

Postgraduate Certificate Multiphase Flow Simulation





Postgraduate Certificate Multiphase Flow Simulation

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

Website: www.techtitute.com/in/information-technology/postgraduate-certificate/multiphase-flow-simulation

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01

Introduction

Computer science students specializing in Multiphase Flow Simulation have a unique advantage in designing safer and more efficient systems, as they can accurately predict how the different components of a system interact and adjust their design accordingly. For this reason, TECH Technological University has designed a degree that allows students to maximize their knowledge of aspects such as Flow Regimes, Continuous Phases, Coupled Solution or Marine Simulation, among others. All this, thanks to a 100% online modality and with the most dynamic and practical multimedia materials available on the academic market.





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Improve your skills and acquire new knowledge about Coupled Solution and Surface Tension, thanks to the best online university in the world according to Forbes, thanks to TECH Technological University"

Acquiring knowledge of Multiphase Flow Simulation is essential for the design of safer and more efficient systems in different industries, for advancing scientific knowledge and for competitiveness in the labor market. Computer science students trained in this field have the opportunity to apply their programming and modelling skills to contribute to a wide range of fields, from biotechnology to process engineering and environmental science.

For this reason, TECH Technological University has designed a Postgraduate Certificate in Multiphase Flow Simulation with the aim of providing students with the necessary skills and competences to be able to carry out their work as specialists with the highest possible efficiency and quality. Thus, throughout this program, aspects such as Evaporation Models, Brownian Motion and the Effects of Turbulence or Aerodynamic Drag will be dealt with.

All this, through a convenient 100% online modality that allows Students to organize their schedules and studies, combining them with their other work and interests. In addition, this degree has the most Complete theoretical and practical materials on the market, which facilitates the student's study process and allows them to achieve their objectives quickly and effectively.

This **Postgraduate Certificate in Multiphase flow Simulation** contains the most complete and up-to-date program on the market. The most important features include:

- ◆ The development of practical cases presented by experts in Multiphase flow Simulation
- ◆ The graphic, schematic and practical contents of the program provide Rehabilitation and practical information on those 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



Become an expert in Stock and Water Sheet Interactions in a few weeks and with total freedom of organization"

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Enhance your professional profile in one of the most promising areas in the field of IT, thanks to TECH Technological University and the most innovative materials on the academic market”

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. For this purpose, the student will be assisted by an innovative interactive video system created by renowned experts.

Access all the content on Boundary Conditions or Visualization and Interpretation of Results, from your Tablet, mobile or computer.

Delve into the Transport of Populations from the comfort of your home and at any time of the day.



02

Objectives

The final objective of this Postgraduate Certificate in Multiphase Flow Simulation is that the student acquires a precise update of his knowledge in this area. An update that will allow students to work with the highest possible quality and efficiency. All this, thanks to TECH Technological University and a 100% online modality that gives total freedom of organization and schedules.





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Delve into all the essentials of Multiphase Flow Simulation, from the comfort of your home or work office"



General Objectives

- ◆ Establish the basis for the study of turbulence
- ◆ Develop CFD statistical concepts
- ◆ Determine the main computational techniques in turbulence research
- ◆ Generate specialized knowledge in the method of Finite Volumes
- ◆ Acquire specialized knowledge in fluid mechanics calculation techniques
- ◆ Examine the wall units and the different regions of a turbulent wall flow
- ◆ Determine the characteristics of compressible flows
- ◆ Examine multiple models and multiphase methods
- ◆ Develop expertise on multiple models and methods in multi-physics and thermal analysis
- ◆ Interpret the results obtained by correct post-processing





Specific Objectives

- ◆ Distinguish what type of multiphase flow is to be simulated: continuous phases, such as simulating a ship at sea, a continuous medium; discrete phases, such as simulating specific droplet trajectories; or use statistical populations when the number of particles, droplets or bubbles is too large to be simulated
- ◆ Establish the difference between Lagrangian, Eulerian and mixed methods
- ◆ Determine the tools best suited to the type of flow to be simulated
- ◆ Modelling the effects of surface tension and phase changes such as evaporation, condensation or cavitation
- ◆ Develop boundary conditions for wave simulation, learn about the different wave models and apply the so-called numerical beach, a region of the domain located at the exit whose objective is to avoid wave reflection



Exceed your highest expectations, thanks to a unique program with the most complete theoretical and practical materials on the academic market"

03

Course Management

In order to provide a curriculum of the highest quality and usefulness, TECH Technological University has selected professionals specialized in Multiphase Flow Simulation as part of this teaching staff, who have been in charge of designing the most advanced and complete contents. In this way, students will learn from the best the keys to their professional development in a field that adapts to the latest advances in the market.





