Postgraduate Diploma

Distributed Computing

tech technological university

tech technological university

Postgraduate Diploma
Distributed Computing

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

Website: www.techtitute.com/us/information-technology/postgraduate-diploma/postgraduate-diploma-distributed-computing

Index

01

Introduction

Without the existence of so-called distributed computing systems, it would be impossible to understand technologies such as big data or an infinite number of existing Internet services. Advances in inter-process communication, cryptographic security, and distributed transactions have enabled unprecedented data replication, establishing an undeniable evolutionary framework for all computer scientists. During this diploma, you will extensively analyze various programming models focused on Distributed Computing, offering a distinct perspective that encompasses both theoretical foundations and a wide array of practical applications. The teaching team has made significant efforts to design a comprehensive and thorough program that will greatly propel the career path of computer scientists.

Take a step forward with this Postgraduate diploma in Distributed Computing and delve into the most cutting-edge techniques in computer science"

When discussing the widespread use of *smartphones* in daily life or the introduction of 5G as the new communication standard, a new realm of possibilities is emerging for computer scientists proficient in Distributed Computing. As time progresses, the degrees of processing and processing speed will continue to increase, which emphasizes the need for computer professionals to be adequately prepared to program at a higher level.

Indeed, this Postgraduate diploma is designed to provide computer professionals with the necessary knowledge and skills in the field of Distributed Computing. Students will receive a comprehensive education in everything related to Distributed Computing, tailored to the demands of today's market, thanks to a teaching team with extensive experience in managing and directing IT projects of this type.

In addition, the degree is offered as a fully online program, making it convenient to integrate with other personal or professional commitments. There are no in-person classes or set schedules; instead, computer scientists have the freedom to download the entire syllabus and allocate their study hours according to their own preferences.

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

- The program includes the development of case studies presented by experts in Parallel and Distributed Computing.
- The program is designed with graphical, schematic, and highly practical content, which gathers essential information about disciplines that are crucial for the professional practice.
- Practical exercises where self-assessment can be used to improve learning.
- Its special emphasis on innovative methodologies
- The program incorporates theoretical lessons, interactive question-and-answer sessions with experts, and individual reflection assignments.
- Content that is accessible from any fixed or portable device with an Internet connection

Achieve a significant promotion in your professional career by showcasing your advanced programming and distributed management skills through postgraduate diploma"

Gain valuable tips and insights from highly successful professionals who have been leaders in international development projects"

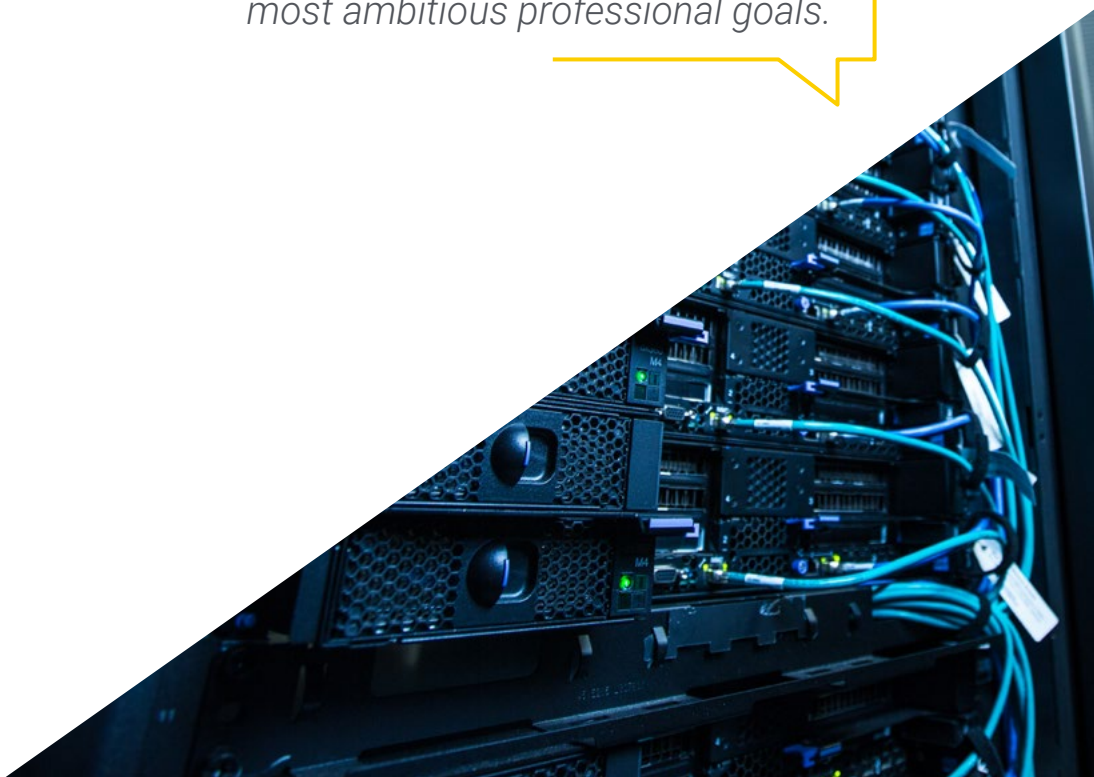
You will have 24/7 access to the virtual classroom, allowing you to choose when, where, and how to study all the educational materials.

