Postgraduate Certificate
Turbulence Modeling and Boundary Layer

tec**h** global university

Postgraduate Certificate
Turbulence Modeling and Boundary Layer

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

Website: **www.techtitute.com/us/information-technology/postgraduate-certificate/turbulence-modeling-boundary-layer**

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Introduction

Turbulence and boundary layer modeling is a fundamental field for the simulation and design of systems related to fluid dynamics. For a computer scientist, studying these topics is crucial, as knowledge of them will enable the development of more accurate and efficient algorithms and simulation software. For this reason, TECH Global University has designed a Postgraduate that allows students to maximize their knowledge in aspects such as Turbulence, Energy Cascade, Wall Problem or Visualization Techniques, among others. All this, thanks to a 100% online modality and with the most dynamic and practical multimedia materials available in the academic market.
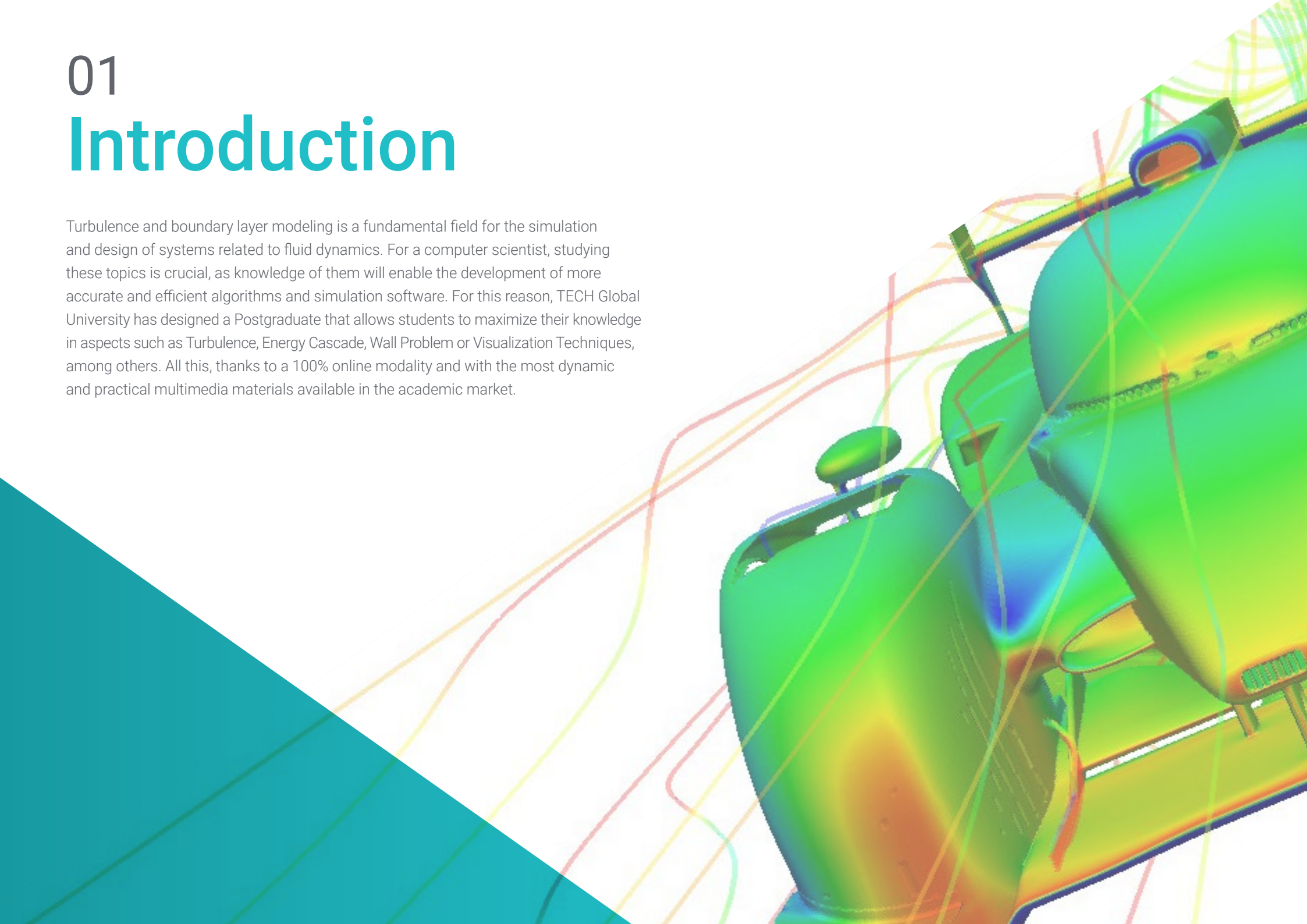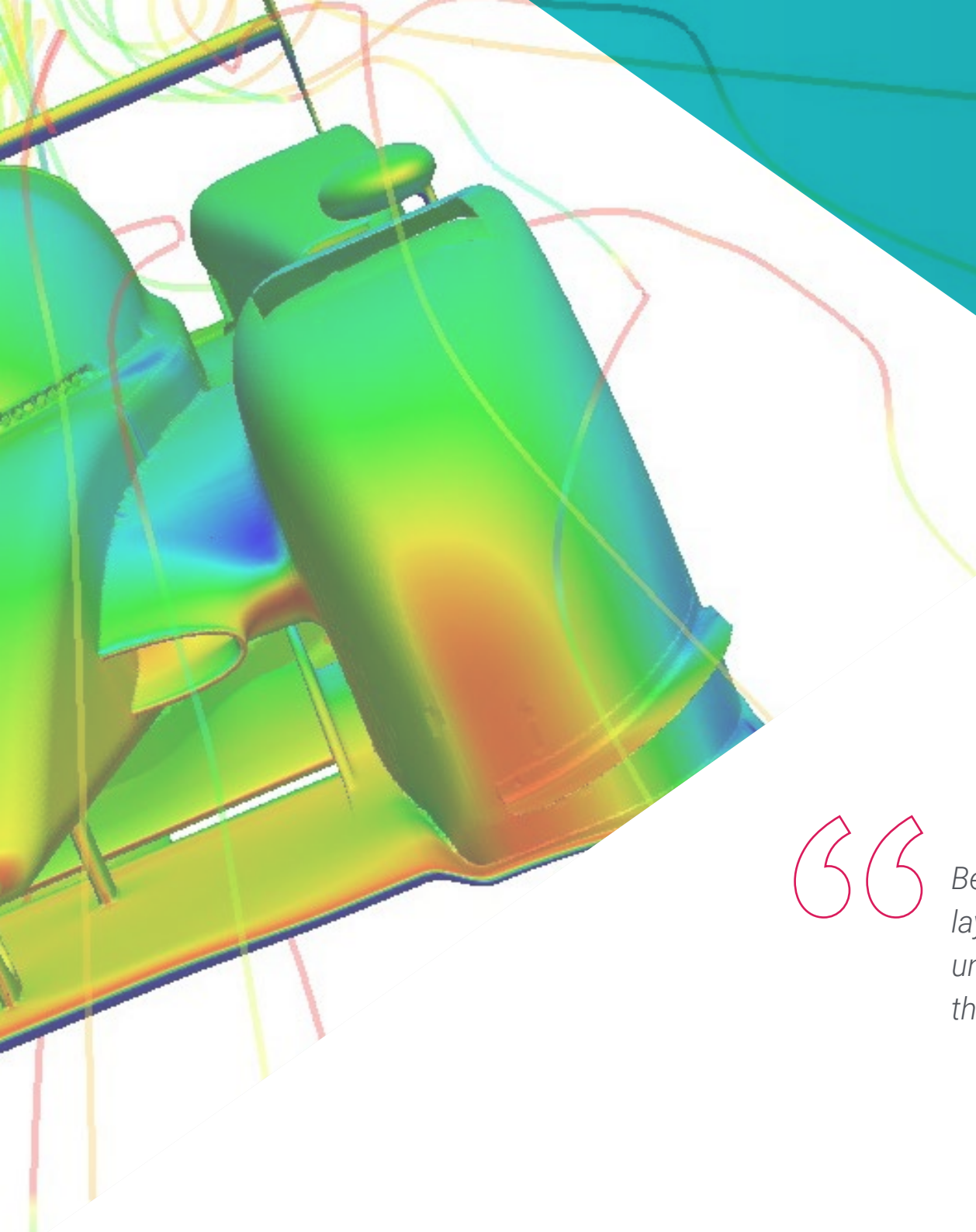
Become an expert in Turbulence and boundary layer Techniques, thanks to the best online university in the world according to Forbes, thanks to TECH Global University"

