Postgraduate Certificate

CFD Techniques for Predesign and Analysis

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Postgraduate Certificate

CFD Techniques for Predesign and Analysis

- Modality: **online**
- Duration: **6 weeks**
- Certificate: **TECH Technological University**
- Schedule: **at your own pace**
- Exams: **online**

Website: www.techtitute.com/us/information-technology/postgraduate-certificate/cfd-techniques-predesign-analysis

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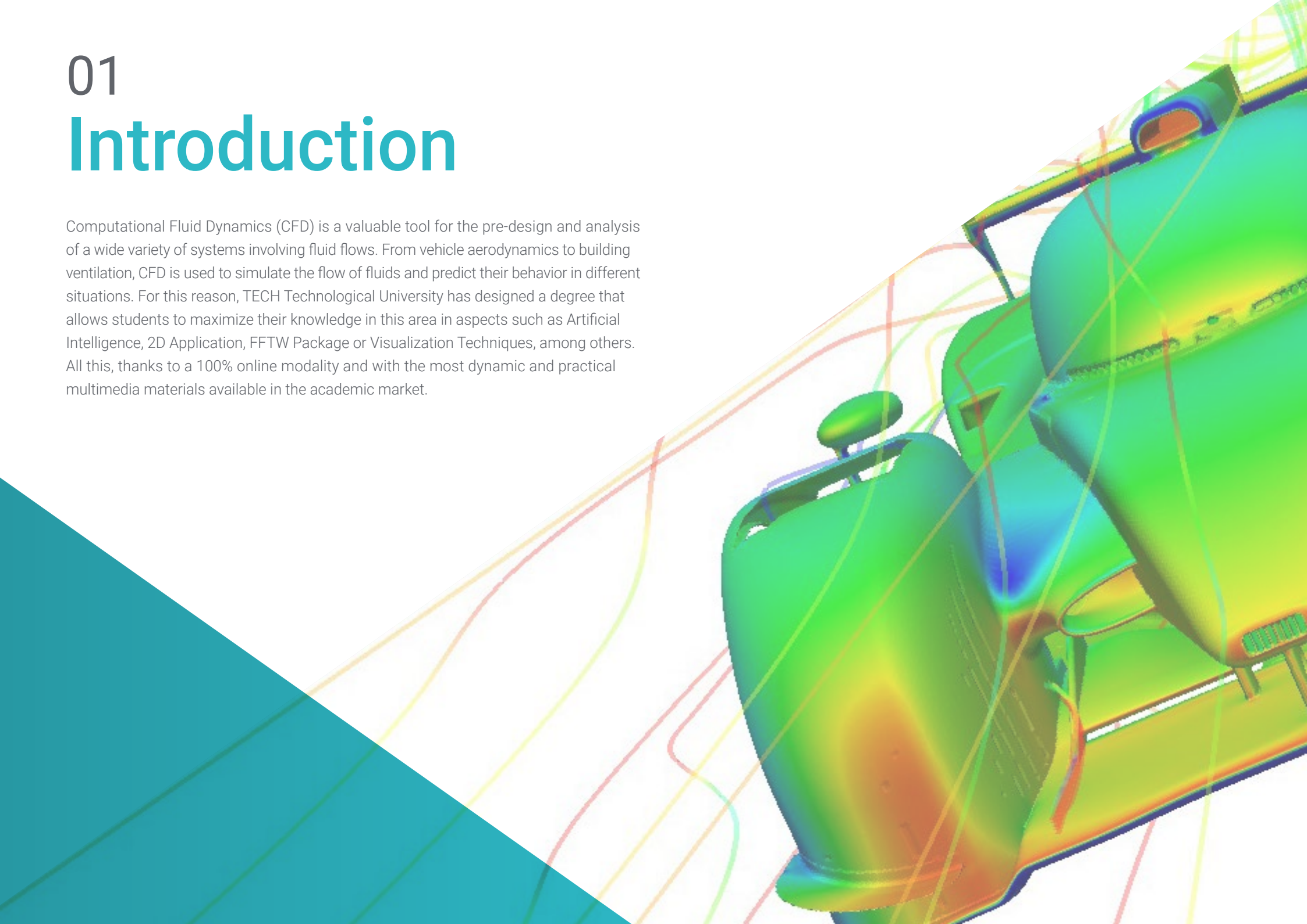
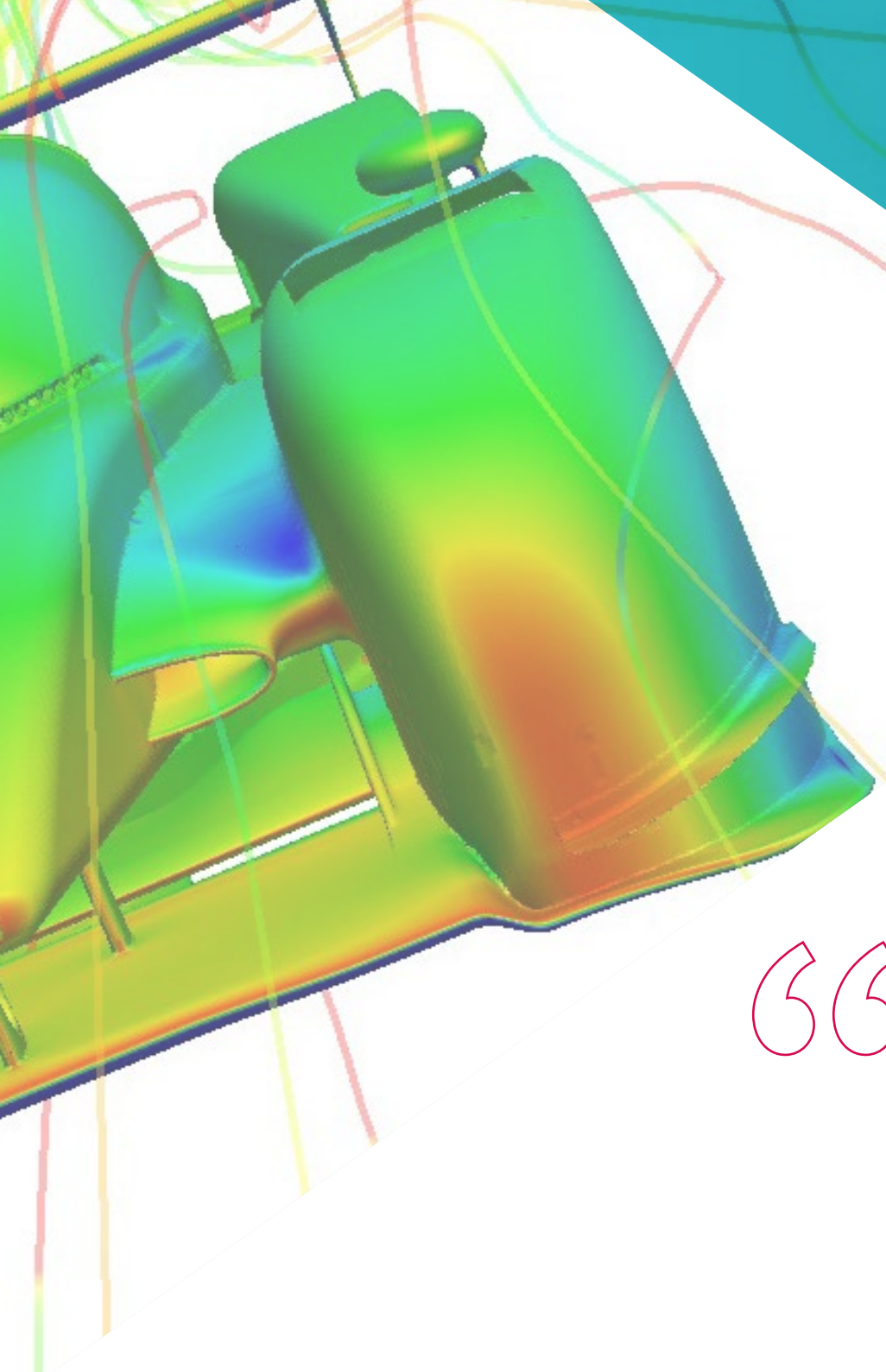
01

