



# Postgraduate Certificate Advanced Algorithms Design

» Modality: online» Duration: 6 weeks

» Certificate: TECH Global University

» Credits: 6 ECTS

» Schedule: at your own pace

» Exams: online

We bsite: www.techtitute.com/us/information-technology/postgraduate-certificate/advanced-algorithms-design

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# Introduction

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# tech 06 | Introduction

This program is intended for those interested in achieving a higher level of knowledge in Advanced Algorithms Design.. The main objective is to learn student to apply in real world the knowledge acquired in this Postgraduate Certificate, in a work environment that reproduces the conditions that can be found in their future, in a rigorous and realistic way.

This Postgraduate Certificate will prepare the student for professional practice of computer engineering, thanks to a transversal and versatile study adapted to new technologies and innovations in this field. You will obtain wide knowledge in Advanced Algorithms Design, from the hand of professionals in the sector.

The student will be able to take advantage of the opportunity and take this course in a 100% online format, without having to give up their obligations.

This **Postgraduate Certificate in Advanced Algorithms Design** 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 Advanced Algorithms Design
- Its graphic, schematic and eminently practical contents provide scientific and practical information on Advanced Algorithms Design
- News on the latest advances in Advanced Algorithms Design
- Contains practical exercises where the self-assessment process can be performed 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





It includes in its teaching staff professionals belonging to the Computer Engineering field, who pour into this learning their work experience, as well as recognized specialists belonging to reference societies and prestigious universities.

Thanks to its multimedia content developed with the latest educational technology, this Postgraduate Certificate will allow the professional a situated and contextual learning, that is, a simulated environment that will provide an immersive learning programmed to prepare for real situations.

The program's design is focused on Problem-Based Learning, by means of which the professor must try to solve different professional practice situations that arise throughout the Postgraduate Certificate. For this, the professional will be assisted by an innovative interactive video system created by recognized experts in Advanced Algorithms Design with extensive teaching experience.

Take advantage of the latest educational technology to get updated in Advanced Algorithms Design without leaving home.

Learn the latest techniques in Advanced Algorithms Design from experts in the field.







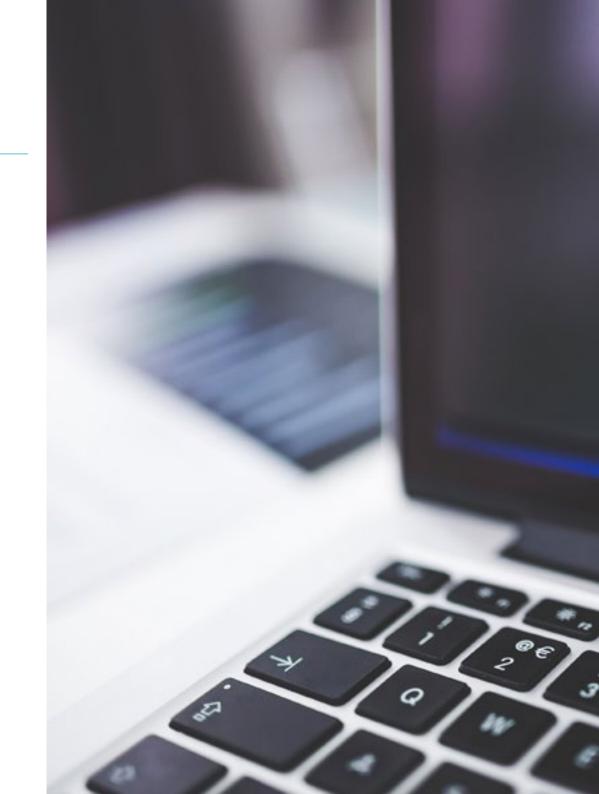
# tech 10 | Objectives



# **General Objectives**

- To educate scientifically and technologically, as well as to prepare for professional practice of Computer Engineering, all this with a transversal and versatile education adapted to new technologies and innovations in this field
- To obtain wide knowledge in computing field, computer structure and Advanced Algorithm Design, including mathematical, statistical and physics basis essential in engineering





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### Objectives | 11 tech



#### **Specific Objectives**

- To deepen in advanced design of algorithms, analyzing recursive and divide and conquer algorithms, as well as performing amortized analysis
- To understand dynamic programming concepts and algorithms for NP problems
- To understand combinatorial optimization operation, as well as different randomization algorithms and parallel algorithms
- To know and understand the operation of different local and candidate search methods
- To learn mechanisms of formal program verification and iterative program verification, including first-order logic and Hoare's formal system
- To learn operation of some of the main numerical methods such as bisection method, Newton Raphson method and secant method