TECH will provide you with the support and resources you need to achieve your most ambitious professional goals.

The teaching staff of the program consists of professionals from the industry who bring their valuable work experience to the table. Additionally, renowned specialists from leading societies and prestigious universities contribute their expertise to enrich the program.

The program's multimedia content, created using state-of-the-art educational technology, enables professionals to learn in a contextual and situated learning environment. This simulated environment offers immersive education specifically designed to prepare individuals for real-world situations.

The program's design emphasizes Problem-Based Learning, requiring professionals to actively solve various real-world practice situations that are presented to them throughout the academic year. For this purpose, the student will be assisted by an innovative interactive video system created by renowned and experienced experts.



02

Objectives

The main objective of this program is to offer a comprehensive study of advanced Distributed Computing, providing computer scientists with the necessary impetus to achieve significant professional advancement. This is achieved through the extensive experience of the teaching staff, who have also contributed their practical insights to the educational materials, laying the foundation for the program's knowledge in today's market.

You will achieve your most ambitious professional updating goals thanks to TECH's advanced teaching methodology"

General Objectives

- Analyze what happens between the different components of Parallel and Distributed Computing
- Measure and compare their efficiency to analyze the performance of the set of components used
- Conduct a thorough analysis of multi-platform parallel computing to leverage task-level parallelism across different hardware accelerators
- Analyze in detail current software and architectures
- Develop in depth the relevant aspects of Parallel and Distributed Computing
- Specialize the student in the use of Parallel and Distributed Computing in different sectors

You will be supported by a dedicated technical and teaching staff who are committed to your success and ready to answer any questions you may have"

Specific Objectives

Module 1. Distributed Systems in Computing

- Develop the key elements of a Distributed System
- Examine the security elements applied in Distributed Systems and their necessity
- Present the different types of Distributed Systems most commonly used, characteristics, functionalities and the problems to be solved
- Demonstrate the applicability of the CAP Theory to Distributed Systems. Consistency, Availability and Partition Tolerance

Module 2. Models and Formal Semantics. Programming oriented to distributed computing

- Identify the benefits of formal semantics
- Examine how formal semantics assists in programming for distributed computing
- Specify the possibilities of applying formal semantics to programming for distributed computing
- Delve into the main tools that determine the feasibility of projects utilizing this technology
- Identify programming languages in the semantic model
- Determine how these semantic models help us with programming languages
- Evaluate and compare computing models
- Specify the concrete applications of distributed models
- Introduce the most advanced market tools for projects

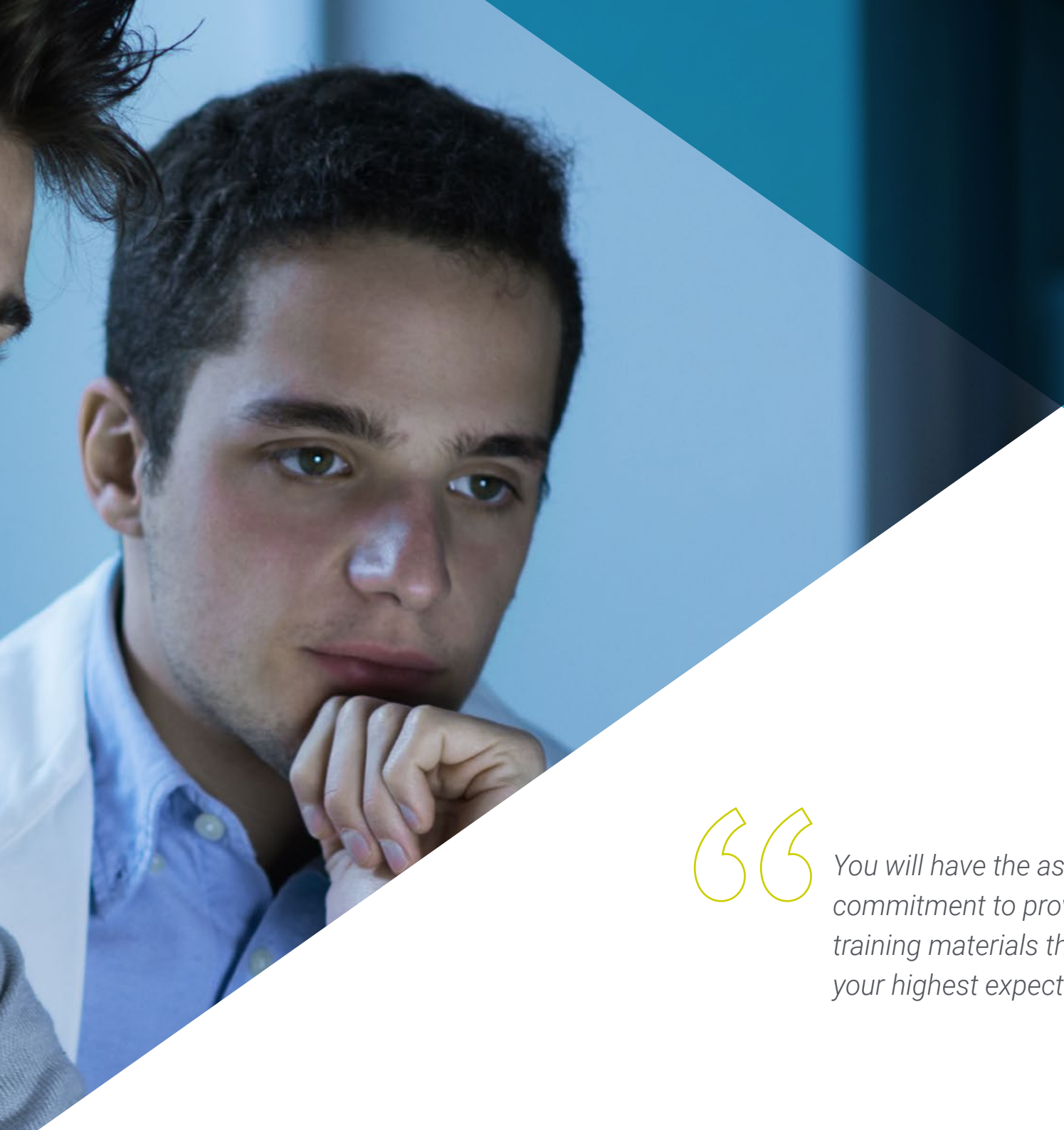
Module 3. Parallel and Distributed Computing Applications

