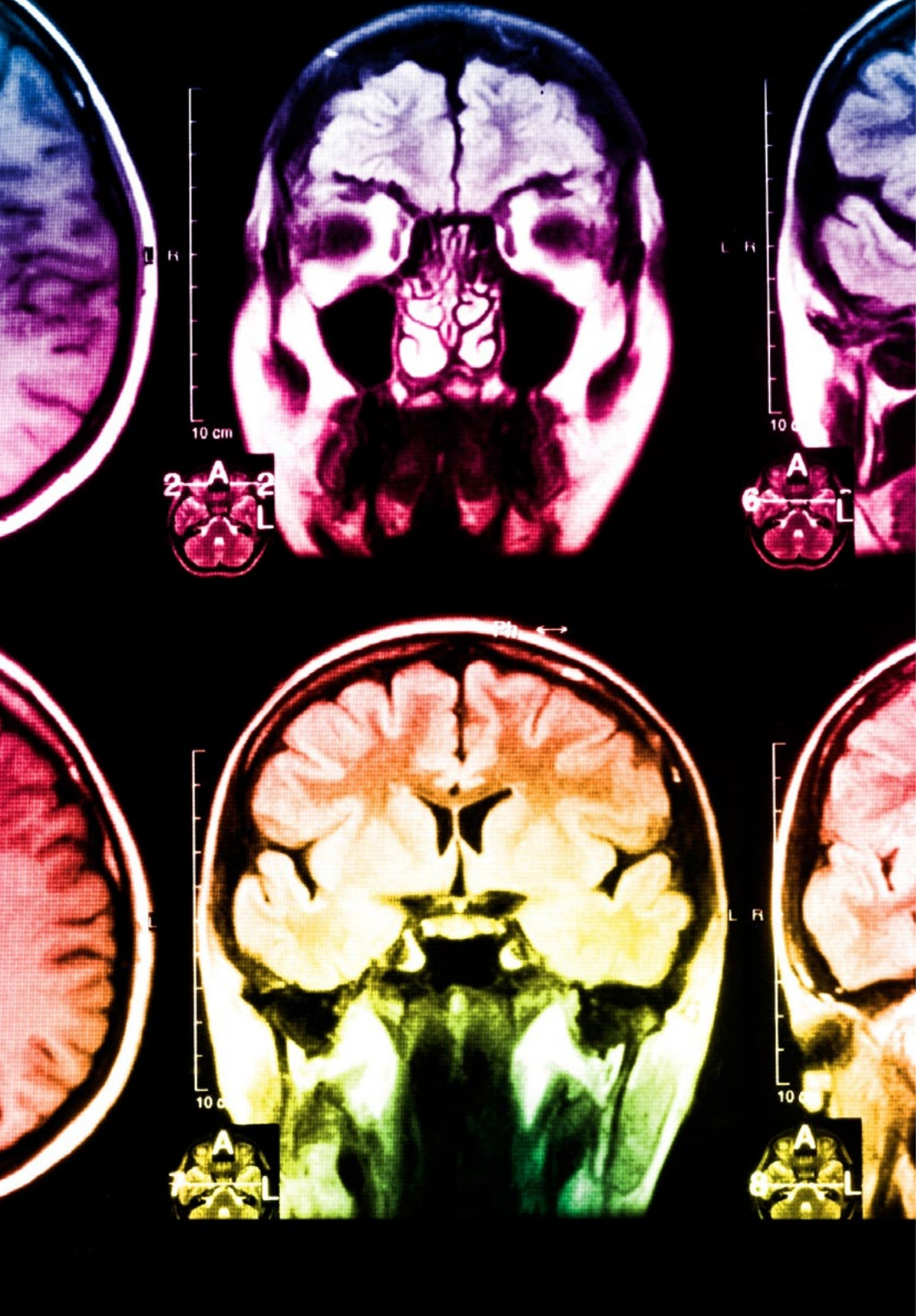
TECH effectively combines the Case Study methodology with a 100% online learning system based on repetition, which combines 8 different teaching elements in each lesson.

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.