## tech 14 | Structure and Content

#### Module 1. Advanced Algorithms Design

- 1.1. Analysis of Recursive and Divide and Conquer Algorithms
  - 1.1.1. Posing and Solving Homogeneous and Non-Homogeneous Recurrence Equations
  - 1.1.2. General Description of the Divide and Conquer Strategy
- 1.2. Amortized Analysis
  - 1.2.1. Aggregate Analysis
  - 1.2.2. The Accounting Method
  - 1.2.3. The Potential Method
- 1.3. Dynamic Programming and Algorithms for NP Problems
  - 1.3.1. Characteristics of Dynamic Programming
  - 1.3.2. Backtracking: Backtracking
  - 1.3.3. Branching and Pruning
- 1.4. Combinatorial Optimization
  - 1.4.1. Representation
  - 1.4.2. 1D Optimization
- 1.5. Randomization Algorithms
  - 1.5.1. Examples of Randomization Algorithms
  - 1.5.2. The Buffon Theorem
  - 1.5.3. Monte Carlo Algorithm
  - 1.5.4. Las Vegas Algorithm
- 1.6. Local and Candidate Search
  - 1.6.1. Gradient Ascent
  - 1.6.2. Hill Climbing
  - 1.6.3. Simulated Annealing
  - 1.6.4. Tabu Search
  - 1.6.5. Candidate Search