- Demonstrate the great contribution of Parallel and Distributed Computing applications to our environment
- Identify the reference architectures available in market
- Evaluate the benefits of these practical applications
- Present successful solutions in the market
- Demonstrate why it is important for assessing climate change
- Determine the current importance of GPUs
- Present the impact of this technology on power grids
- Explore distributed engines to serve our customers
- Learn about the benefits of distributed computing to bring advantages to our companies
- Present examples of In-Memory Databases and their importance
- Examine how these models help medicine

03

Course Management

The instructors of this postgraduate diploma have accumulated significant experience in various international projects related to Distributed Computing, as mentioned before. As a result, all the program content benefits from the combination of the latest theory in Distributed Computing and practical experience in managing and implementing state-of-the-art projects.



You will have the assurance of TECH's commitment to providing comprehensive training materials that are tailored to meet your highest expectations"

Management

D. Olalla Bonal, Martín

- Senior Blockchain Practice Manager at EY
- Blockchain Client Technical Specialist for IBM
- Director of Architecture for Blocknitive
- Non-Relational Distributed Databases Team Coordinator for wedoIT (IBM Subsidiary)
- Infrastructure Architect at Bankia
- Head of Layout Department at T-Systems
- Department Coordinator for Bing Data Spain S.L.

Professors

Mr. Gozalo Fernández, Juan Luis

- Blockchain-based Product Manager for Open Canarias
- Director Blockchain DevOps Director at Alastria
- Director of Service Level Technology at Santander Spain
- Tinkerlink Mobile Application Development Manager at Cronos Telecom
- IT Service Management Technology Director at Barclays Bank Spain
- Bachelor's Degree in Computer Engineering from UNED
- *Deep Learning* Specialization in DeepLearning.ai

04

Structure and Content

The structure and content of this postgraduate diploma have been meticulously designed to provide students with maximum comfort and efficiency. The program consists of three modules, each of which is further divided into 10 different topics. These topics cover a wide range of areas, including the characteristics and design of Distributed Systems, Distributed Computing oriented programming, and the applications of Distributed Computing in the current landscape.

You will have access to a wide range of multimedia resources which include summary videos, detailed instructional videos, and motivational videos created by the teachers"

Module 1. Distributed Systems in Computing

1.1. Distributed Systems
- 1.1.1. Distributed Systems (SD)
- 1.1.2. Proof of the CAP Theorem (or Brewer's Conjecture)
- 1.1.3. Fallacies of Distributed Systems Programming
- 1.1.4. Ubiquitous Computing

1.2. Distributed Systems Features
- 1.2.1. Heterogeneity
- 1.2.2. Extensibility
- 1.2.3. Security/Safety
- 1.2.4. Scales
- 1.2.5. Fault Tolerance
- 1.2.6. Concurrency
- 1.2.7. Transparency

1.3. Networks and Interconnection of Distributed Networks
- 1.3.1. Networks and Distributed Systems.
- 1.3.2. Networks Available to Create a Distributed System. Typology
- 1.3.3. Network Protocols Distributed vs. Centralized
- 1.3.4. Interconnection of Networks. Internet

1.4. Communication Between Distributed Processes
- 1.4.1. Communication between nodes of a D.S. Problems and failures
- 1.4.2. Mechanisms to Implement Over RPC and RDMA to Avoid Failures
- 1.4.3. Mechanisms to Implement in the Software to Avoid Failures.

1.5. Distributed Systems Design
- 1.5.1. Efficient Design of Distributed Systems (SD)
- 1.5.2. Patterns for Distributed Systems (SD) Programming
- 1.5.3. Service Oriented Architecture SOA
- 1.5.4. Service Orchestration and Microservices Data Management

1.6. Distributed Systems Operation
- 1.6.1. Systems Monitoring
- 1.6.2. Implementing an Efficient Logging System in a DS
- 1.6.3. Monitoring in Distributed Networks
- 1.6.4. Use of a Monitoring Tool for an SD Prometheus and Grafana Prometheus y Grafana

1.7. System Replication
- 1.7.1. System Replication Typology
- 1.7.2. Immutable Architecture
- 1.7.3. Container Systems and Virtualizing Systems as Distributed Systems.
- 1.7.4. Blockchain Networks as Distributed Systems