Turbulence and boundary layer modeling is an essential tool for the simulation and design of systems that engage fluid dynamics. For computer scientists, their study and knowledge is essential for the development of more accurate and efficient algorithms and simulation software. In addition, they have applications in a wide range of fields, demonstrating their relevance.

For this reason, TECH has designed a Postgraduate Certificate in Turbulence and Boundary Layer Modeling to provide students with the necessary skills and competencies to be able to perform their work as specialists with the highest possible efficiency and quality. Thus, throughout this program, aspects such as RANS Methods, LES evolution, Wall I Turbulence or Fanno and Rayleigh Flows will be addressed.

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 Turbulence Modeling and Boundary Layer** 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 Turbulence Modeling and Boundary Layer
- 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

Reach your maximum potential in this field, delving into topics such as RANS Equations and Spectral Filters, in only 6 weeks and with total freedom of organization"

Improve your professional profile in one of the most promising areas of the IT sector, thanks to TECH Global University and the most innovative materials"

Enroll now and enjoy all the content on Characteristic Scales and Turbulent Viscosity Hypothesis, from your Tablet, mobile or computer.

Deepen your knowledge of Spectral Methods and Visualization Techniques from the comfort of your home and at any time of the day.
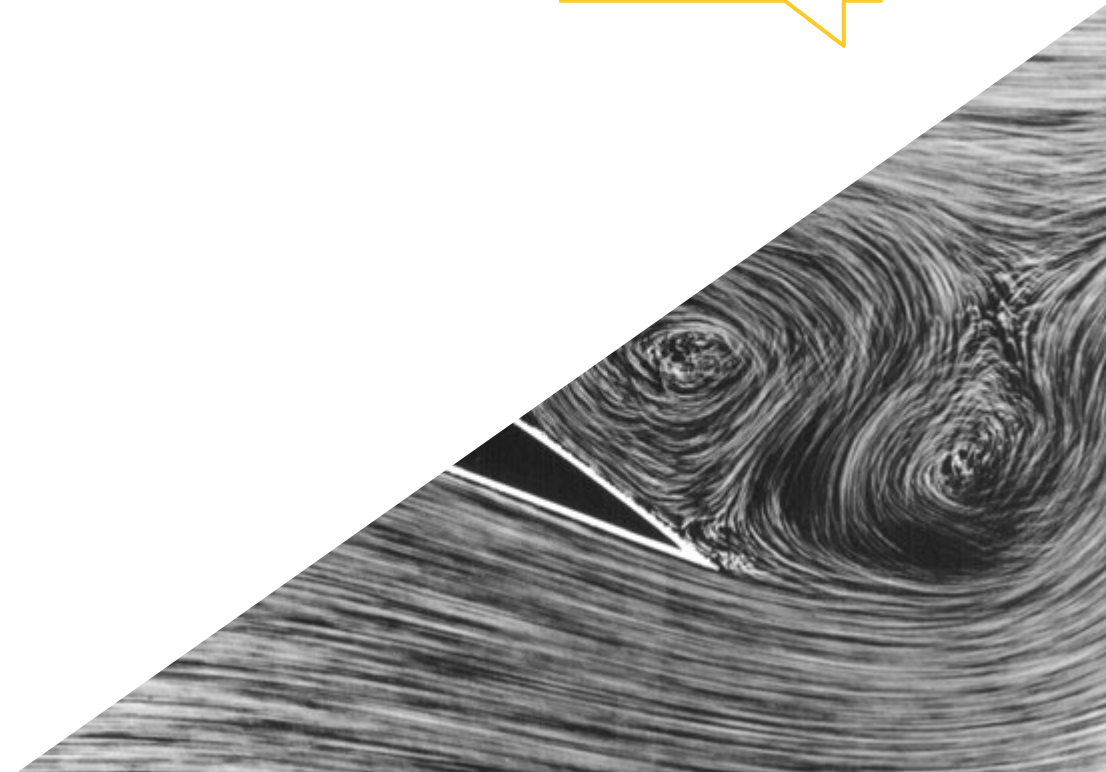
The program's teaching staff includes professionals from the sector who contribute their work experience to this training program, as well as renowned specialists from leading societies and prestigious universities.

