Postgraduate Certificate
Autoencoders, GANs, and Diffusion Models in Deep Learning

tech *global university*

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Postgraduate Certificate
Autoencoders, GANs, and Diffusion Models in Deep Learning

» Modality: **online**
» Duration: **6 weeks**
» Certificate: **TECH Global University**
» Credits: **6 ECTS**
» Schedule: **at your own pace**
» Exams: **online**

Website: **www.techtitute.com/us/engineering/postgraduate-certificate/autoencoders-gans-diffusion-models-deep-learning**

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Introduction

Autoencoders, GANs and Diffusion Models have the ability to generate new data from an input data set. This way, they can be used to reduce the dimensionality of a dataset, which can be useful in applications where it is desired to reduce the number of features for better analysis and classification. In this context, this program responds to the need to train professionals who can develop advanced solutions in these areas, in a rigorous and up-to-date way. Moreover, being a 100% online program and using the Relearning methodology, it allows engineers to improve their skills in a flexible way and adapted to their requirements and schedules.

" *Do you want to become an elite engineer? This program will take you to the next level and give you the skills you need to achieve your goals and objectives"*

Autoencoders are widely used for dimensionality reduction in different applications, such as speech recognition, electroencephalography pattern identification (EEG), and medical image classification. They have also been used in anomaly detection applications in a variety of domains, including predictive maintenance, cyber security, and fraud detection. In that sense, the use of Diffusion Models can improve the performance of Deep Learning models by enabling the diffusion of information throughout the network. In addition, GANs can be used to improve image quality by generating more realistic and detailed images than conventional techniques.

In this context, the Postgraduate Certificate in Autoencoders, GANs and Diffusion Models in Deep Learning responds to the need to train professionals in the creation of advanced proposals in these areas. Therefore, the program delves into the architecture of neural networks, loss function and optimization methods, as well as specialized techniques such as image generation, dimensionality reduction and simulation of stochastic processes. In addition, it adapts to the needs of the students, offering the flexibility of a 100% online format, which allows them to learn at their own pace and schedule.

Furthermore, the Postgraduate Certificate in Autoencoders, GANs and Diffusion Models in Deep Learning uses the Relearning methodology, which facilitates applying theoretical concepts to real industry cases and, therefore, developing stronger skills for the working world. In this way, it is an excellent choice for engineers who wish to specialize in neural network algorithms for signal, image and time sequence processing and keep up to date with their methods and uses.

This **Postgraduate Certificate in Autoencoders, GANs, and Diffusion Models 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

You will delve into the most innovative techniques in dimensionality reduction and generation of compact representations"

"*You will delve from automatic encoder noise removal to the construction of generative adversarial networks, acquire advanced skills and prepare yourself to face the most complex challenges in this field*"

Not only will you learn the most innovative techniques, but you will also apply this knowledge in real situations through practical projects with this valuable qualification.

Through an innovative and practical methodology, you will acquire the most advanced skills in data representation, content generation and automatic encoder denoising.

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. This will be done with the help of an innovative system of interactive videos made by renowned experts.
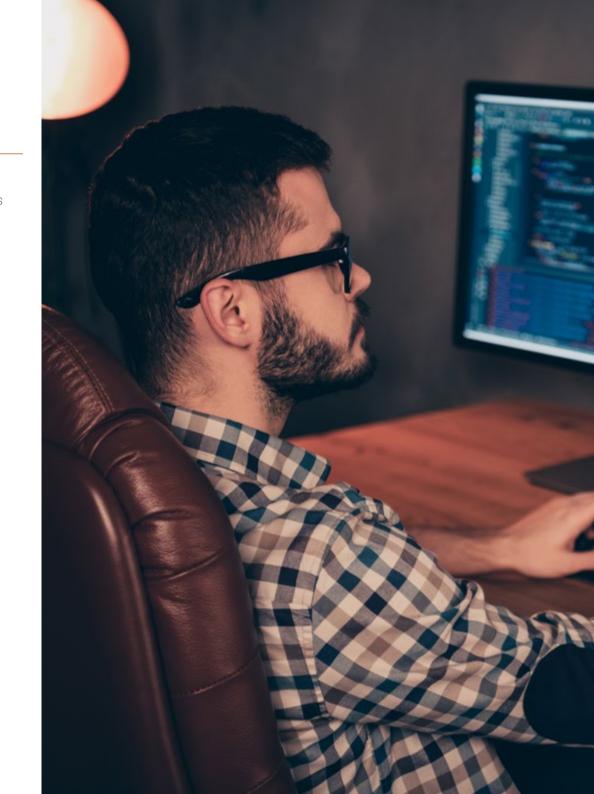
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Objectives

The main objective of this TECH program is for the graduate to master the art of efficient data representation using deep learning techniques, performing dimensionality reductions and generating compact representations. Therefore, this program is designed to provide the engineer with solid knowledge in the realization of PCA with an incomplete linear automatic encoder, implement it in Python and use test data to evaluate its performance. In addition, the student will be introduced to the most advanced cutting-edge knowledge in stacked automatic encoders, deep neural networks and construction of encoding architectures, as well as use regularization techniques to optimize their performance.