1.8. Distributed Multimedia Systems
- 1.8.1. Distributed Exchange of Images and Videos. Problems
- 1.8.2. Multimedia Object Servers
- 1.8.3. Network Topology for a Multimedia System
- 1.8.4. Analysis of Distributed Multimedia Systems: Netflix, Amazon, Spotify, etc.
- 1.8.5. Distributed Multimedia Systems in Education

1.9. Distributed File Systems
- 1.9.1. Distributed File Sharing. Problems
- 1.9.2. Applicability of the CAP Theory to Databases.
- 1.9.3. Distributed Web File Systems: Akamai
- 1.9.4. IPFS Distributed Document File Systems
- 1.9.5. Distributed Database Systems

1.10. Security Approaches in Distributed Systems
- 1.10.1. Security in Distributed Systems
- 1.10.2. Known Attacks on Distributed Systems
- 1.10.3. Tools for Testing the Security of a DS

Module 2. Models and Formal Semantics. Programming oriented to distributed computing

2.1. Semantics Data Model
- 2.1.1. Semantics Data Model
- 2.1.2. Semantics Data Model. Purposes
- 2.1.3. Semantics Data Model. Applications

2.2. Semantic Model of Programming Languages
- 2.2.1. Language Processing
- 2.2.2. Translation and Interpretation
- 2.2.3. Hybrid Languages

2.3. Models of Computation
- 2.3.1. Monolithic Computing
- 2.3.2. Parallel Computing
- 2.3.3. Distributed Computing
- 2.3.4. Cooperative Computing (P2P)

2.4. Parallel Computing
- 2.4.1. Parallel Architecture
- 2.4.2. Hardware
- 2.4.3. Software

2.5. Distribution Models Grid Computing
- 2.5.1. Grid Computing Architecture
- 2.5.2. Grid Computing Architecture. Analysis
- 2.5.3. Grid Computing Architecture Applications

2.6. Distribution Models Cluster Computing
- 2.6.1. Cluster Computing Architecture
- 2.6.2. Cluster Computing Architecture Analysis
- 2.6.3. Cluster Computing Architecture Applications

2.7. Cluster Computing Current Tools to Implement Cluster Computing. Hypervisors
- 2.7.1. Market Competitors
- 2.7.2. VMware Hypervisor
- 2.7.3. Hyper-V

2.8. Distribution Models Cloud Computing
- 2.8.1. Architecture Cloud Computing
- 2.8.2. Cloud Computing Architecture. Analysis
- 2.8.3. Cloud Computing Architecture. Applications

2.9. Distribution Models Amazon Cloud Computing
- 2.9.1. Amazon Cloud Computing Functional Criteria
- 2.9.2. Amazon Cloud Computing Licensing
- 2.9.3. Amazon Cloud Computing Reference Architectures

2.10. Distribution Models Microsoft Cloud Computing
- 2.10.1. Microsoft Cloud Computing Functional Criteria
- 2.10.2. Microsoft Cloud Computing Licensing
- 2.10.3. Microsoft Cloud Computing Reference Architectures

Module 3. Parallel and Distributed Computing Applications

3.1. Parallel and Distributed Computing in Today's Applications
- 3.1.1. Hardware
- 3.1.2. Software
- 3.1.3. Importance of Timing

3.2. Climate. Climate Change.
- 3.2.1. Climate Applications. Data Sources
- 3.2.2. Climate Applications. Data Volumes
- 3.2.3. Climate Applications. Real Time

3.3. GPU Parallel Computing
- 3.3.1. GPU Parallel Computing
- 3.3.2. AIH vs. CPU. GPU Usage
- 3.3.3. GPU. Examples:

3.4. Smart Grid. Computing in Power Grids
- 3.4.1. Smart Grid
- 3.4.2. Conceptual Models. Examples:
- 3.4.3. Smart Grid. Example

3.5. Distributed Engine. ElasticSearch
- 3.5.1. Distributed Engine. ElasticSearch
- 3.5.2. Architecture with ElasticSearch. Examples:
- 3.5.3. Distributed Engine. Case Uses

