

# Postgraduate Diploma Intelligent Systems



## Postgraduate Diploma Intelligent Systems

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

Website: [www.techtute.com/us/artificial-intelligence/postgraduate-diploma/postgraduate-diploma-intelligent-systems](http://www.techtute.com/us/artificial-intelligence/postgraduate-diploma/postgraduate-diploma-intelligent-systems)

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# 01

# Introduction

With the advance of new technologies such as Artificial Intelligence, more and more organizations are looking to integrate Intelligent Systems professionals into their organizational charts. These tools bring multiple benefits, ranging from the automation of repetitive tasks (such as translations or analysis of large volumes of data) to the optimization of processes and personalization of experiences. However, these procedures encompass a number of challenges, including inherent biases in the training data. As a result, professionals in this field must update their knowledge frequently and stay on the cutting edge of technology to ensure excellence-based services. To help them with this task, TECH is developing an online program that will address in detail the agents of Machine Learning.





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*This 100% online Postgraduate Diploma will allow you to code real-world problems through advanced algorithms and computer systems"*

Intelligent Systems are undergoing a constant evolution, which opens a wide range of possibilities for society in general terms. For example, the implementation of Artificial Intelligence provides solutions in the field of medicine. These range from patient monitoring to assisting in clinical decision-making and the development of new drugs. This reflects the importance of professionals having a thorough knowledge of this subject in order to improve people's quality of life. Moreover, in order to carry out successful innovation processes, they need to be aware of the latest trends in this area of expertise and incorporate them into their practice.

For this reason, TECH launches a revolutionary program that will provide students with an integral prism that merges Machine Learning with Knowledge Engineering. To this end, the academic itinerary will delve into both Agent Theory and Neuron Networks. In this way, students will learn the most effective methods for the integration of knowledge representations, starting from the relationship between the different types of logic. On the other hand, this program will focus on Computational Perception so that graduates will be able to handle programming languages adequately.

To consolidate all these contents, TECH is based on the innovative Relearning system. This teaching method is based on the repetition of key contents, to guarantee a progressive and natural learning process. In addition, the only thing graduates will need is a device with Internet access to access the study materials remotely, at the time or place of their choice. In addition, the Virtual Campus will be available at all times and will allow users to download the contents so that they can consult them whenever they wish.

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

- Development of 100 simulated scenarios presented by experts in Intelligent Systems Science
- The graphic, schematic and practical contents with which they are conceived provide scientific and practical information on Intelligent Systems.
- News on the latest developments in Intelligent Systems.
- It contains practical exercises where the self-assessment process can be carried out to improve learning
- Interactive learning system based on the case method and its application to real practice.
- All of this will be complemented by 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



*Master the software agents according to JADE in the best digital university in the world according to Forbes"*

“

*You will master the Protégé software to efficiently create, edit and visualize ontologies”*

The program includes in its teaching staff, professionals from the sector who pour into this program the experience of their work, in addition to recognized specialists from prestigious reference societies and 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.

*Elevate your professional potential within the world of Knowledge Engineering thanks to the innovative resources provided by this program.*

*With the innovative Relearning methodology, you will assimilate all the knowledge to obtain the results you are looking for and make a leap in your professional career.*





# 02

# Objectives

Through 450 hours of learning, graduates will be characterized by having a comprehensive knowledge of Intelligent Systems. The professionals will acquire advanced competences to incorporate in their projects advanced methods belonging to Machine Learning and Knowledge Engineering, being an example the Monte Carlo simulation. In addition, they will master Computational Perception to handle different programming languages, among which JADE stands out. In this way, the experts will be qualified to design and execute cutting-edge solutions in a technological field that offers multiple job opportunities.