Its multimedia content, developed with the latest educational technology, will allow the professional a situated and contextual learning, that is, a simulated environment that will provide an immersive training programmed to train in real situations.

The design of this program focuses on Problem-Based Learning, in which the professional will have to try to solve the different professional practice situations that will arise throughout the academic course. For this purpose, the student will be assisted by an innovative interactive video system created by renowned experts.

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Objectives

The objectives of this Postgraduate Certificate in Turbulence Modeling and Boundary Layer are based on providing the student with an accurate and complete update of their knowledge in this area. A update that will allow students to work in this IT with the highest possible quality in their work. All this, thanks to TECH Global University and a 100% online modality that gives total freedom of organization and schedules to the student.

" *Address all the essential aspects of the Smaller Scales of Turbulence or the Chaos Problem, 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 the multiple models and methods in multi-physics and thermal analysis
- Interpret the results obtained by correct post-processing
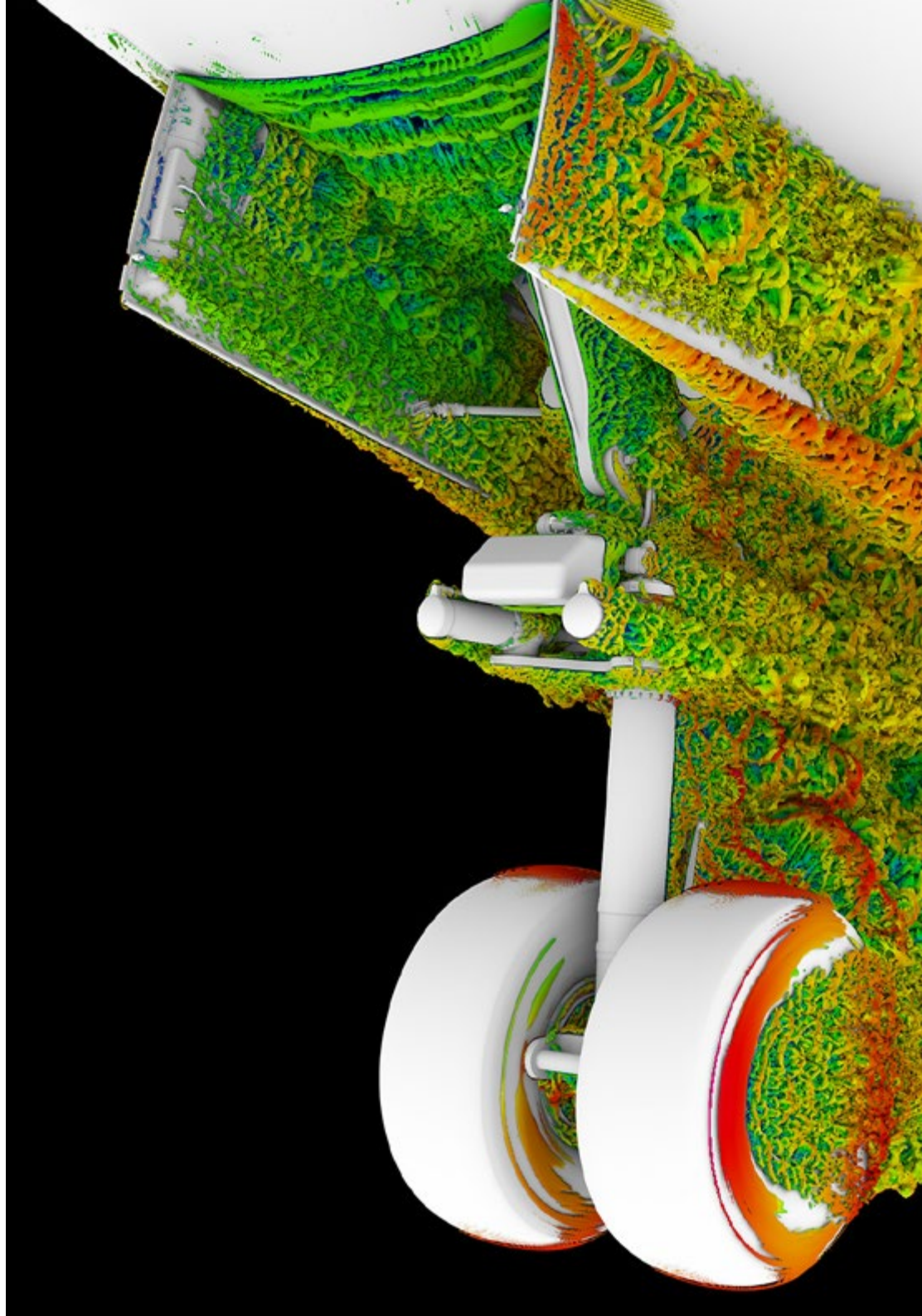
Specific Objectives