Become a leader in the field of Deep Learning with advanced skills in variational optimization and unsupervised deep learning"

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
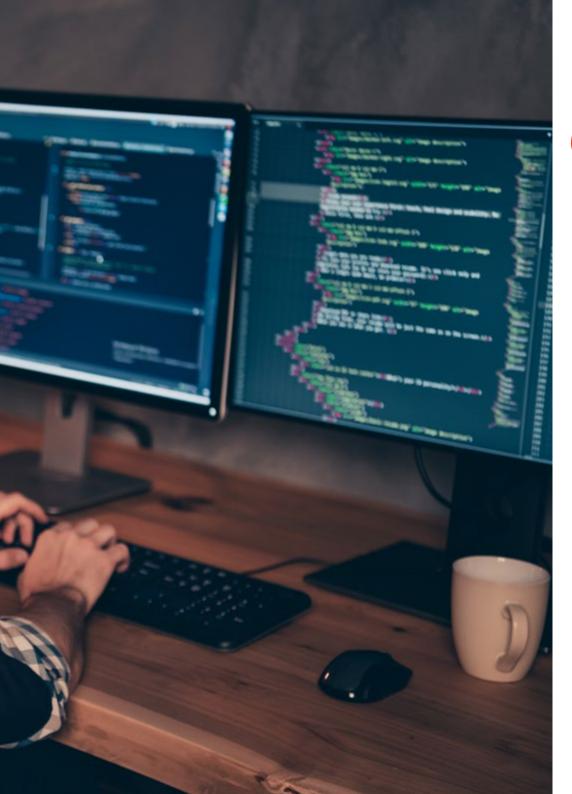
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Specific Objectives

◆ Implement PCA techniques with a linear incomplete automatic encoder

◆ Use convolutional and variational autoencoders to improve the results of autoencoders

◆ Analyze how GANs and diffusion models can generate new and realistic images

You will master the use of sparse coding techniques with this unique online qualification"

Course Management

Throughout the course you will have the opportunity to learn from experts in efficient data representation, dimensionality reduction, deep learning and generation of compact representations, who will provide you with the necessary knowledge to master these techniques and apply them in real situations. In addition, you will be guided by professionals in the realization of PCA with an incomplete linear automatic encoder, the construction of coding architectures using stacked automatic encoders, and the design and training of convolutional autoencoders to generate complex data representations. All this under the most efficient methodology, TECH Relearning.

Do you want to master the construction of generative adversarial networks and diffusion models? A team of Deep Learning experts help you get there"

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. 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
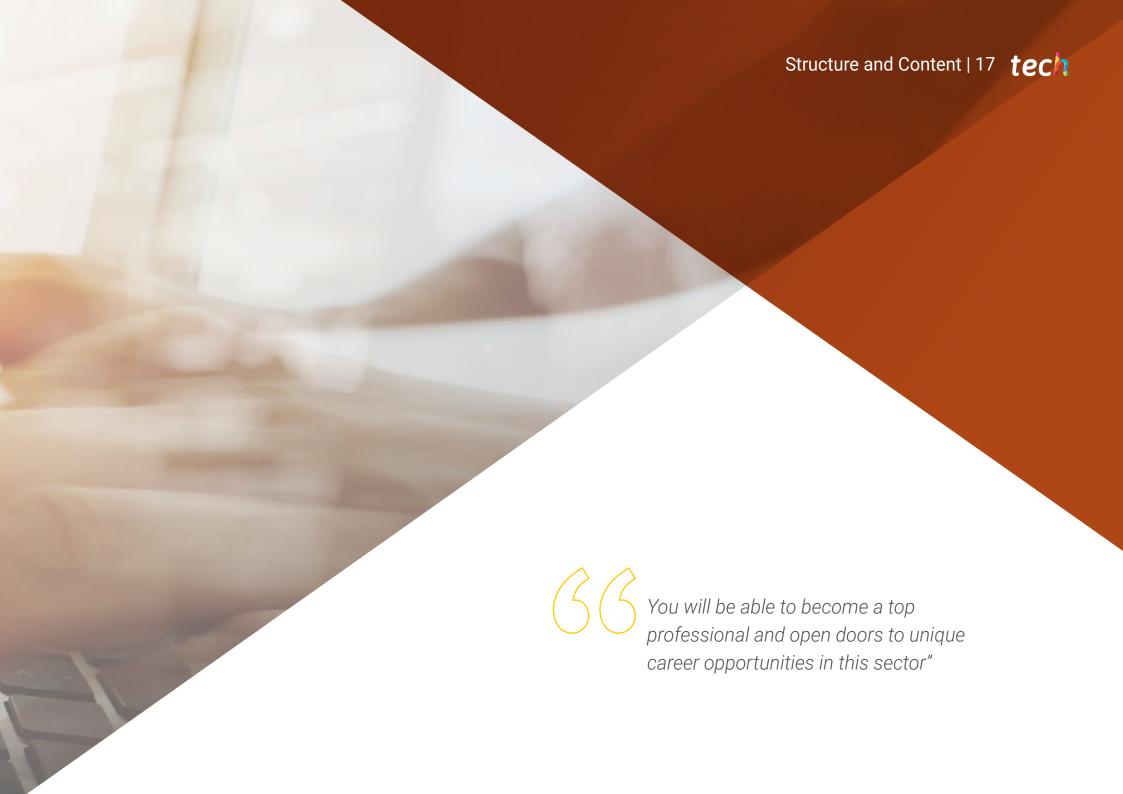- Professor at the European Business School