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*With the most highly valued means of study in online teaching, this program will have a great impact on your professional growth”*



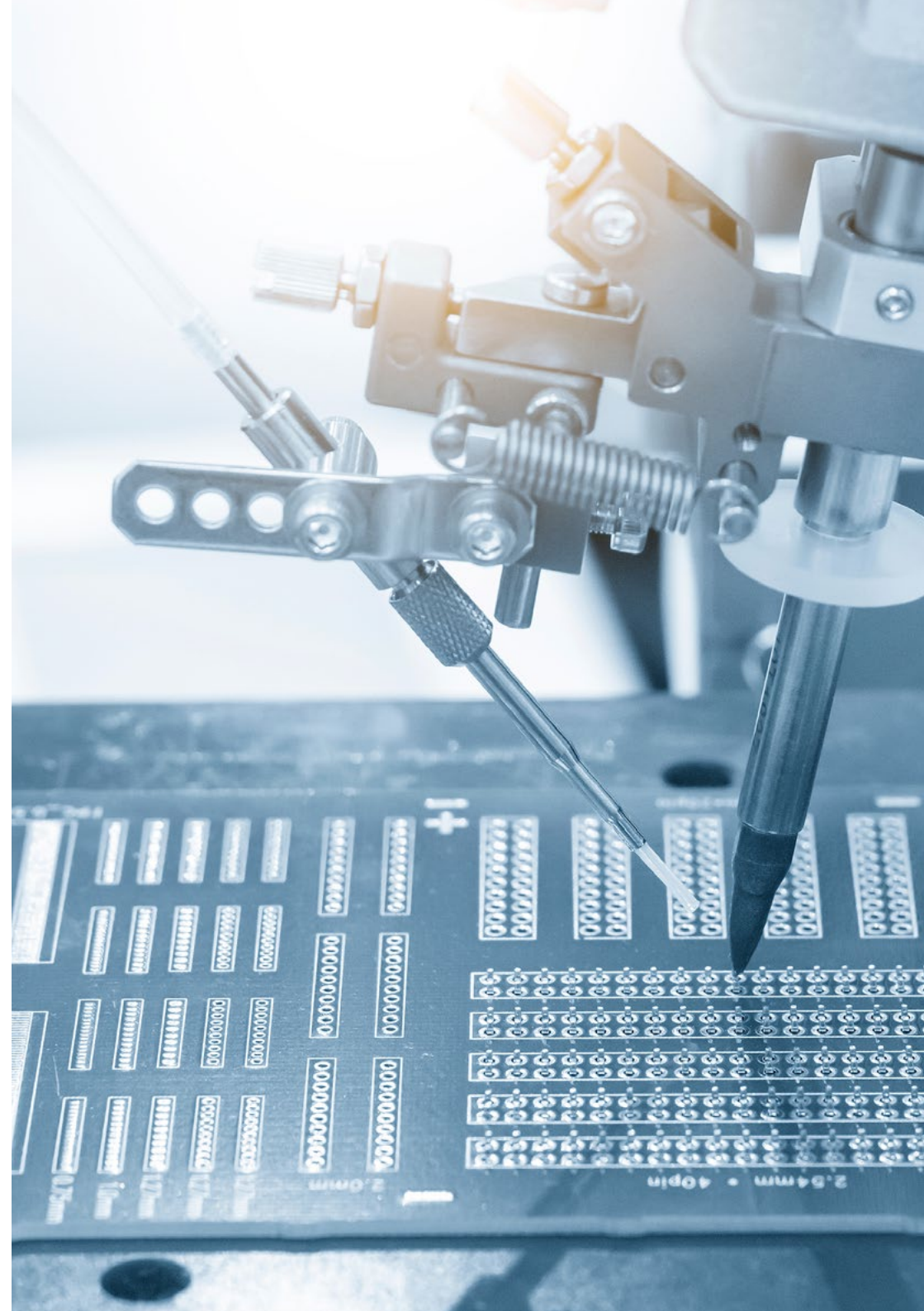
## General Objectives

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- Prepare scientifically and technologically, as well as to develop the professional practice of IT engineering, with a transversal and versatile approach adapted to the new technologies and innovations in this field
- Obtain wide knowledge in the field of IT engineering, structure of computers and Software Engineering, including the mathematical, statistical and physical basis which is essential in engineering



*A program that brings you closer to the next challenges in Multiagent Systems and Computational Perception"*





## Specific Objectives

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### Module 1. Intelligent Systems

- ♦ Learn all the concepts related to agent theory and agent architecture and its reasoning process
- ♦ Assimilate the Theory and Practice behind the Concepts of Information and Knowledge, as well as the different ways of Representing Knowledge
- ♦ Understand the theory related to ontologies, as well as learn ontology languages and software for ontology creation
- ♦ Learn different models of knowledge representation, such as vocabularies, taxonomies, thesauri and mind maps among others
- ♦ Understand the functioning of semantic reasoners, knowledge-based systems and expert systems
- ♦ Know how the semantic web works, its current and future state, as well as semantic web-based applications

