

# Postgraduate Diploma Advanced Deep Learning



## Postgraduate Diploma Advanced Deep Learning

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

Acceso web: [www.techtitute.com/pk/artificial-intelligence/postgraduate-diploma/postgraduate-diploma-advanced-deep-learning](http://www.techtitute.com/pk/artificial-intelligence/postgraduate-diploma/postgraduate-diploma-advanced-deep-learning)

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# 01

# Introduction

Deep Learning is becoming a valuable tool for developers, given its ability to solve complex problems in areas such as computer vision, natural language processing or voice recognition. Given its multiple benefits, the most prestigious companies in the world are requesting the incorporation of experts in this field. This is especially accentuated in the healthcare area, where Artificial Intelligence plays a fundamental role. Doctors use Deep Learning tools to discover new drugs, analyze genomic data and even monitor the condition of patients. In order for experts to take advantage of this situation, TECH is launching an online university program that will delve into the latest trends in Neural Networks and Reinforcement Learning.



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*Thanks to this Postgraduate Diploma,  
you will apply to your projects the most  
advanced optimization methods to train  
Deep Neural Networks"*

Natural Language Processing through Deep Learning has completely revolutionized the way computers understand and generate human language. This technology has a wide range of applications, from automating text-based tasks to improving online security. One of the fields in which these resources are most widely used is in commercial enterprises. In this way, businesses include virtual assistants such as chatbots in their web platforms to resolve consumer questions in real time. Therefore, Deep Learning contributes to provide relevant answers based on the content of large databases.

In this context, TECH implements a Postgraduate Diploma that will deal thoroughly with Language Processing with Natural Recurrent Networks. Designed by experts in this subject, the curriculum will analyze the keys to the creation of the training dataset. In this sense, the steps to follow for the students to perform a correct cleaning and transformation of the information will be analyzed. The agenda will also delve into sentiment analysis with algorithms to detect emerging opinions and trends. Furthermore, the program will address the construction of OpenAi environments for graduates to develop and evaluate reinforcement learning algorithms.

The program's methodology will reflect the need for flexibility and adaptation to contemporary professional demands. With a 100% online format, it will allow students to advance their learning without compromising their job responsibilities. In addition, the application of the Relearning system, based on the reiteration of key concepts, ensures a deep and lasting understanding. This pedagogical approach reinforces the ability of professionals to effectively apply the knowledge acquired in their daily practice. At the same time, the only thing students will only need a device with Internet access to complete this academic itinerary.

This **Postgraduate Diploma in Advanced 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 Advanced Deep Learning
- The graphical, schematic and practical contents with which it is conceived gather technological and practical information on those disciplines that are essential for professional practice
- Practical exercises where the self-assessment process can be carried out 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 the Architecture of the Visual Cortex and be able to reconstruct three-dimensional models of objects in only 6 months with this course"*

“

*You will be able to create Artificial Intelligence models with top-notch natural language”*

The program’s teaching staff includes professionals from the sector who contribute their work experience to this 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.

*With the interactive summaries of each topic, you will consolidate in a more dynamic way the concepts of 2D Seizure.*

*The Relearning methodology, of which TECH is a pioneer, will guarantee you a gradual and natural learning process.*



# 02 Objectives

Thanks to this Postgraduate Diploma, graduates will acquire a comprehensive knowledge of the *Deep Learning* field. They will also master the most avant-garde techniques of *Deep Computer Vision* to analyze, process and interpret images automatically and with a high level of accuracy. In addition, they will incorporate natural language processing into their projects to automate tedious tasks such as the study of large volumes of data, text generation or translation. In addition, you will be equipped with the most innovative Deep Learning resources to successfully solve any obstacle that arises during the performance of your respective jobs.





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*You will implement Deep Q-Leaening to your projects to address sequential decision making problems in complex and dynamic environments”*



## General Objectives

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- Fundamentalize 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
- Fundamentals of the key concepts and main applications of deep learning
- Implement and optimize neural networks with Keras
- Develop expertise in the training of deep neural networks
- Analyze the optimization and regularization mechanisms required for deep neural network training



*A program that will allow you to advance progressively and completely to multiply your chances of success in the workplace"*





## Specific Objectives

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### Module 1. Deep Computer Vision with Convolutional Neural Networks

- ◆ Explore and understand how convolutional and clustering layers work for Visual Cortex architecture
- ◆ Use pre-trained Keras models for object classification, localization, detection, and tracking, as well as semantic segmentation

### Module 2. NLP Natural Language Processing with RNN and Attention

- ◆ Train an encoder-decoder network to perform neural machine translation
- ◆ Developing a practical application of natural language processing with RNN and attention

### Module 3. Reinforcement Learning

- ◆ Evaluate the use of neural networks to improve the accuracy of an agent when making decisions
- ◆ Implement different boosting algorithms to improve the performance of an agent

# 03

# Course Management

TECH's main premise is to offer quality education in all its university programs. For this reason, it has carried out a thorough selection process of the teachers who make up this Postgraduate Diploma. These professionals have been chosen for their in-depth knowledge in *Deep Learning* and Artificial Intelligence. In addition to this, they have a long career in this field, where they have been part of renowned institutions in various fields such as computer science, security or finance. This ensures that students have access to a specialization made up of top quality didactic content and work applicability.