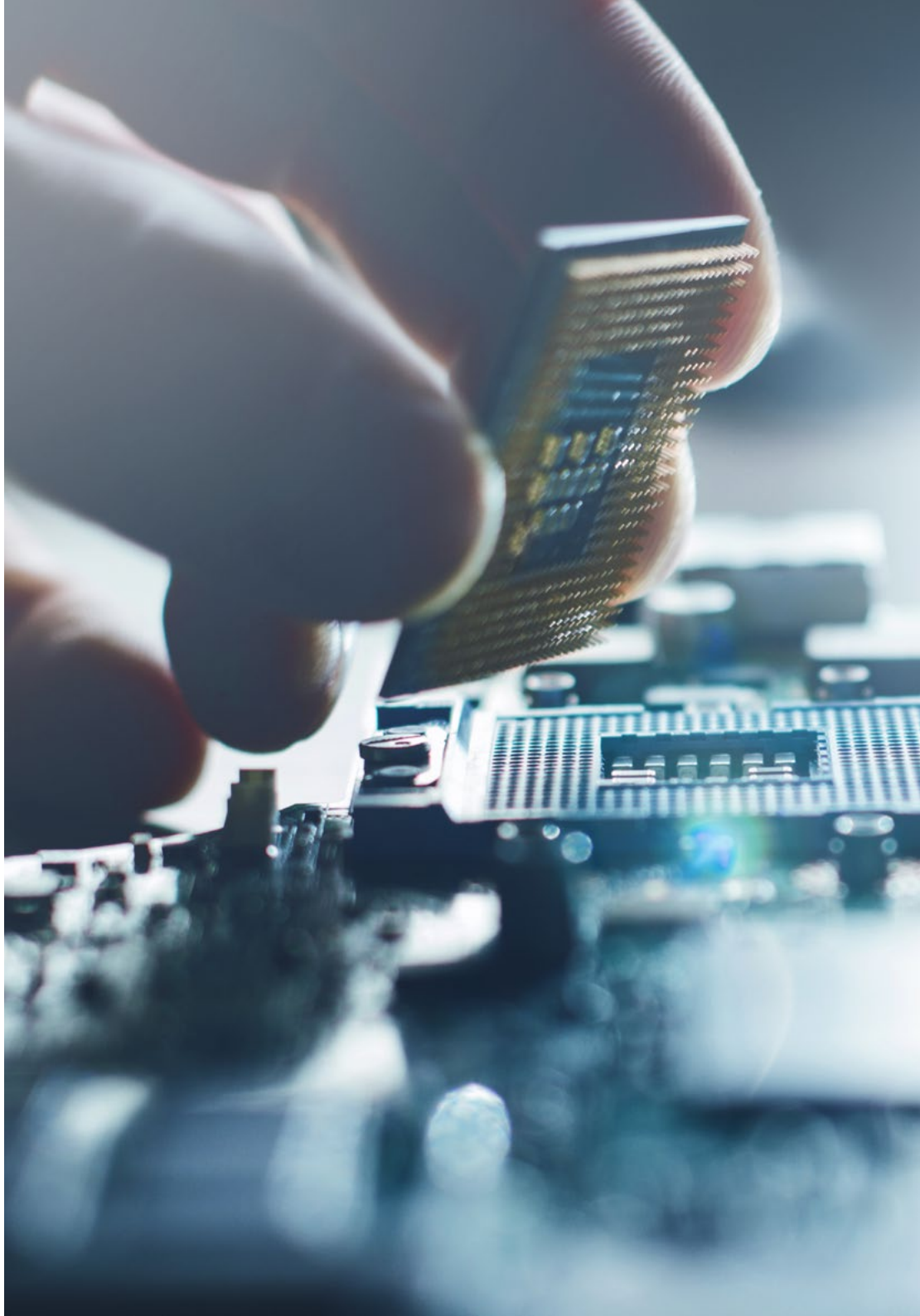
3.6. Big Data Framework
- 3.6.1. Big Data Framework
- 3.6.2. Architecture of Advanced Tools
- 3.6.3. Big Data in Distributed Computing

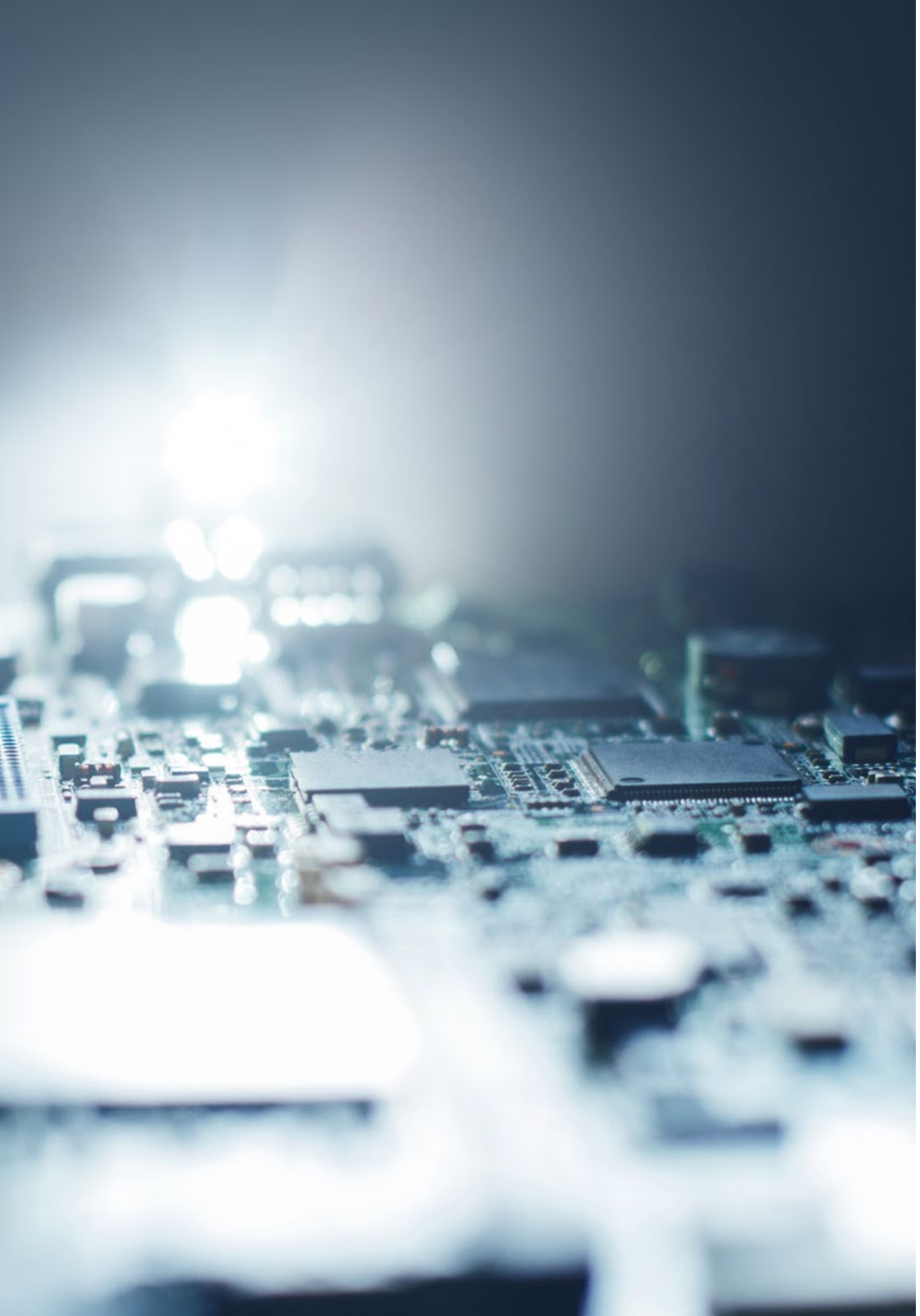
3.7. Memory Database
- 3.7.1. Memory Database
- 3.7.2. Redis Solution. Case Study
- 3.7.3. Deployment of Solutions With In-Memory Database