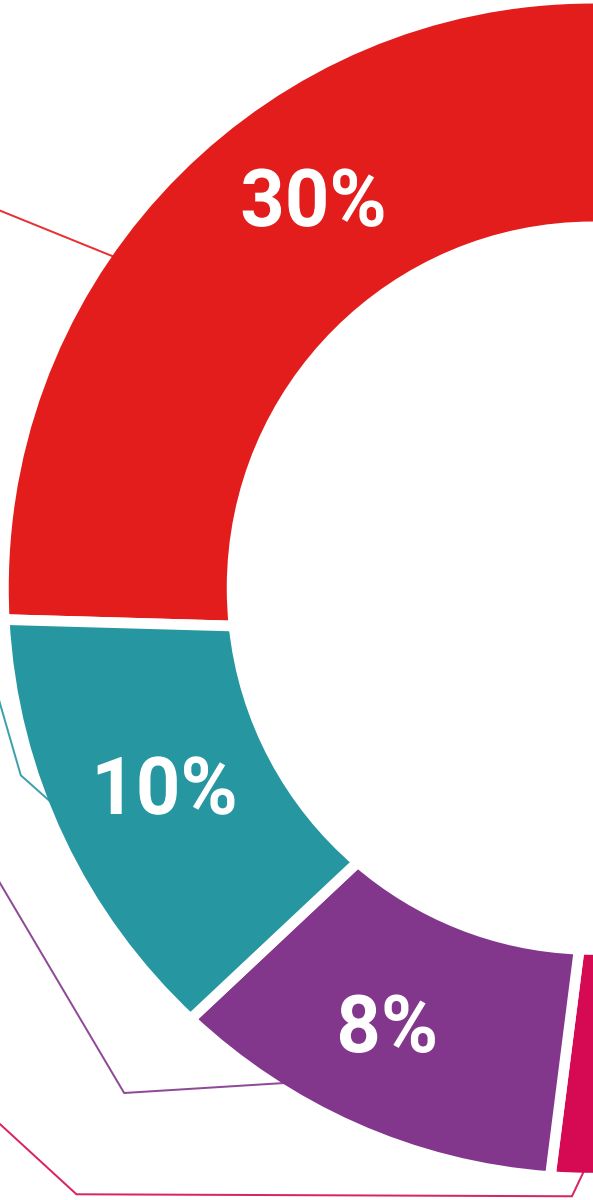
Learning from an Expert strengthens knowledge and memory, and generates confidence in future difficult decisions.

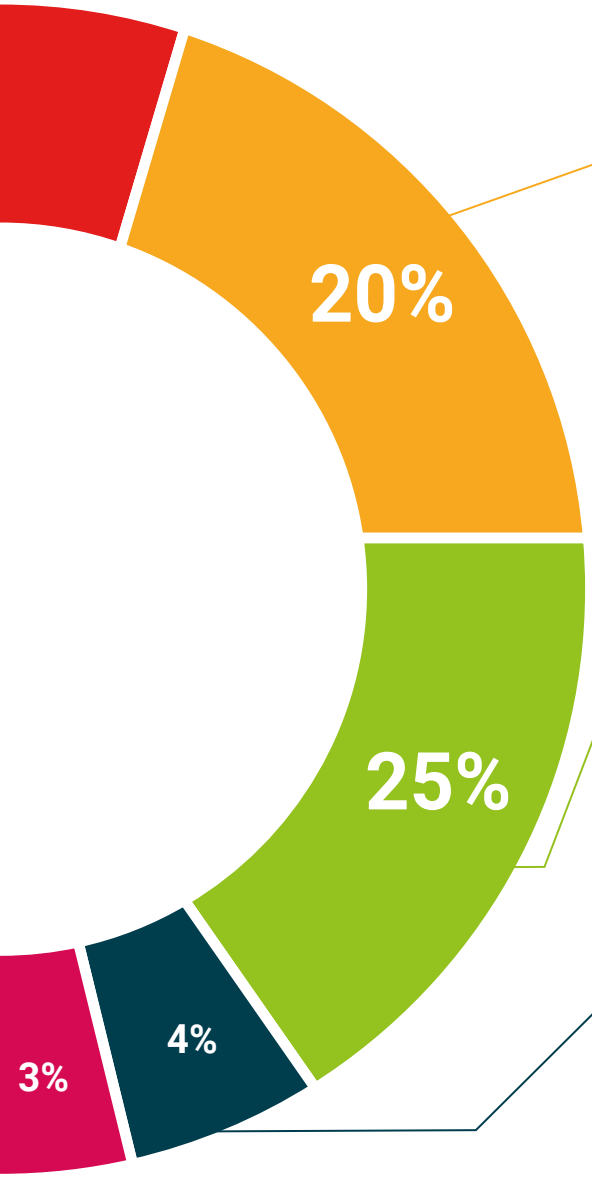
Practising Skills and Abilities

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 Deep Learning guarantees students, in addition to the most rigorous and up-to-date education, access to a Postgraduate Diploma 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 following

CERTIFICATE

to

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

For having passed and accredited the following program

POSTGRADUATE DIPLOMA

in

Deep Learning

This is a qualification awarded by this University, equivalent to 450 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 Navarro

Dean

This qualification must always be accompanied by the university degree issued by the competent authority to practice professionally in each country.

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.

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Deep Learning

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

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Deep Learning

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