Ms. Delgado Feliz, Benedit
- Electronic Surveillance Assistant and Operator at the National Directorate of Drug Control
- Social Communication by the Catholic University of Santo Domingo
- Voiceover by the Otto Rivera School of Professional Voiceover

Ms. Gil de León, María
- Marketing Co-Director and Secretary at RAÍZ Magazine
- Copy Editor at Gauge Magazine
- Reader of Stork Magazine by Emerson College
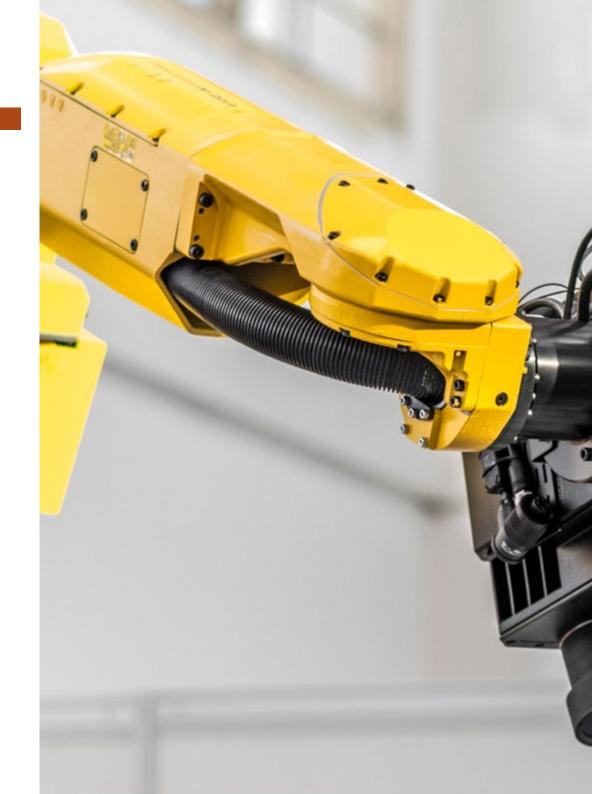- Bachelor's degree in Writing, Literature and Publishing awarded by Emerson College

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Structure and Content

Throughout this program, you will delve into the most cutting-edge topics in Deep Learning, learning innovative techniques in data representation, dimensionality reduction and generation of compact representations. In addition, you will explore the operation of variational automatic encoders, unsupervised deep learning and apply these techniques to image generation and modeling of data distributions. With this syllabus, you will be prepared to become a high-level professional in Autoencoders, GANs, and Diffusion Models in Deep Learning and apply this knowledge in real situations.

You will be able to become a top professional and open doors to unique career opportunities in this sector"

Module 1. Autoencoders, GANs, and Diffusion Models

1.1. Efficient Data Representations
    1.1.1. Dimensionality Reduction
    1.1.2. Deep Learning
    1.1.3. Compact Representations

1.2. PCA Performance with an Incomplete Linear Automatic Encoder
    1.2.1. Training Process
    1.2.2. Python Implementation
    1.2.3. Use of Test Data

1.3. Stacked Automatic Encoders
    1.3.1. Deep Neural Networks
    1.3.2. Construction of Coding Architectures
    1.3.3. Use of Regularization

1.4. Convolutional Autocoders
    1.4.1. Convolutional Model Design
    1.4.2. Convolutional Model Training
    1.4.3. Results Evaluation

1.5. Noise Elimination of Automatic Encoders
    1.5.1. Filter Application
    1.5.2. Coding Model Design
    1.5.3. Use of Regularization Techniques

1.6. Dispersed Automatic Encoders
    1.6.1. Increasing Coding Efficiency
    1.6.2. Minimizing the Parameter Number
    1.6.3. Use of Regularization Techniques