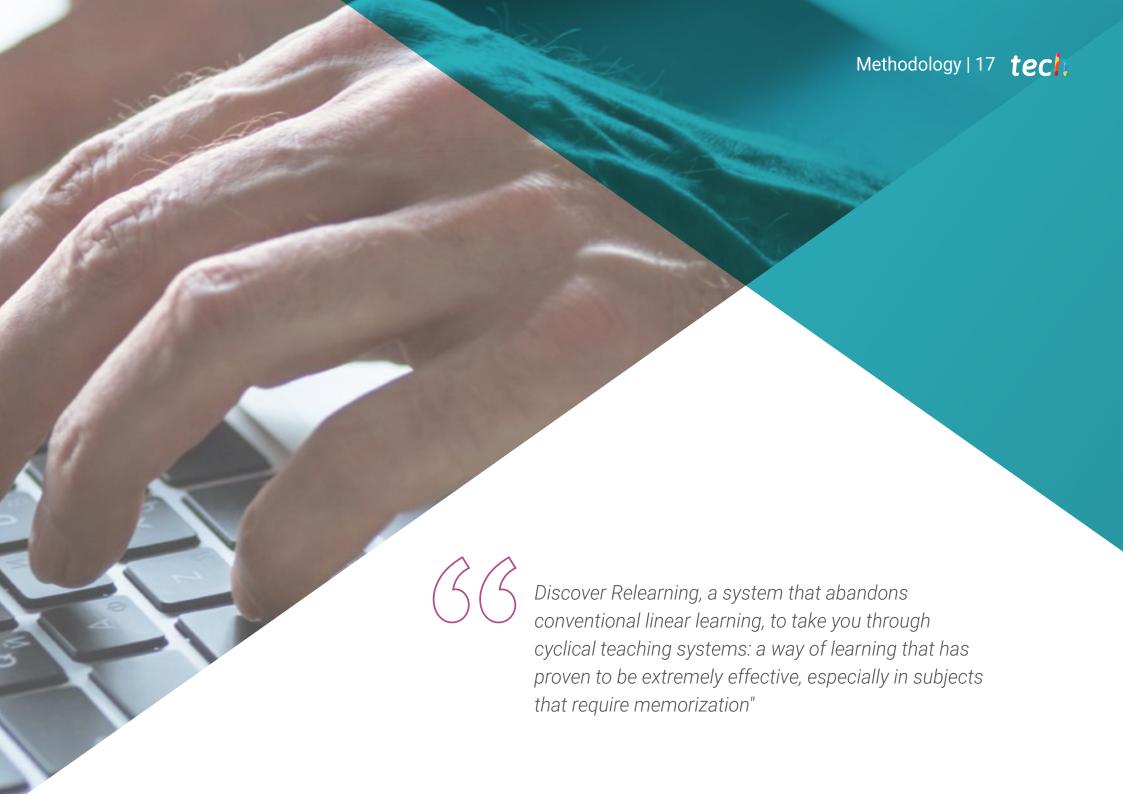
## Structure and Content | 15 tech

- Formal Verification of Programs
  - 1.7.1. Specification of Functional Abstractions
  - 1.7.2. The Language of First-Order Logic
  - 1.7.3. Hoare's Formal System
- Verification of Iterative Programs
  - 1.8.1. Rules of Hoare's Formal System
  - 1.8.2. Concept of Invariant Iterations
- Numeric Methods
  - 1.9.1. The Bisection Method
  - 1.9.2. Newton Raphson's Method
  - 1.9.3. The Secant Method
- 1.10. Parallel Algorithms
  - 1.10.1. Parallel Binary Operations
  - 1.10.2. Parallel Operations with Networks
  - 1.10.3. Parallelism in Divide and Conquer
  - 1.10.4. Parallelism in Dynamic Programming



A unique, key, and decisive training experience to boos training experience to boost your professional development"





# tech 18 | Methodology

#### 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.

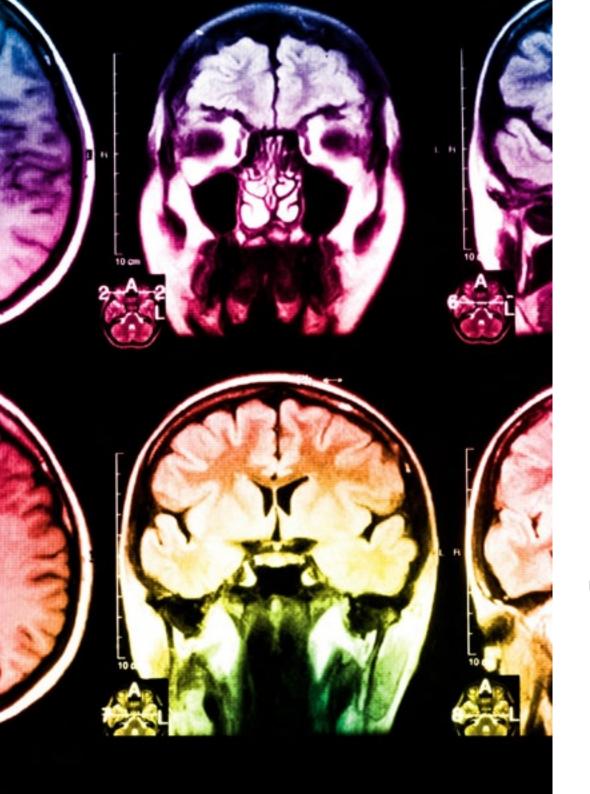
We enhance the Case Study with the best 100% online teaching method: Relearning.

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.





## Methodology | 21 tech

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.



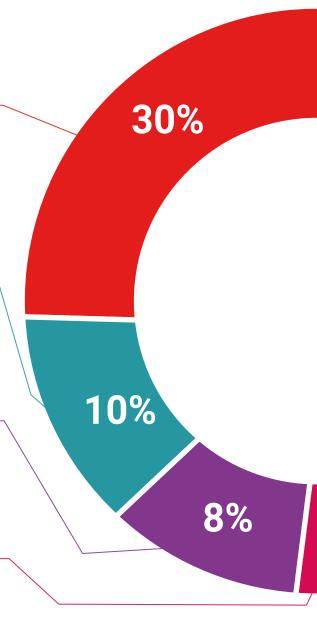
#### **Practising Skills and Abilities**

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.





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.

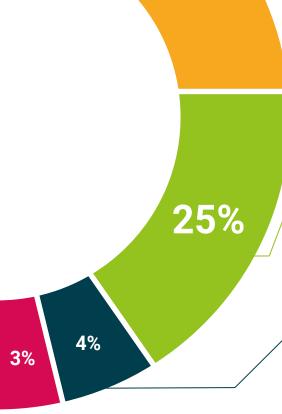


This exclusive educational system for presenting multimedia content was awarded by Microsoft as a "European Success Story".

#### **Testing & Retesting**

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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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# tech 26 | Certificate

This program will allow you to obtain your **Postgraduate Certificate in Advanced Algorithms Design** 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 Advanced Algorithms Design

Modality: online

Duration: 6 weeks

Accreditation: 6 ECTS



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

#### Postgraduate Certificate in Advanced Algorithms Design

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



<sup>\*</sup>Apostille Convention. In the event that the student wishes to have their paper certificate issued with an apostille, TECH Global University will make the necessary arrangements to obtain it, at an additional cost.

health confidence people
health information tutors
education information teaching
guarantee accreditation teaching
institutions technology learning
community commitment



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