Introduction

Computational Fluid Dynamics (CFD) is a valuable tool for the pre-design and analysis of a wide variety of systems involving fluid flows. From vehicle aerodynamics to building ventilation, CFD is used to simulate the flow of fluids and predict their behavior in different situations. For this reason, TECH Technological University has designed a degree that allows students to maximize their knowledge in this area in aspects such as Artificial Intelligence, 2D Application, FFTW Package 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.





Enhance your skills and acquire new knowledge about Compressible Fluids or Domain Decomposition, thanks to the best online university in the world according to Forbes, thanks to TECH Technological University"

Computational Fluid Dynamics is an important tool in many fields such as the aerospace industry, where precision and efficiency are essential. Studying CFD techniques is essential for computer scientists, engineers and designers who want to create more efficient and optimized systems.

For this reason, TECH has designed a Postgraduate Certificate in CFD Techniques for Predesign and Analysis 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 Parallelization Techniques, Turbulence Structures or the Application to a Fluid Problem 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 most demanding objectives quickly.

This **Postgraduate Certificate in CFD Techniques for Predesign and Analysis** contains the most complete and up-to-date program on the market. The most important features include:

- The development of case studies presented by experts in CFD Techniques for Predesign and Analysis Techniques
- 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 the self-assessment process can be carried out 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 CFD Techniques for Predesign and Analysis in a few weeks and with total freedom of organization"

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

Deepen your knowledge of Spectral Methods and Visualization Techniques from the comfort of your home and at any time of the day.

Access all CFD and Supercomputing content from your tablet, mobile or computer.

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.

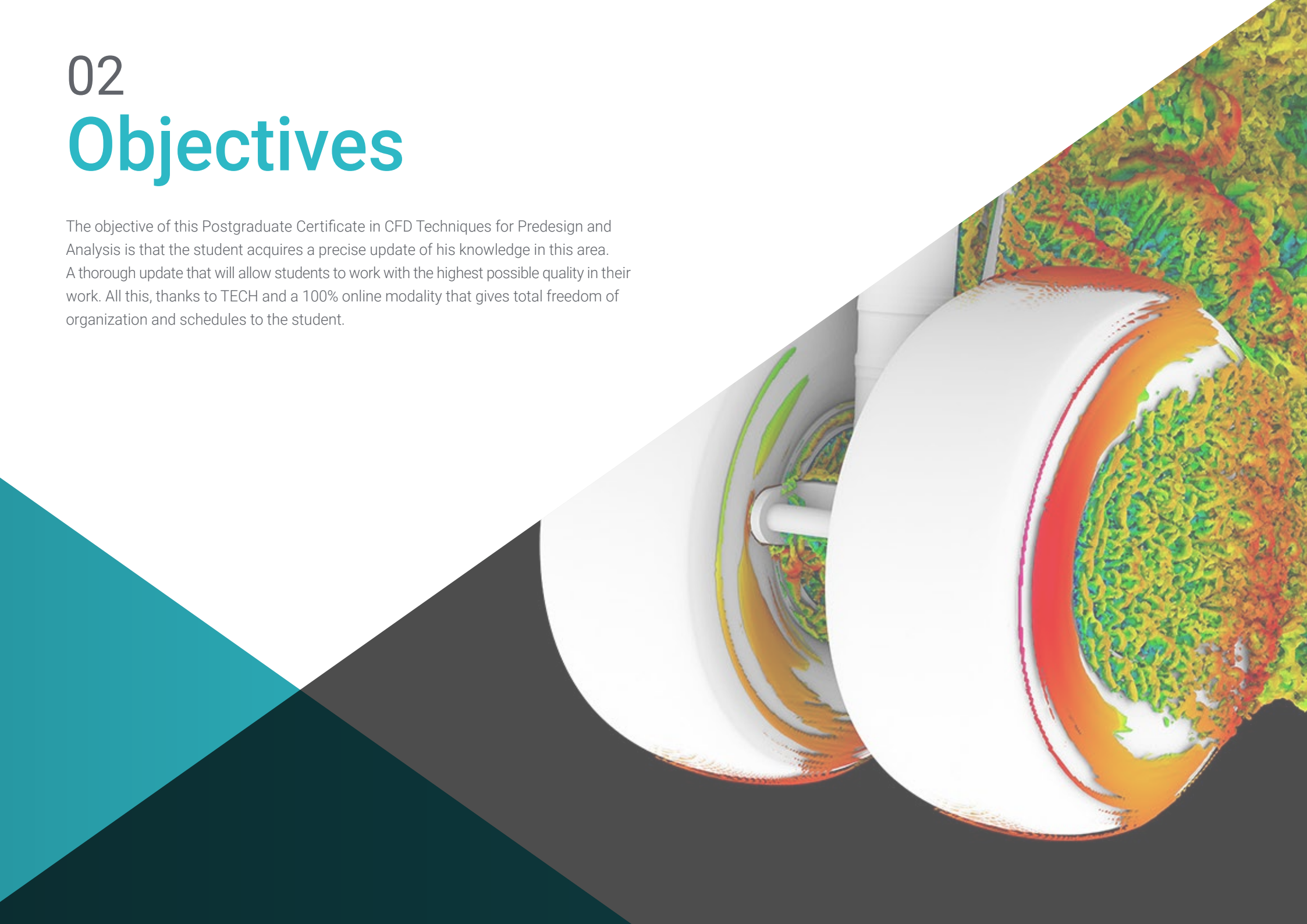
Its multimedia content, developed with the latest educational technology, will allow the professional a situated and contextual learning, that is, a simulated environment that will provide an immersive training programmed to train in real situations.