### Module 2. Artificial Intelligence and Knowledge Engineering

- ♦ Lay the foundations of artificial intelligence and knowledge engineering, making a brief tour through the history of artificial intelligence up to the present day
- ♦ Understand the essential concepts of search in artificial intelligence, both informed and uninformed search
- ♦ Understand how artificial intelligence works in games

- ♦ Learn the fundamental concepts of neural networks and the use of genetic algorithms
- ♦ Acquire the appropriate mechanisms to represent knowledge, especially taking into account the semantic web
- ♦ Understand the functioning of expert systems and decision support systems

### Module 3. Multiagent Systems and Computational Perception

- ♦ Understand the basic and advanced concepts related to agents and multi-agent systems
- ♦ Study the FIPA agent standard, considering agent communication, agent management and architecture, among other issues
- ♦ Further study the JADE platform (Java Agent Development Framework), learning to program in it both basic and advanced concepts, including communication and agent discovery topics
- ♦ Lay the foundations of natural language processing, such as automatic speech recognition and computational linguistics



# 04

# Structure and Content

This program is designed by a teaching staff composed of experts in Computer Engineering, which will provide students with a holistic view of Intelligent Systems. The academic itinerary will analyze in detail the agents of Artificial Intelligence. The syllabus will provide students with the most advanced software for the creation of ontologies, among which RDF Triplets stand out. Likewise, the training will delve into Knowledge Engineering so that graduates can develop systems that simulate and apply human knowledge effectively. In addition, the program will focus on image segmentation with Fourier Transforms.