- Applying the concept of orders of magnitude
- To present the problem of closure of the Navier-Stokes equations
- Examining energy budget equations
- Developing the concept of turbulent viscosity
- To substantiate the different types of RANS and LES
- To present the regions of a turbulent flow
- Modeling the energy equation

Thanks to TECH Global University, you will exceed your highest expectations, through a unique program and with the most complete theoretical and practical materials in the academic market"

03

Course Management

In order to provide a Postgraduate of the highest quality and usefulness, TECH Global University has selected professionals specialized in Turbulence Modeling and Boundary Layer as part of this teaching staff, who have been in charge of the design of the most advanced contents. Thus, you will learn from the best the keys to your professional development in a field that adapts to new technologies and the latest market advances.

The best experts in Computational Fluid Mechanics will prepare you to face any challenge you may encounter in the reality of 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
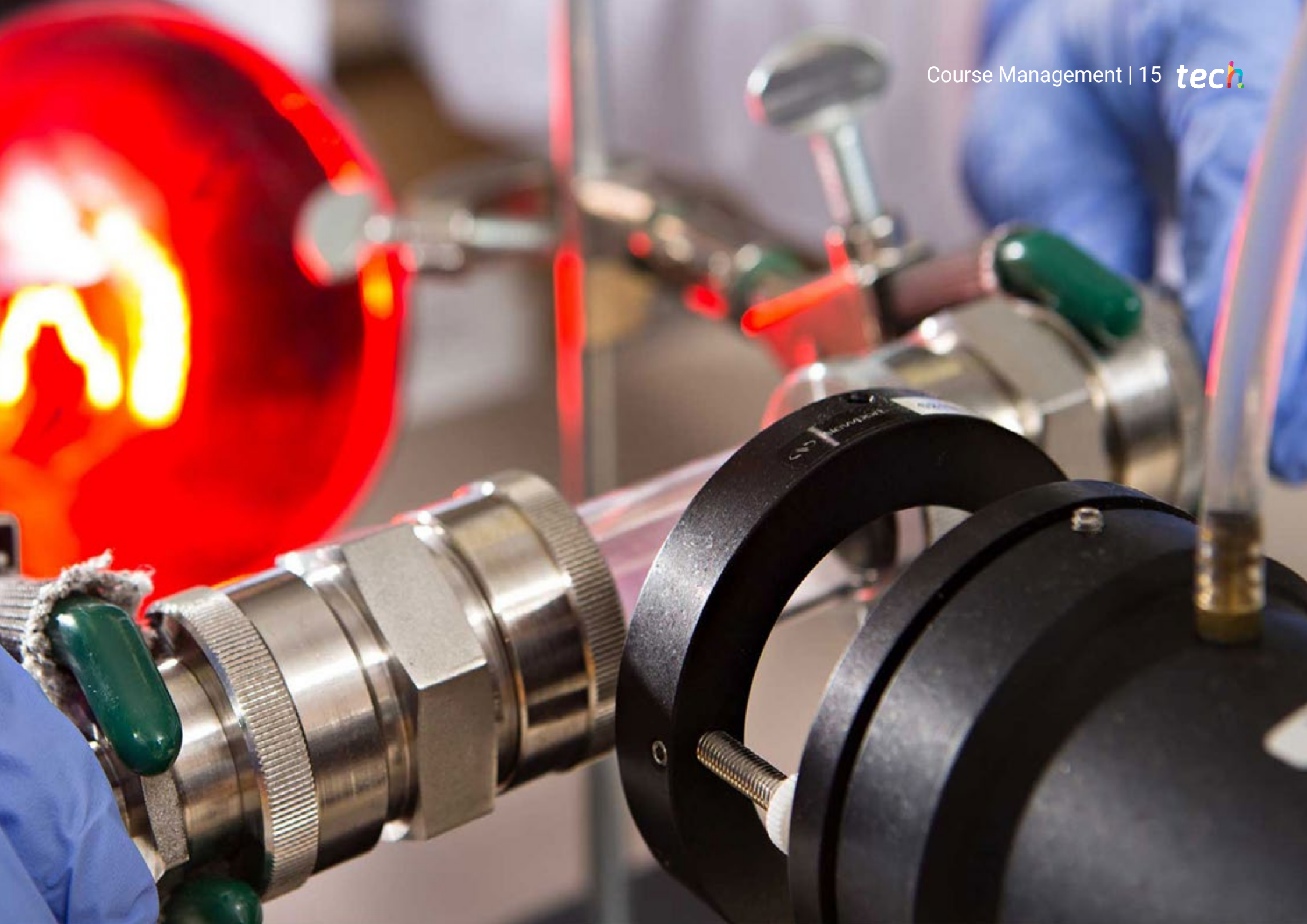
Structure and Content

The structure and the pedagogical resources of this curriculum have been created by the Reputation professionals that make up TECH Global University team of experts in the area of the mechanics of Computational Fluid Science. These specialists have used their extensive experience and state-of-the-art knowledge to create practical and completely innovative content. All this, based on the most efficient pedagogical methodology, TECH Global University Relearning, which allows a natural and progressive assimilation of the essential concepts of the syllabus.

"

Tackle the best opportunity the academic market has to offer you to achieve the successful positions you have always wanted in the IT industry"

Module 1. Modeling of turbulence in Fluid

1.1.   Turbulence. Key Features
    1.1.1.   Dissipation and diffusivity
    1.1.2.   Characteristic scales. Orders of magnitude
    1.1.3.   Reynolds Number

1.2.   Definitions of Turbulence. From Reynolds to the present day
    1.2.1.   Research Problem The boundary layer
    1.2.2.   Meteorology, Richardson and Smagorinsky
    1.2.3.   The Problem of Chaos

1.3.   The Energy Cascade
    1.3.1.   Smaller scales of turbulence
    1.3.2.   Kolmogorov's hypothesis
    1.3.3.   The cascade exponent