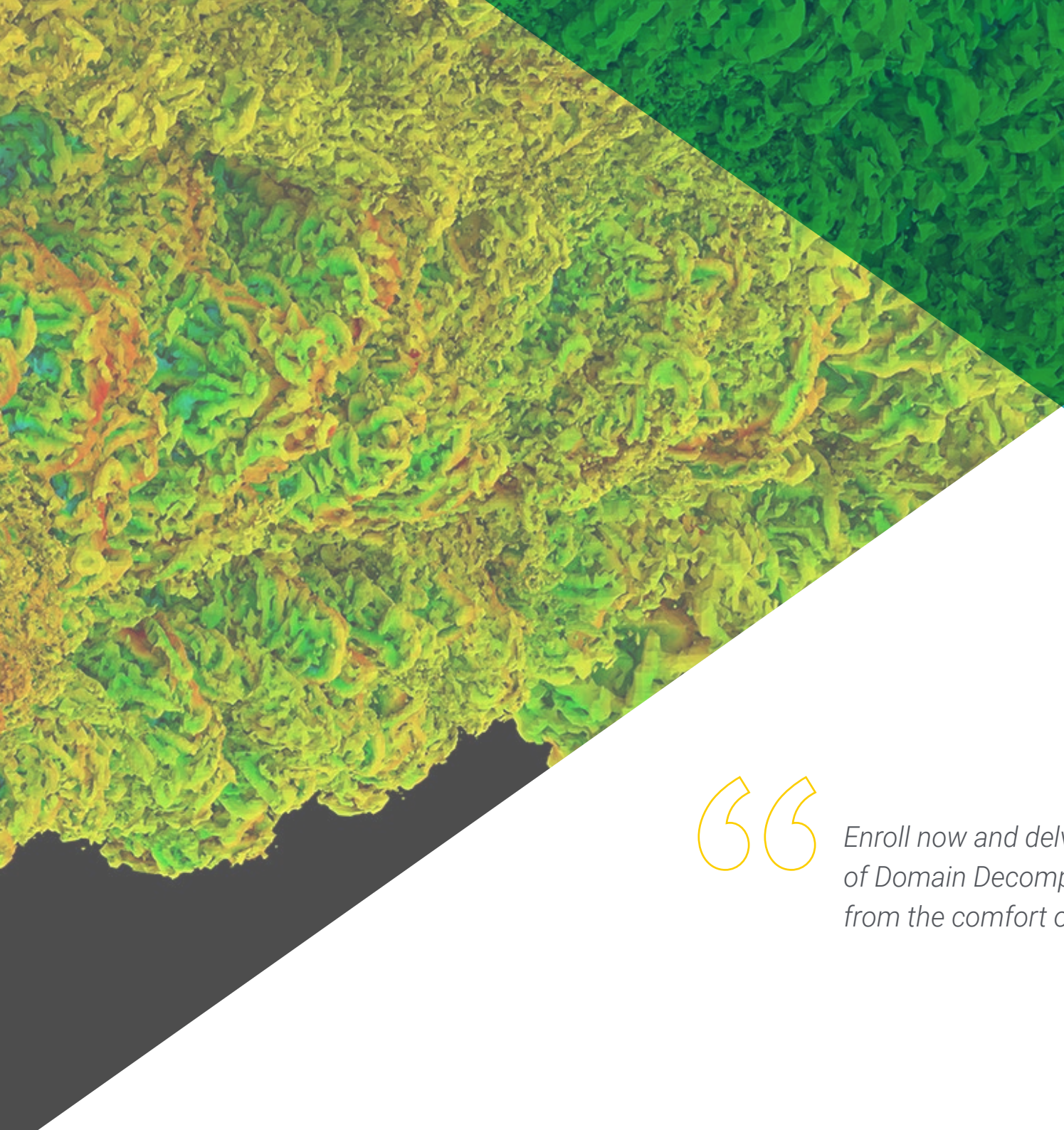
The design of this program focuses on Problem-Based Learning, in which the professional will have to try to solve the different professional practice situations that will arise throughout the academic course. For this purpose, the student will be assisted by an innovative interactive video system created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

02

Objectives

The objective of this Postgraduate Certificate in CFD Techniques for Predesign and Analysis is that the student acquires a precise update of his knowledge in this area. A thorough update that will allow students to work with the highest possible quality in their work. All this, thanks to TECH and a 100% online modality that gives total freedom of organization and schedules to the student.