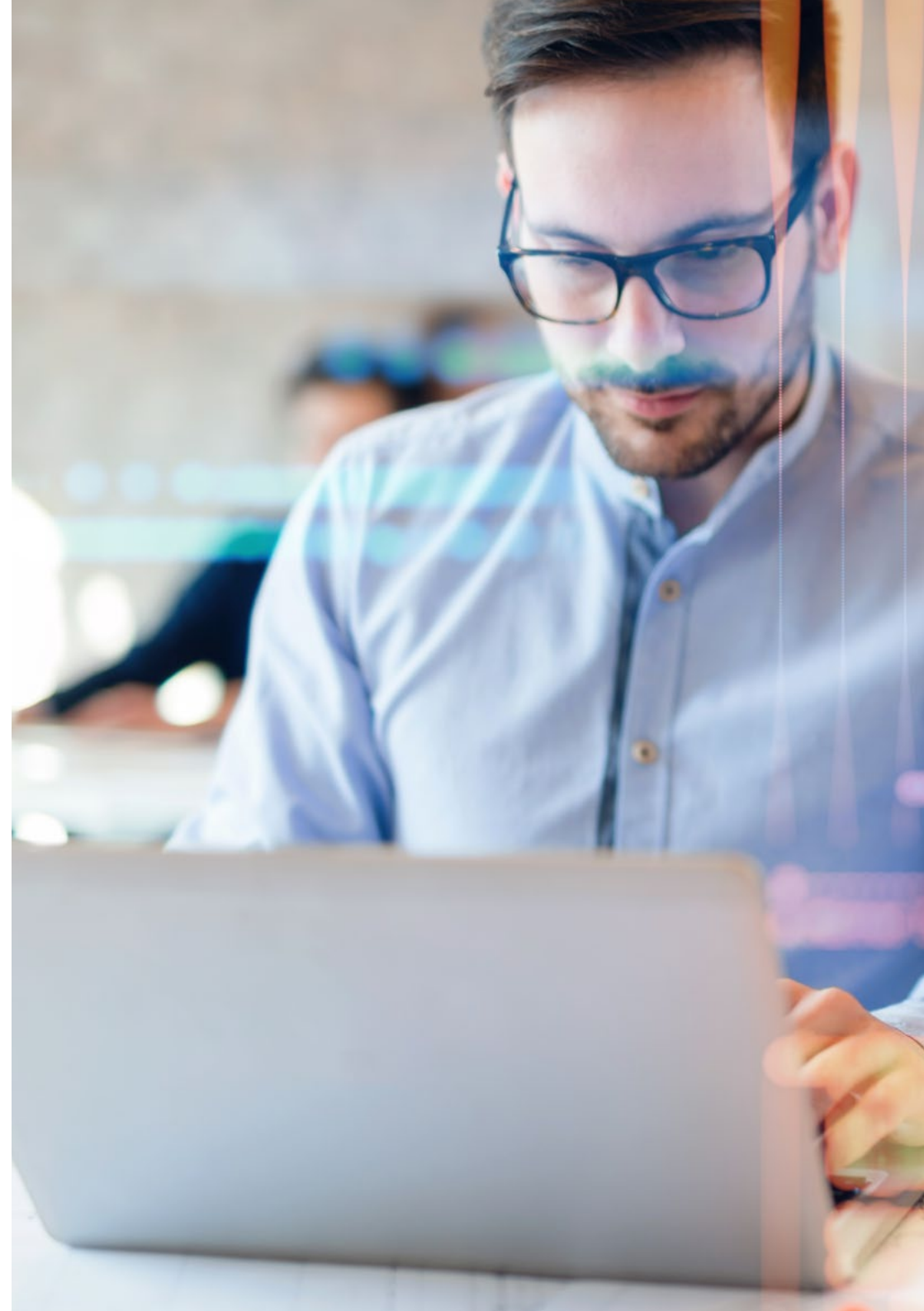


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*A comprehensive and current curriculum  
configured as a high quality training tool  
of exceptional quality”*

## Module 1. Intelligent Systems

- 1.1. Agents Theory
  - 1.1.1. Concept History
  - 1.1.2. Agent Definition
  - 1.1.3. Agents in Artificial Intelligence
  - 1.1.4. Agents in Software Engineering
- 1.2. Agent Architectures
  - 1.2.1. The Reasoning Process of an Agent
  - 1.2.2. Reactive Agents
  - 1.2.3. Deductive Agents
  - 1.2.4. Hybrid Agents
  - 1.2.5. Comparison
- 1.3. Information and Knowledge
  - 1.3.1. Difference between Data, Information and Knowledge
  - 1.3.2. Data Quality Assessment
  - 1.3.3. Data Collection Methods
  - 1.3.4. Information Acquisition Methods
  - 1.3.5. Knowledge Acquisition Methods
- 1.4. Knowledge Representation
  - 1.4.1. The Importance of Knowledge Representation
  - 1.4.2. Definition of Knowledge Representation According to Roles
  - 1.4.3. Knowledge Representation Features
- 1.5. Ontologies
  - 1.5.1. Introduction to Metadata
  - 1.5.2. Philosophical Concept of Ontology
  - 1.5.3. Computing Concept of Ontology
  - 1.5.4. Domain Ontologies and Higher-Level Ontologies
  - 1.5.5. Building an Ontology







- 1.6. Ontology Languages and Ontology Creation Software
  - 1.6.1. Triple RDF, Turtle and N3
  - 1.6.2. RDF Schema
  - 1.6.3. OWL
  - 1.6.4. SPARQL
  - 1.6.5. Introduction to Ontology Creation Tools
  - 1.6.6. Installing and Using Protégé
- 1.7. Semantic Web
  - 1.7.1. Current and Future Status of the Semantic Web
  - 1.7.2. Semantic Web Applications
- 1.8. Other Knowledge Representation Models
  - 1.8.1. Vocabulary
  - 1.8.2. Global Vision
  - 1.8.3. Taxonomy
  - 1.8.4. Thesauri
  - 1.8.5. Folksonomy
  - 1.8.6. Comparison
  - 1.8.7. Mind Maps
- 1.9. Knowledge Representation Assessment and Integration
  - 1.9.1. Zero-Order Logic
  - 1.9.2. First-Order Logic
  - 1.9.3. Descriptive Logic
  - 1.9.4. Relationship between Different Types of Logic
  - 1.9.5. Prolog: Programming Based on First-Order Logic
- 1.10. Semantic Reasoners, Knowledge-Based Systems and Expert Systems
  - 1.10.1. Concept of Reasoner
  - 1.10.2. Reasoner Applications
  - 1.10.3. Knowledge-Based Systems
  - 1.10.4. MYCIN: History of Expert Systems
  - 1.10.5. Expert Systems Elements and Architecture
  - 1.10.6. Creating Expert Systems