1.7. Variational Automatic Encoders
    1.7.1. Use of Variational Optimization
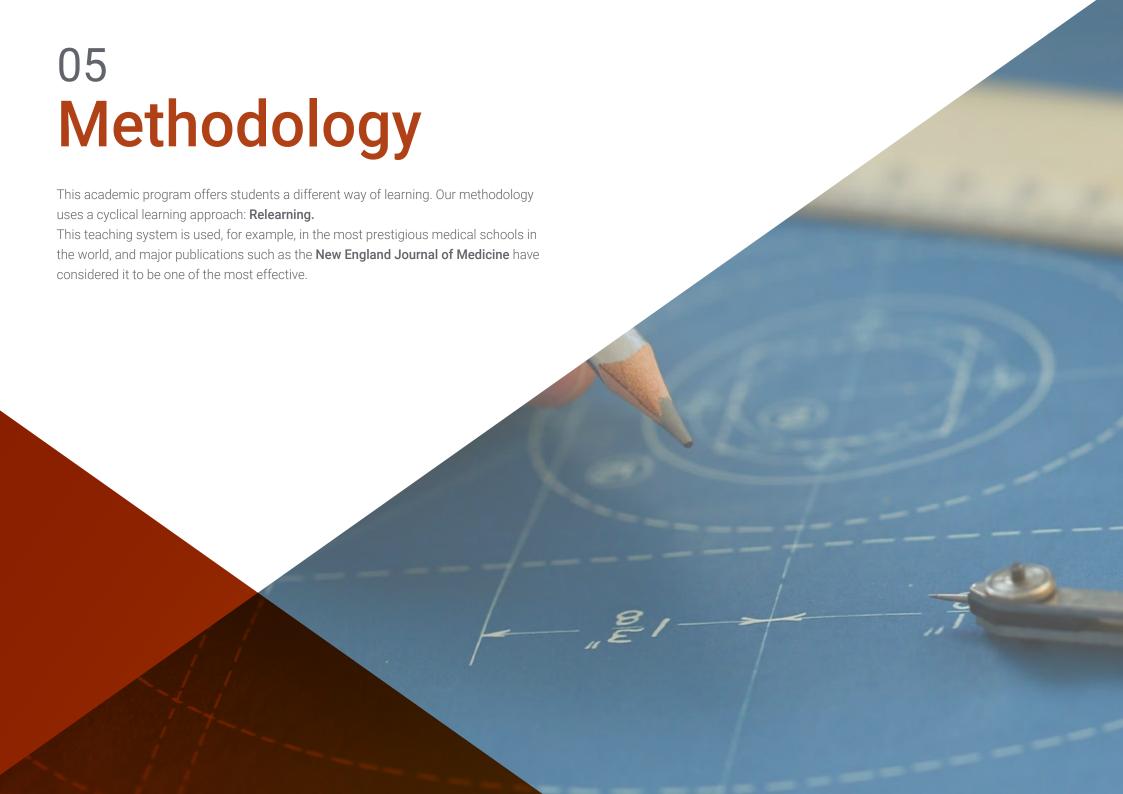   1.7.2. Unsupervised Deep Learning
    1.7.3. Deep Latent Representations

This program gives you the opportunity to study the most cutting-edge syllabus in the current academic panorama in the field of Deep Learning"

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.

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.

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

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.

01 learning from evidence

02 relearning from evidence

03 testing

04 learning from an expert

05 neurocognitive context dependent learning

06 Von-Restorff effect

07 case based learning through storytelling

08 competencies testing (retesting)

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.

30%

10%

8%

20%

25%

4%

3%

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.

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Certificate

The Postgraduate Certificate in Autoencoders, GANs, and Diffusion Models in Deep Learning and guarantees students, in addition to the most rigorous and up-to-date education, access to a Postgraduate Certificate issued by TECH Global University.

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 Certificate in Autoencoders, GANs, and Diffusion Models in Deep Learning** 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 Certificate in Autoencoders, GANs, and Diffusion Models in Deep Learning**

Modality: **online**

Duration: **6 weeks**

Accreditation: **6 ECTS**

tech global university

Mr./Ms. _____, with identification document _____
has successfully passed and obtained the title of:

Postgraduate Certificate in Autoencoders, GANs, and Diffusion Models in Deep Learning

This is a program of 180 hours of duration equivalent to 6 ECTS, with a start date of dd/mm/yyyy and an end date of dd/mm/yyyy.

TECH Global University is a university officially recognized by the Government of Andorra on the 31st of January of 2024, which belongs to the European Higher Education Area (EHEA).

In Andorra la Vella, on the 28th of February of 2024

Dr. Pedro Navarro Illana
Rector

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 diploma issued with an apostille, TECH Global University will make the necessary arrangements to obtain it, at an additional cost.

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