1.4.   The closure problem revisited
    1.4.1.   10 unknowns and 4 equations
    1.4.2.   The turbulent kinetic energy equation
    1.4.3.   The Cycle of Turbulence

1.5.   Turbulent viscosity
    1.5.1.   Historical Background and Parallelism
    1.5.2 Initiation problem: jets
    1.5.3.   Turbulent viscosity in CFD problems

1.6.   RANS methods
    1.6.1.   The turbulent viscosity hypothesis
    1.6.2.   The RANS equations
    1.6.3.   RANS methods. Examples of use

"Thanks to the most efficient pedagogical methodology, TECH Global University Relearning, you will be able to acquire new knowledge in a precise way and in just a few months"

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.

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.

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 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%
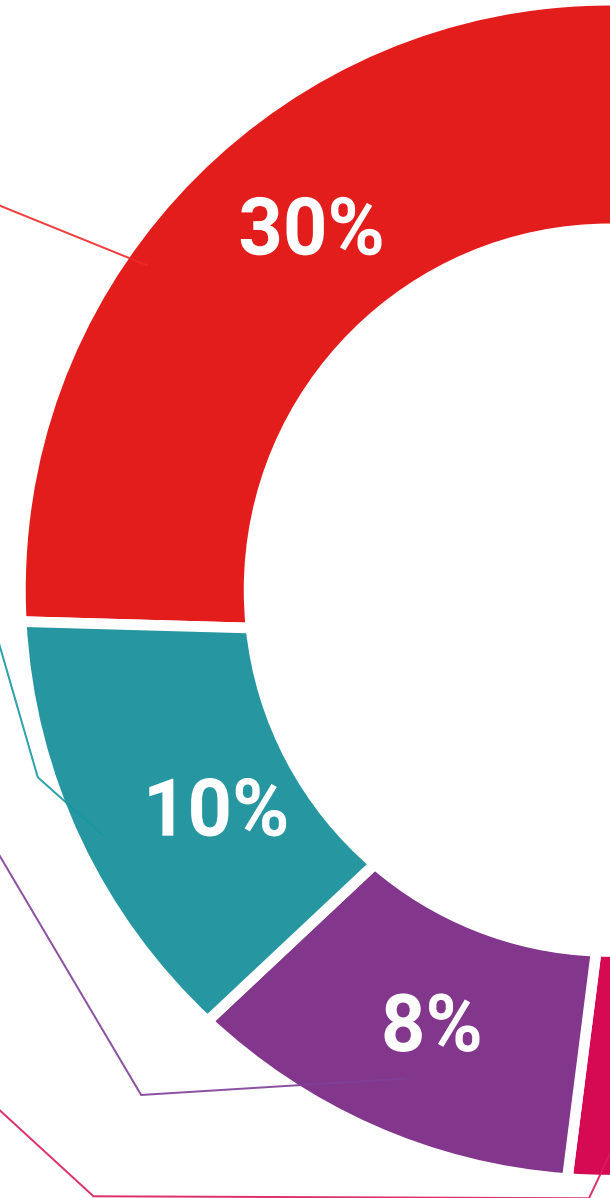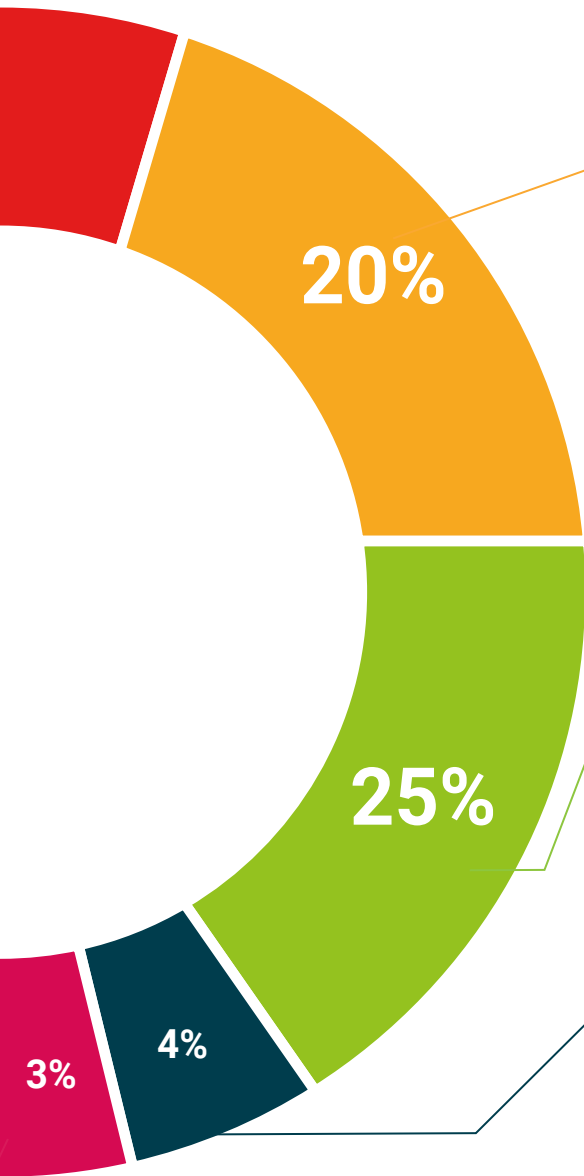
Case Studies