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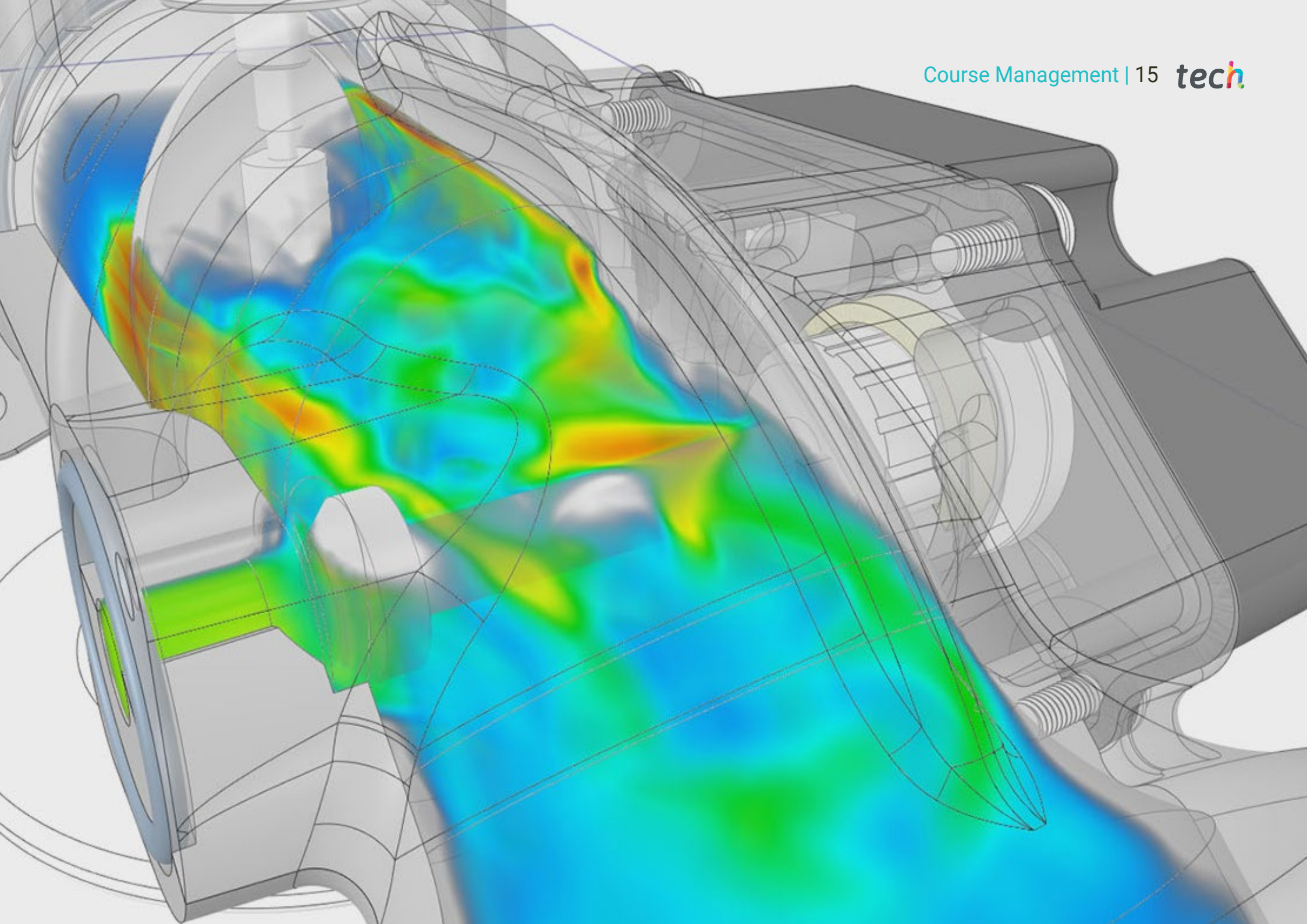
The most experienced management and teaching staff will provide you with the most up-to-date knowledge on Population Transport and Particle Source Term, preparing you to face the most demanding challenges in this area"