## Module 2. Artificial Intelligence and Knowledge Engineering

- 2.1. Introduction to Artificial Intelligence and Knowledge Engineering
  - 2.1.1. Brief History of Artificial Intelligence
  - 2.1.2. Artificial Intelligence Today
  - 2.1.3. Knowledge Engineering
- 2.2. Searching
  - 2.2.1. Common Search Concepts
  - 2.2.2. Uninformed Search
  - 2.2.3. Informed Search
- 2.3. Boolean Satisfiability, Constraint Satisfiability and Automatic Planning
  - 2.3.1. Boolean Satisfiability
  - 2.3.2. Constraint Satisfiability Problems
  - 2.3.3. Automatic Planning and PDDL
  - 2.3.4. Planning as Heuristic Search
  - 2.3.5. Planning with SAT
- 2.4. Artificial Intelligence in Games
  - 2.4.1. Game Theory
  - 2.4.2. Minimax and Alpha-Beta Pruning
  - 2.4.3. Simulation: Monte Carlo
- 2.5. Supervised and Unsupervised Learning
  - 2.5.1. Introduction to Machine Learning
  - 2.5.2. Classification
  - 2.5.3. Regression
  - 2.5.4. Validation of Results
  - 2.5.5. Clustering
- 2.6. Neural Networks
  - 2.6.1. Biological Fundamentals
  - 2.6.2. Computational Model
  - 2.6.3. Supervised and Unsupervised Neuron Networks
  - 2.6.4. Simple Perceptron
  - 2.6.5. Multilayer Perceptron
- 2.7. Genetic Algorithms
  - 2.7.1. History
  - 2.7.2. Biological Basis
  - 2.7.3. Problem Coding
  - 2.7.4. Generation of the Initial Population
  - 2.7.5. Main Algorithm and Genetic Operators
  - 2.7.6. Evaluation of Individuals: Fitness
- 2.8. Thesauri, Vocabularies, Taxonomies
  - 2.8.1. Vocabulary
  - 2.8.2. Taxonomy
  - 2.8.3. Thesauri
  - 2.8.4. Ontologies
- 2.9. Knowledge Representation Semantic Web
  - 2.9.1. Semantic Web
  - 2.9.2. Specifications RDF, RDFS and OWL
  - 2.9.3. Inference/ Reasoning
  - 2.9.4. Linked Data
- 2.10. Expert systems and DSS
  - 2.10.1. Expert Systems
  - 2.10.2. Decision Support Systems



**Module 3. Multiagent Systems and Computational Perception**

- 3.1. Agents and Multiagent Systems
  - 3.1.1. Concept of Agent
  - 3.1.2. Architecture
  - 3.1.3. Communication and Coordination
  - 3.1.4. Programming Languages and Tools
  - 3.1.5. Applications of the Agents
  - 3.1.6. The FIPA
- 3.2. The Standard for Agents: FIPA
  - 3.2.1. Communication between Agents
  - 3.2.2. Agent Management
  - 3.2.3. Abstract Architecture
  - 3.2.4. Other Specifications
- 3.3. The JADE Platform
  - 3.3.1. Software Agents According to JADE
  - 3.3.2. Architecture
  - 3.3.3. Installation and Execution
  - 3.3.4. JADE Packages
- 3.4. Basic Programming with JADE
  - 3.4.1. The Management Console
  - 3.4.2. Basic Creation of Agents
- 3.5. Advanced Programming with JADE
  - 3.5.1. Advanced Creation of Agents
  - 3.5.2. Communication between Agents
  - 3.5.3. Discovering Agents
- 3.6. Computer Vision
  - 3.6.1. Processing and Digital Analysis of Images
  - 3.6.2. Image Analysis and Artificial Vision
  - 3.6.3. Image Processing and Human Vision
  - 3.6.4. Image Capturing System
  - 3.6.5. Image Formation and Perception

- 3.7. Digital Image Analysis
  - 3.7.1. Stages of the Image Analysis Process
  - 3.7.2. Pre-Processing
  - 3.7.3. Basic Operations
  - 3.7.4. Spatial Filtering
- 3.8. Digital Image Transformation and Image Segmentation
  - 3.8.1. Fourier Transform
  - 3.8.2. Frequency Filtering
  - 3.8.3. Basic Concepts
  - 3.8.4. Thresholding
  - 3.8.5. Contour Detection
- 3.9. Shape Recognition
  - 3.9.1. Feature Extraction
  - 3.9.2. Classification Algorithms
- 3.10. Natural Language Processing
  - 3.10.1. Automatic Speech Recognition
  - 3.10.2. Computational Linguistics