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.

06
Certificate

The Postgraduate Certificate in Turbulence Modeling and Boundary Layer 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 Turbulence Modeling and Boundary Layer** 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.
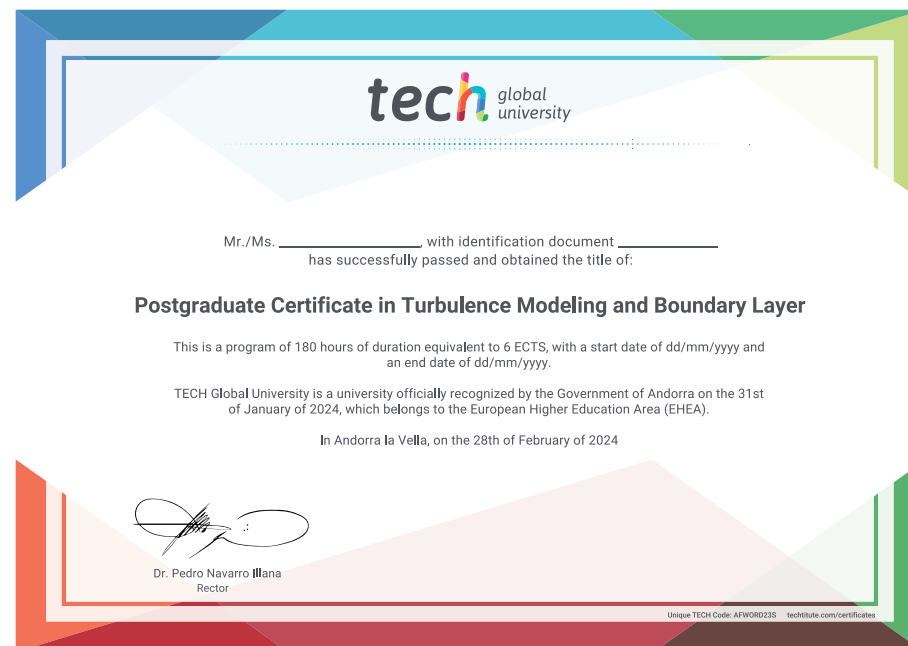
This **TECH Global University** title is a European program of continuing education and professional updating that guarantees the acquisition of competencies in its area of knowledge, providing a high curricular value to the student who completes the program.

Title: **Postgraduate Certificate in Turbulence Modeling and Boundary Layer**

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 Turbulence Modeling and Boundary Layer

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

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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