3.8. Blockchain.
- 3.8.1. Blockchain Architecture. Components
- 3.8.2. Collaboration Between Nodes and Consensus.
- 3.8.3. Blockchain Solutions. Implementations

3.9. Distributed Systems in Medicine
- 3.9.1. Architecture Components
- 3.9.2. Distributed Systems in Medicine. Operation
- 3.9.3. Distributed Systems in Medicine. Applications

3.10. Distributed Systems in the Aviation Sector
- 3.10.1. Architecture Design
- 3.10.2. Distributed Systems in the Aviation Sector. Component Functionalities
- 3.10.3. Distributed Systems in the Aviation Sector. Applications





You will be able to better contextualize the theory taught through the numerous exercises provided for each topic”

05

Methodology

This academic program offers students a different way of learning. Our methodology uses a cyclical learning approach: **Relearning.**

This teaching system is used, for example, in the most prestigious medical schools in the world, and major publications such as the **New England Journal of Medicine** have considered it to be one of the most effective.

Discover Relearning, a system that abandons conventional linear learning, to take you through cyclical teaching systems: a way of learning that has proven to be extremely effective, especially in subjects that require memorization"

Case Study to contextualize all content

Our program offers a revolutionary approach to developing skills and knowledge. Our goal is to strengthen skills in a changing, competitive, and highly demanding environment.

At TECH, you will experience a learning methodology that is shaking the foundations of traditional universities around the world"

You will have access to a learning system based on repetition, with natural and progressive teaching throughout the entire syllabus.

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

A learning method that is different and innovative

This TECH program is an intensive educational program, created from scratch, which presents the most demanding challenges and decisions in this field, both nationally and internationally. This methodology promotes personal and professional growth, representing a significant step towards success. The case method, a technique that lays the foundation for this content, ensures that the most current economic, social and professional reality is taken into account.

> *Our program prepares you to face new challenges in uncertain environments and achieve success in your career"*

The case method has been the most widely used learning system among the world's leading Information Technology schools for as long as they have existed. The case method was developed in 1912 so that law students would not only learn the law based on theoretical content. It consisted of presenting students with real-life, complex situations for them to make informed decisions and value judgments on how to resolve them. In 1924, Harvard adopted it as a standard teaching method.

What should a professional do in a given situation? This is the question that you are presented with in the case method, an action-oriented learning method. Throughout the course, students will be presented with multiple real cases. They will have to combine all their knowledge and research, and argue and defend their ideas and decisions.