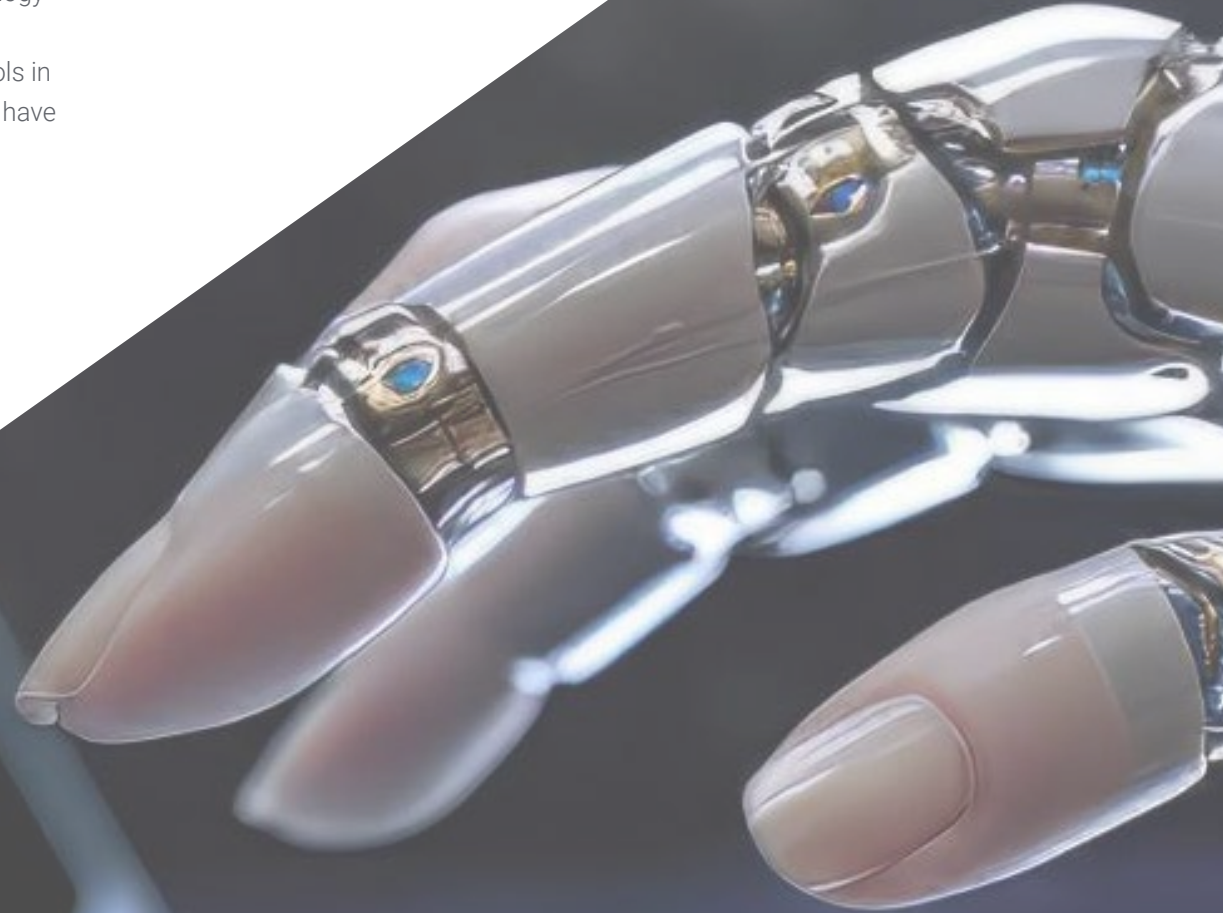
*You will have at your disposal the most modern educational resources, with free access to the virtual campus 24 hours a day"*

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





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

This **Postgraduate Diploma in Intelligent Systems** 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 diploma 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 Intelligent Systems**

Official N° of Hours: **450 h.**



\*Apostille Convention. In the event that the student wishes to have their paper diploma 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 Intelligent Systems

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



# Postgraduate Diploma Intelligent Systems