Management



Dr. García Galache, José Pedro

- XFlow Development Engineer at Dassault Systèmes
- Doctor in Aeronautical Engineering from the Polytechnic University of Valencia
- Degree in Aeronautical Engineering from the Polytechnic University of Valencia
- Research Master's Degree in Fluid Mechanics by the Von Kármán Institute for Fluid Dynamics
- Programa de formación breve en el Instituto Von Kármán de Dinámica de Fluidos



04

Structure and Content

The structure and didactic contents of this Postgraduate Certificate in Multiphase Flow Simulation have been designed by the renowned professionals who make up TECH Technological University team of experts in the field of Computer Science. These specialists have drawn on their extensive experience and up-to-date knowledge to create practical and completely innovative content. All of this, based on the most efficient pedagogical methodology, TECH Technological University Relearning.



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*Acquire the most comprehensive
and up-to-date view on Population
Boundary Conditions”*

Module 1. Multiphase flow

- 1.1. Flow regimes
 - 1.1.1. Continued phase
 - 1.1.2. Discrete phase
 - 1.1.3. Discrete phase populations
- 1.2. Continuous phases
 - 1.2.1. Properties of the liquid-gas interface
 - 1.2.2. Each phase a domain
 - 1.2.2.1. Independent phase resolution
 - 1.2.3. Coupled solution
 - 1.2.3.1. Fluid fraction as a descriptive phase scalar
 - 1.2.4. Reconstruction of the gas-liquid interface
- 1.3. Marine simulation
 - 1.3.1. Wave regimes. Wave height vs. depth
 - 1.3.2. Input boundary condition. Wave simulation
 - 1.3.3. Non-reflective output boundary condition. Numerical beach
 - 1.3.4. Lateral boundary conditions. Lateral wind and drift
- 1.4. Surface Tension
 - 1.4.1. Physical Phenomenon of the Surface Tension
 - 1.4.2. Modeling
 - 1.4.3. Interaction with surfaces. Angle of wetting
- 1.5. Phase Changes
 - 1.5.1. Source and sink terms associated with phase change
 - 1.5.2. Evaporation models
 - 1.5.3. Condensation and precipitation models. Nucleation of droplets
 - 1.5.4. Cavitation
- 1.6. Discrete phase: particles, droplets and bubbles
 - 1.6.1. Resistance strength
 - 1.6.2. The buoyancy force
 - 1.6.3. Inertia
 - 1.6.4. Brownian motion and turbulence effects
 - 1.6.5. Other forces



- 1.7. Interaction with the surrounding fluid
 - 1.7.1. Generation from continuous phase
 - 1.7.2. Aerodynamic drag
 - 1.7.3. Interaction with other entities, coalescence and rupture
 - 1.7.4. Boundary Conditions
- 1.8. Statistical description of particle populations. Packages
 - 1.8.1. Transportation of stocks
 - 1.8.2. Stock boundary conditions
 - 1.8.3. Stock interactions
 - 1.8.4. Extending the discrete phase to populations
- 1.9. Water film
 - 1.9.1. Water Sheet Hypothesis
 - 1.9.2. Equations and modeling
 - 1.9.3. Source term from particles
- 1.10. Example of an application with OpenFOAM
 - 1.10.1. Description of an industrial problem
 - 1.10.2. *Setup* and simulation
 - 1.10.3. Visualization and interpretation of results

“Achieve your most demanding objectives thanks to the most efficient teaching methodology, TECH Technological University Relearning”



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.

“

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.