Relearning Methodology

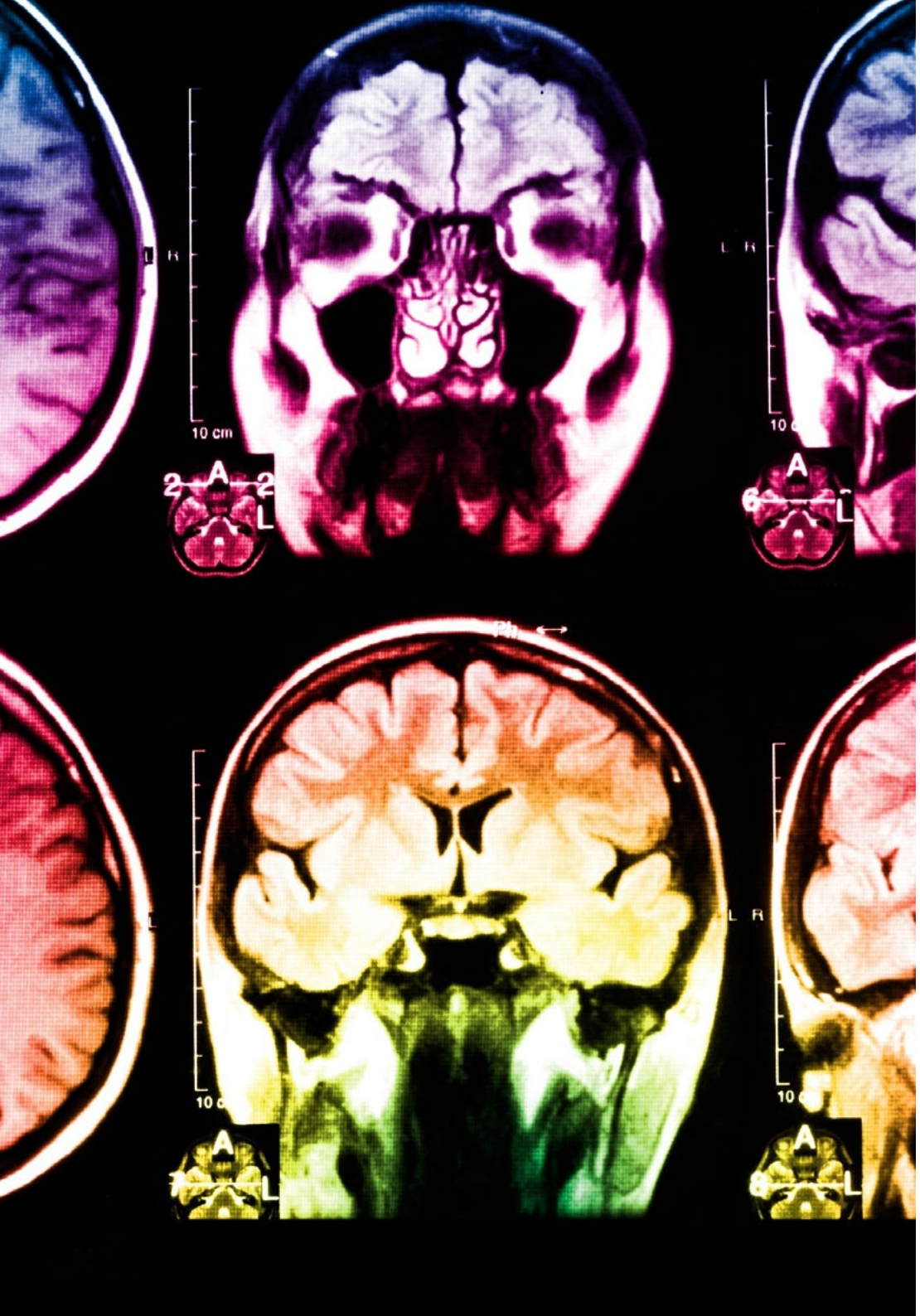
TECH effectively combines the Case Study methodology with a 100% online learning system based on repetition, which combines different teaching elements in each lesson.

We enhance the Case Study with the best 100% online teaching method: Relearning.

In 2019, we obtained the best learning results of all online universities in the world.

At TECH you will learn using a cutting-edge methodology designed to train the executives of the future. This method, at the forefront of international teaching, is called Relearning.

Our university is the only one in the world authorized to employ this successful method. In 2019, we managed to improve our students' overall satisfaction levels (teaching quality, quality of materials, course structure, objectives...) based on the best online university indicators.



In our program, learning is not a linear process, but rather a spiral (learn, unlearn, forget, and re-learn). Therefore, we combine each of these elements concentrically. This methodology has trained more than 650,000 university graduates with unprecedented success in fields as diverse as biochemistry, genetics, surgery, international law, management skills, sports science, philosophy, law, engineering, journalism, history, and financial markets and instruments. All this in a highly demanding environment, where the students have a strong socio-economic profile and an average age of 43.5 years.

Relearning will allow you to learn with less effort and better performance, involving you more in your training, developing a critical mindset, defending arguments, and contrasting opinions: a direct equation for success.

From the latest scientific evidence in the field of neuroscience, not only do we know how to organize information, ideas, images and memories, but we know that the place and context where we have learned something is fundamental for us to be able to remember it and store it in the hippocampus, to retain it in our long-term memory.

In this way, and in what is called neurocognitive context-dependent e-learning, the different elements in our program are connected to the context where the individual carries out their professional activity.

This program offers the best educational material, prepared with professionals in mind:

Study Material

All teaching material is produced by the specialists who teach the course, specifically for the course, so that the teaching content is highly specific and precise.

These contents are then applied to the audiovisual format, to create the TECH online working method. All this, with the latest techniques that offer high quality pieces in each and every one of the materials that are made available to the student.

Classes

There is scientific evidence suggesting that observing third-party experts can be useful.