“

*The teaching team will guide you throughout the academic itinerary and will solve any doubts you may have in this regard"*

## Management



### Mr. Gil Contreras, Armando

- ♦ Lead Big Data Scientist at Johnson Controls
- ♦ Data Scientist-Big Data at Opensistemas S.A
- ♦ Fund Auditor at Creatividad and Tecnología (CYTSA)
- ♦ Public Sector Auditor at PricewaterhouseCoopers Auditors
- ♦ Master's Degree in Data Science from the Centro Universitario de Tecnología y Arte
- ♦ MBA in International Relations and Business from the Centro de Estudios Financieros (CEF)
- ♦ Bachelor's Degree in Economics from Instituto Tecnológico de Santo Domingo

## Professors

### Ms. Delgado Feliz, Bedit

- ♦ 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

### 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
- ♦ Master in Professional *Coaching*
- ♦ Executive MBA from Emlyon Business School, France
- ♦ Master's Degree in Quality Management from EOI, Spain
- ♦ Computer Engineering from the Universidad Acción Pro-Education and Culture (UNAPEC)

**Mr. Matos Rodríguez, Dionis**

- ◆ Data Engineer at Wide Agency Sodexo
- ◆ 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
- ◆ Master's Degree in Big Data & Analytics by EAE Business School
- ◆ Master's Degree in Systems Analysis and Design
- ◆ Bachelor's Degree in Computer Engineering from APEC University