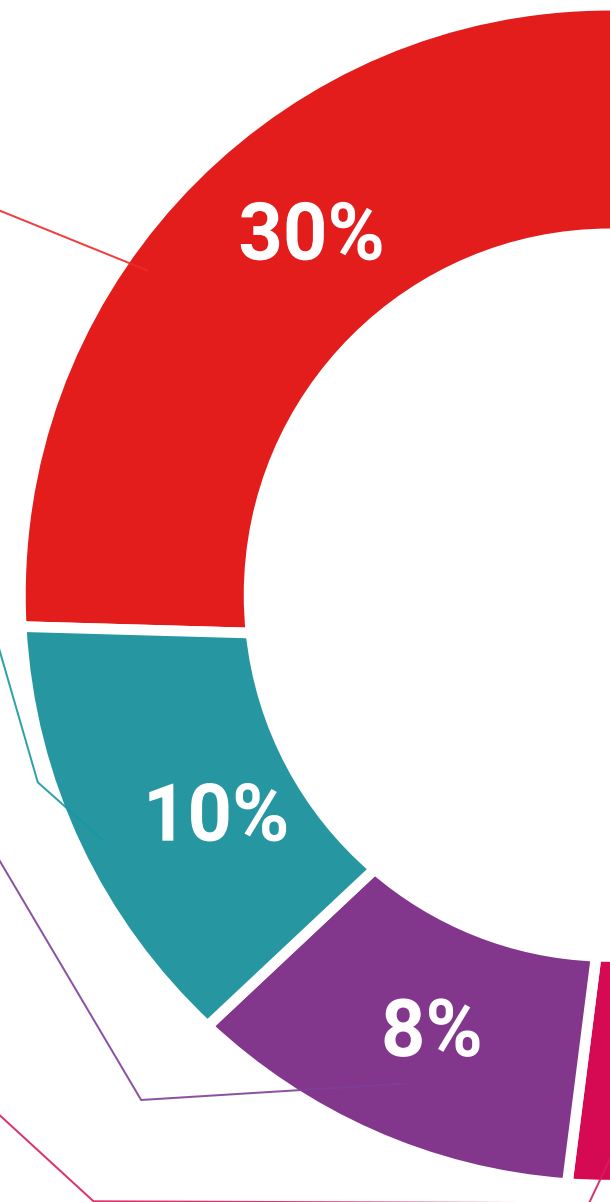
Practising Skills and Abilities

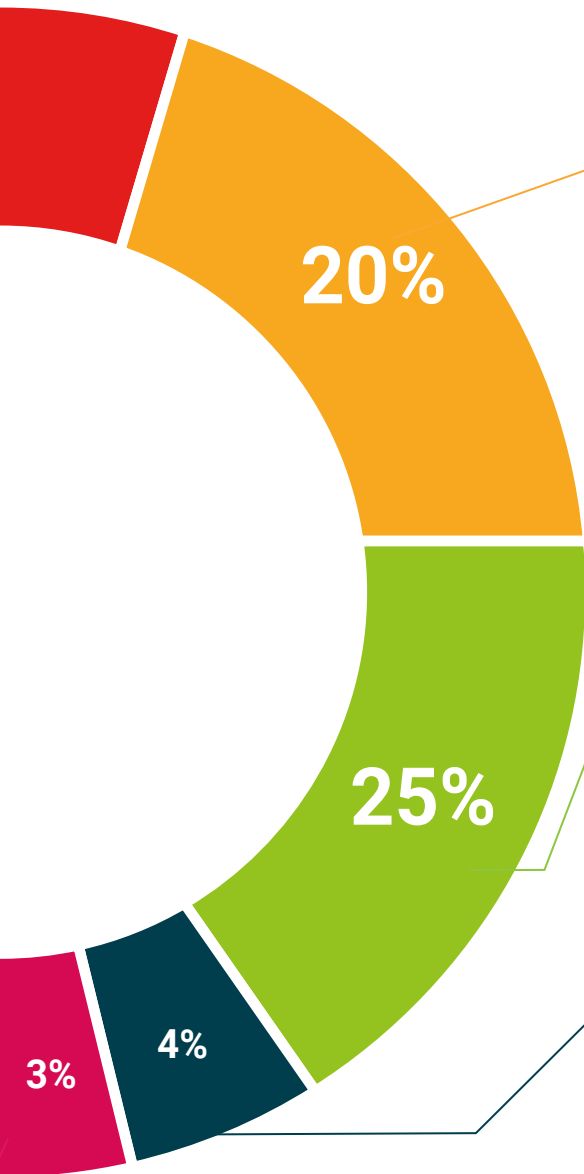
They will carry out activities to develop specific skills and abilities in each subject area. Exercises and activities to acquire and develop the skills and abilities that a specialist needs to develop in the context of the globalization that we are experiencing.



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 Certificate in Multiphase flow Simulation guarantees students, in addition to the most rigorous and up-to-date education, access to a Postgraduate Certificate 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 Certificate in Multiphase flow Simulation** 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 Certificate** issued by **TECH Technological University** via tracked delivery*.

The certificate issued by **TECH Technological University** will reflect the qualification obtained in the Postgraduate Certificate, and meets the requirements commonly demanded by labor exchanges, competitive examinations, and professional career evaluation committees.

Title: **Postgraduate Certificate in Multiphase Fluids Simulation**

Official N° of hours: **150 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.



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