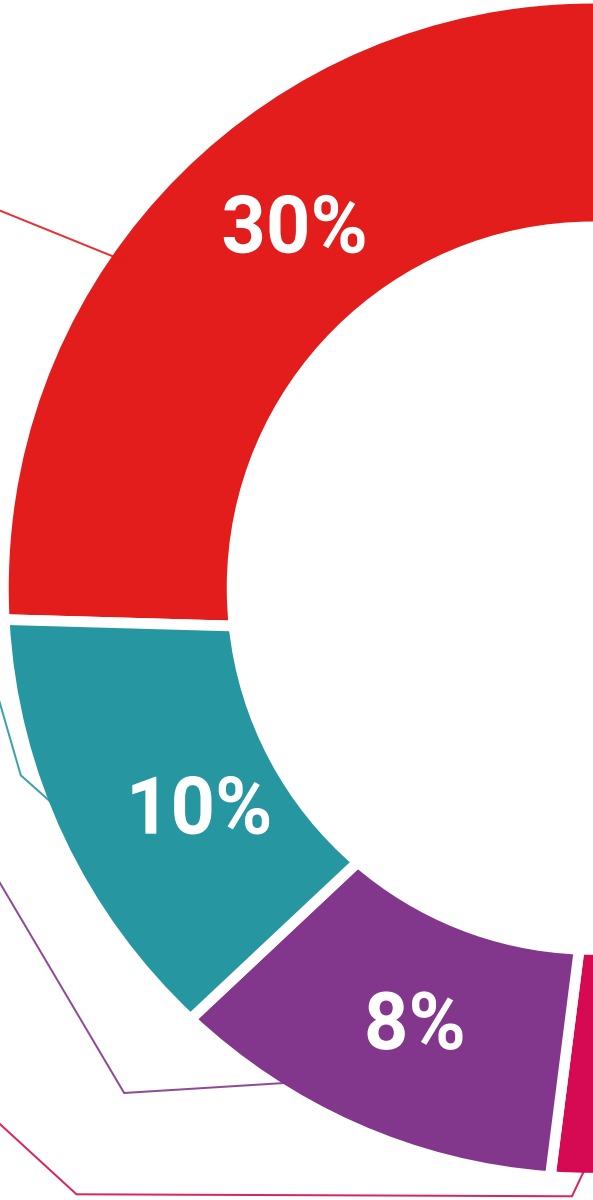
Learning from an Expert strengthens knowledge and memory, and generates confidence in future difficult decisions.

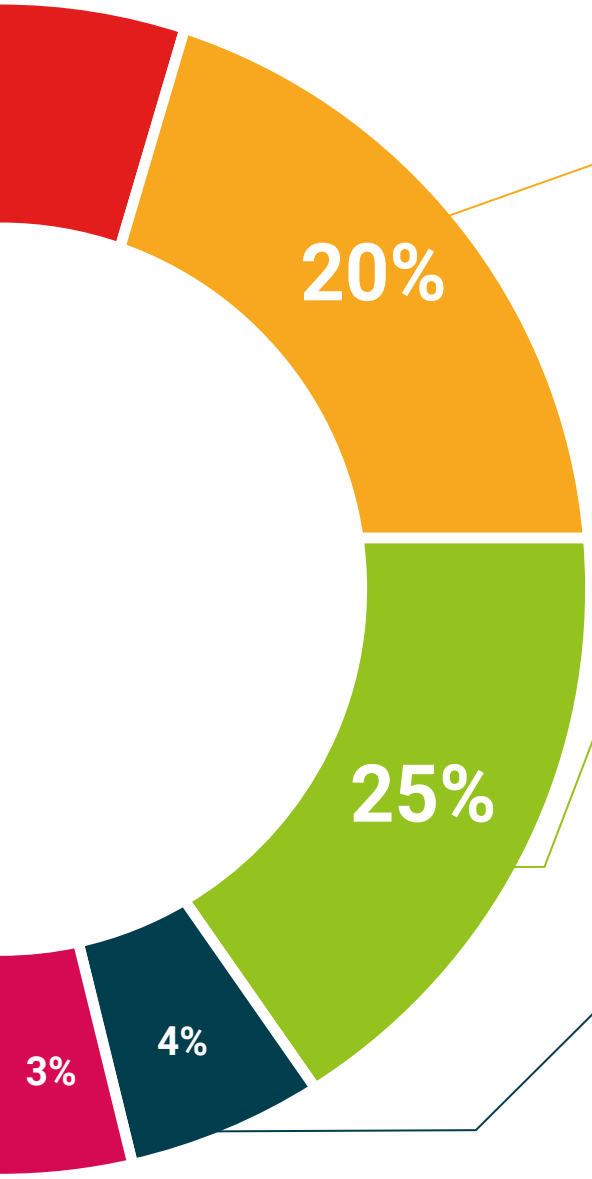
Practising Skills and Abilities

They will carry out activities to develop specific skills and abilities in each subject area. Exercises and activities to acquire and develop the skills and abilities that a specialist needs to develop in the context of the globalization that we are experiencing.

Additional Reading

Recent articles, consensus documents and international guidelines, among others. In TECH's virtual library, students will have access to everything they need to complete their course.





Case Studies

Students will complete a selection of the best case studies chosen specifically for this program. Cases that are presented, analyzed, and supervised by the best specialists in the world.

Interactive Summaries

The TECH team presents the contents attractively and dynamically in multimedia lessons that include audio, videos, images, diagrams, and concept maps in order to reinforce knowledge.

This exclusive educational system for presenting multimedia content was awarded by Microsoft as a "European Success Story".

Testing & Retesting

We periodically evaluate and re-evaluate students' knowledge throughout the program, through assessment and self-assessment activities and exercises, so that they can see how they are achieving their goals.

06

Certificate

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

By successfully completing this program, you can obtain your certificate and without the need for travel or dealing with cumbersome paperwork"

This **Postgraduate Diploma in Distributed Computing** 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 Distributed Computing**

Official Nº of Hours: **450 h.**


tech technological university

Awards the following

DIPLOMA

to

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

For having passed and accredited the following program

POSTGRADUATE DIPLOMA

in

Distributed Computing

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

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 EDUCATION will make the necessary arrangements to obtain it, at an additional cost.

tech technological university

Postgraduate Diploma
Distributed Computing

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

Postgraduate Diploma

Distributed Computing

tech technological university