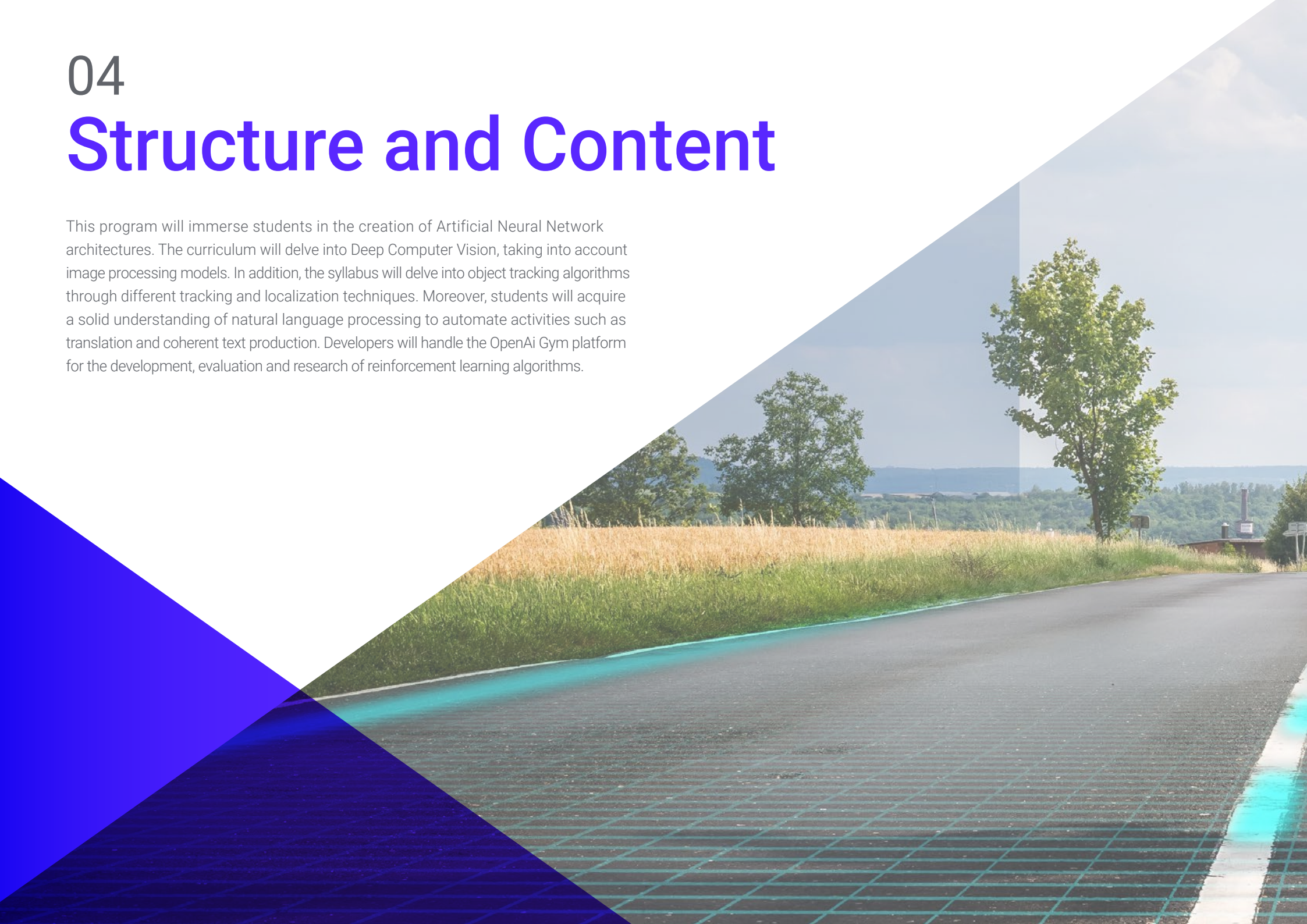
**Ms. Gil de León, María**

- ◆ Co-Director of Marketing and Secretary at RAÍZ Magazine
- ◆ Copy Editor at Gauge Magazine
- ◆ Stork Magazine reader from Emerson College
- ◆ B.A. in Writing, Literature and Publishing from Emerson College

# 04

# Structure and Content

This program will immerse students in the creation of Artificial Neural Network architectures. The curriculum will delve into Deep Computer Vision, taking into account image processing models. In addition, the syllabus will delve into object tracking algorithms through different tracking and localization techniques. Moreover, students will acquire a solid understanding of natural language processing to automate activities such as translation and coherent text production. Developers will handle the OpenAi Gym platform for the development, evaluation and research of reinforcement learning algorithms.







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*You will maximize your skills by analyzing real cases and solving complex situations in simulated learning environments”*

## Module 1. Deep Computer Vision with Convolutional Neural Networks

- 1.1. The Visual Cortex Architecture
  - 1.1.1. Functions of the Visual Cortex
  - 1.1.2. Theories of Computational Vision
  - 1.1.3. Models of Image Processing
- 1.2. Convolutional Layers
  - 1.2.1. Reuse of Weights in Convolution
  - 1.2.2. 2D Convolution
  - 1.2.3. Activation Functions
- 1.3. Grouping Layers and Implementation of Grouping Layers with Keras
  - 1.3.1. *Pooling* and *Striding*
  - 1.3.2. *Flattening*
  - 1.3.3. Types of *Pooling*
- 1.4. CNN Architecture
  - 1.4.1. VGG Architecture
  - 1.4.2. AlexNet architecture
  - 1.4.3. ResNet Architecture
- 1.5. Implementation of a ResNet-34 CNN using Keras
  - 1.5.1. Weight Initialization
  - 1.5.2. Input Layer Definition
  - 1.5.3. Output Definition
- 1.6. Use of Pre-trained Keras Models
  - 1.6.1. Characteristics of Pre-trained Models
  - 1.6.2. Uses of Pre-trained Models
  - 1.6.3. Advantages of Pre-trained Models
- 1.7. Pre-trained Models for Transfer Learning
  - 1.7.1. Transfer Learning
  - 1.7.2. Transfer Learning Process
  - 1.7.3. Advantages of Transfer Learning
- 1.8. *Deep Computer Vision* Classification and Localization
  - 1.8.1. Image Classification
  - 1.8.2. Localization of Objects in Images
  - 1.8.3. Object Detection



- 1.9. Object Detection and Object Tracking
  - 1.9.1. Object Detection Methods
  - 1.9.2. Object Tracking Algorithms
  - 1.9.3. Tracking and Localization Techniques
- 1.10. Semantic Segmentation
  - 1.10.1. Deep Learning for Semantic Segmentation
  - 1.10.2. Edge Detection
  - 1.10.3. Rule-based Segmentation Methods

## Module 2. Natural Language Processing (NLP) with Natural Recurrent Networks (NRN) and Attention

- 2.1. Text Generation Using RNN
  - 2.1.1. Training an RNN for Text Generation
  - 2.1.2. Natural Language Generation with RNN
  - 2.1.3. Text Generation Applications with RNN
- 2.2. Training Data Set Creation
  - 2.2.1. Preparation of the Data for Training an RNN
  - 2.2.2. Storage of the Training Dataset
  - 2.2.3. Data Cleaning and Transformation
- 2.3. Sentiment Analysis
  - 2.3.1. Classification of Opinions with RNN
  - 2.3.2. Detection of Themes in Comments
  - 2.3.3. Sentiment Analysis with Deep Learning Algorithms
- 2.4. Encoder-decoder Network for Neural Machine Translation
  - 2.4.1. Training an RNN for Machine Translation
  - 2.4.2. Use of an *Encoder-decoder* Network for Machine Translation
  - 2.4.3. Improving the Accuracy of Machine Translation with RNNs
- 2.5. Attention Mechanisms
  - 2.5.1. Application of Care Mechanisms in RNN
  - 2.5.2. Use of Care Mechanisms to Improve the Accuracy of the Models
  - 2.5.3. Advantages of Attention Mechanisms in Neural Networks

- 2.6. Transformer Models
  - 2.6.1. Using Transformer Models for Natural Language Processing
  - 2.6.2. Application of Transformer Models for Vision
  - 2.6.3. Advantages of Transformer Models
- 2.7. Transformers for Vision
  - 2.7.1. Use of Transformer Models for Vision
  - 2.7.2. Image Data Preprocessing
  - 2.7.3. Training a Transform Model for Vision
- 2.8. Hugging Face Transformer Library
  - 2.8.1. Using the Hugging Face Transformers Library
  - 2.8.2. Application of the Hugging Face Transformers Library
  - 2.8.3. Advantages of the Hugging Face Transformers library
- 2.9. Other Transformers Libraries. Comparison
  - 2.9.1. Comparison between different Transformers Libraries
  - 2.9.2. Use of the other Transformers Libraries
  - 2.9.3. Advantages of the other Transformers Libraries
- 2.10. Development of an NLP Application with RNN and Attention. Practical Application
  - 2.10.1. Development of a Natural Language Processing Application with RNN and Attention
  - 2.10.2. Use of RNN, Attention Mechanisms and Transformers Models in the Application
  - 2.10.3. Evaluation of the Practical Application

## Module 3. Reinforcement Learning

- 3.1. Optimization of Rewards and Policy Search
  - 3.1.1. Reward Optimization Algorithms
  - 3.1.2. Policy Search Processes
  - 3.1.3. Reinforcement Learning for Reward Optimization
- 3.2. OpenAI
  - 3.2.1. OpenAI Gym Environment
  - 3.2.2. Creation of OpenAI Environments
  - 3.2.3. Reinforcement Learning Algorithms in OpenAI

- 3.3. Neural Network Policies
  - 3.3.1. Convolutional Neural Networks for Policy Search
  - 3.3.2. Deep Learning Policies
  - 3.3.3. Extending Neural Network Policies
- 3.4. Stock Evaluation: the Credit Allocation Problem
  - 3.4.1. Risk Analysis for Credit Allocation
  - 3.4.2. Estimating the Profitability of Loans
  - 3.4.3. Credit Evaluation Models based on Neural Networks
- 3.5. Policy Gradients
  - 3.5.1. Reinforcement Learning with Policy Gradients
  - 3.5.2. Optimization of Policy Gradients
  - 3.5.3. Policy Gradient Algorithms
- 3.6. Markov Decision Processes
  - 3.6.1. Optimization of Markov Decision Processes
  - 3.6.2. Reinforcement Learning for Markov Decision Processes
  - 3.6.3. Models of Markov Decision Processes
- 3.7. Temporal Difference Learning and *Q-Learning*
  - 3.7.1. Application of Temporal Differences in Learning
  - 3.7.2. Application of *Q-Learning* in Learning
  - 3.7.3. Optimization of *Q-Learning* Parameters
- 3.8. Implementation of *Deep Q-Learning* and *Deep Q-Learning* variants
  - 3.8.1. Construction of Deep Neural Networks for *Deep Q-Learning*
  - 3.8.2. Implementation of *Deep Q-Learning*
  - 3.8.3. Variations of *Deep Q-Learning*
- 3.9. Reinforcement Learning Algorithms
  - 3.9.1. Reinforcement Learning Algorithms
  - 3.9.2. Reward Learning Algorithms
  - 3.9.3. Punishment Learning Algorithms
- 3.10. Design of a Reinforcement Learning Environment. Practical Application
  - 3.10.1. Design of a Reinforcement Learning Environment
  - 3.10.2. Implementation of a Reinforcement Learning Algorithm
  - 3.10.3. Evaluation of a Reinforcement Learning Algorithm





“ You will have access to the most comprehensive learning materials in academia, available in a variety of multimedia formats to optimize your 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.





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*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 Advanced 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.



The image features two black graduation caps (mortarboards) against a bright blue sky with light, wispy clouds. One cap is in the foreground on the left, and another is slightly behind it on the right. The background is split diagonally by a white and blue geometric shape. The quote is positioned on the white section.

“

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

This **Postgraduate Diploma in Advanced 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 Advanced Deep Learning**

Official N° of Hours: **450 h.**



\*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.



future  
health confidence people  
education information tutors  
guarantee accreditation teaching  
institutions technology learning  
community commitment  
personalized service innovation  
knowledge present quality  
development languages  
virtual classroom



## Postgraduate Diploma Advanced Deep Learning

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

# Postgraduate Diploma Advanced Deep Learning