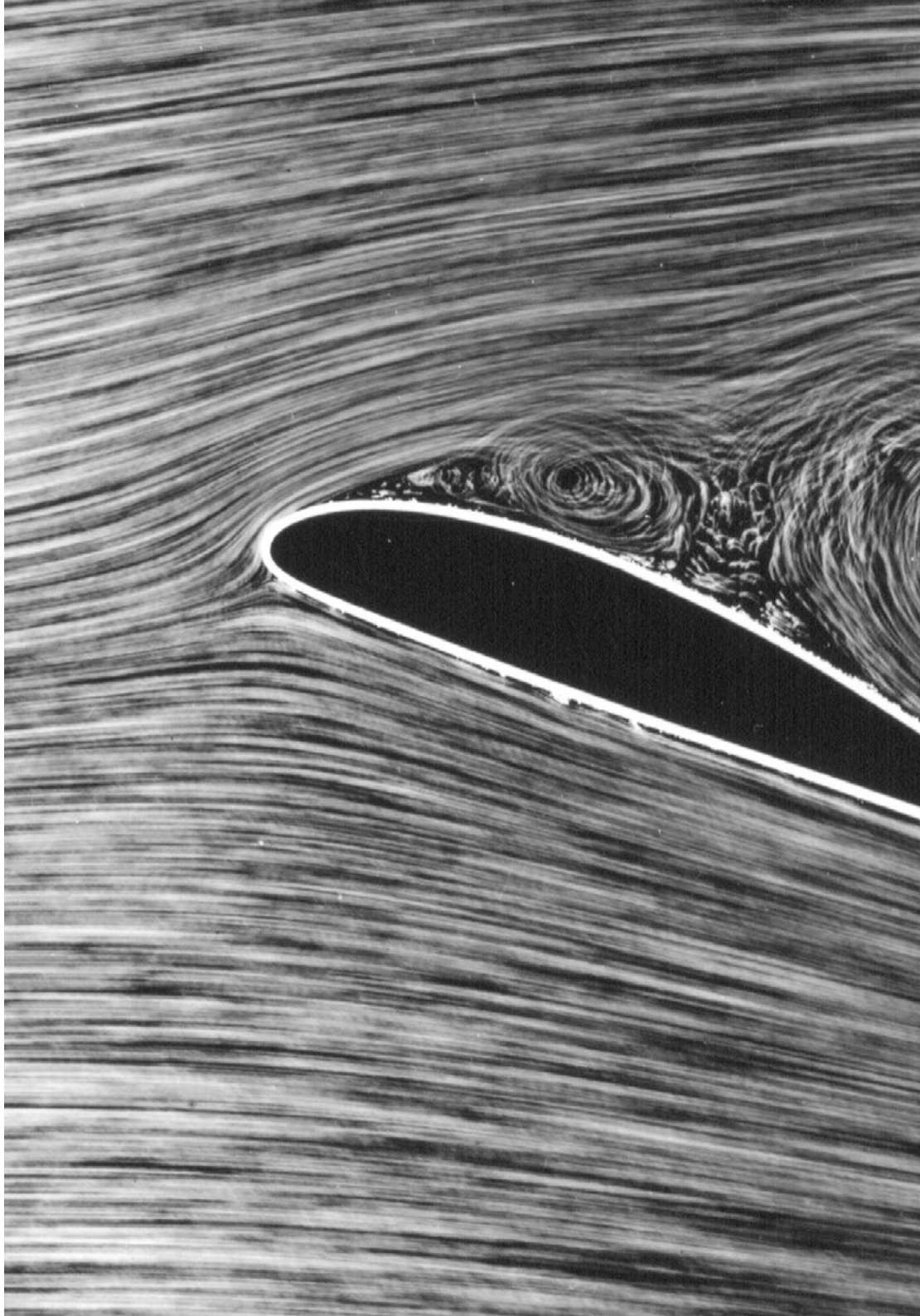


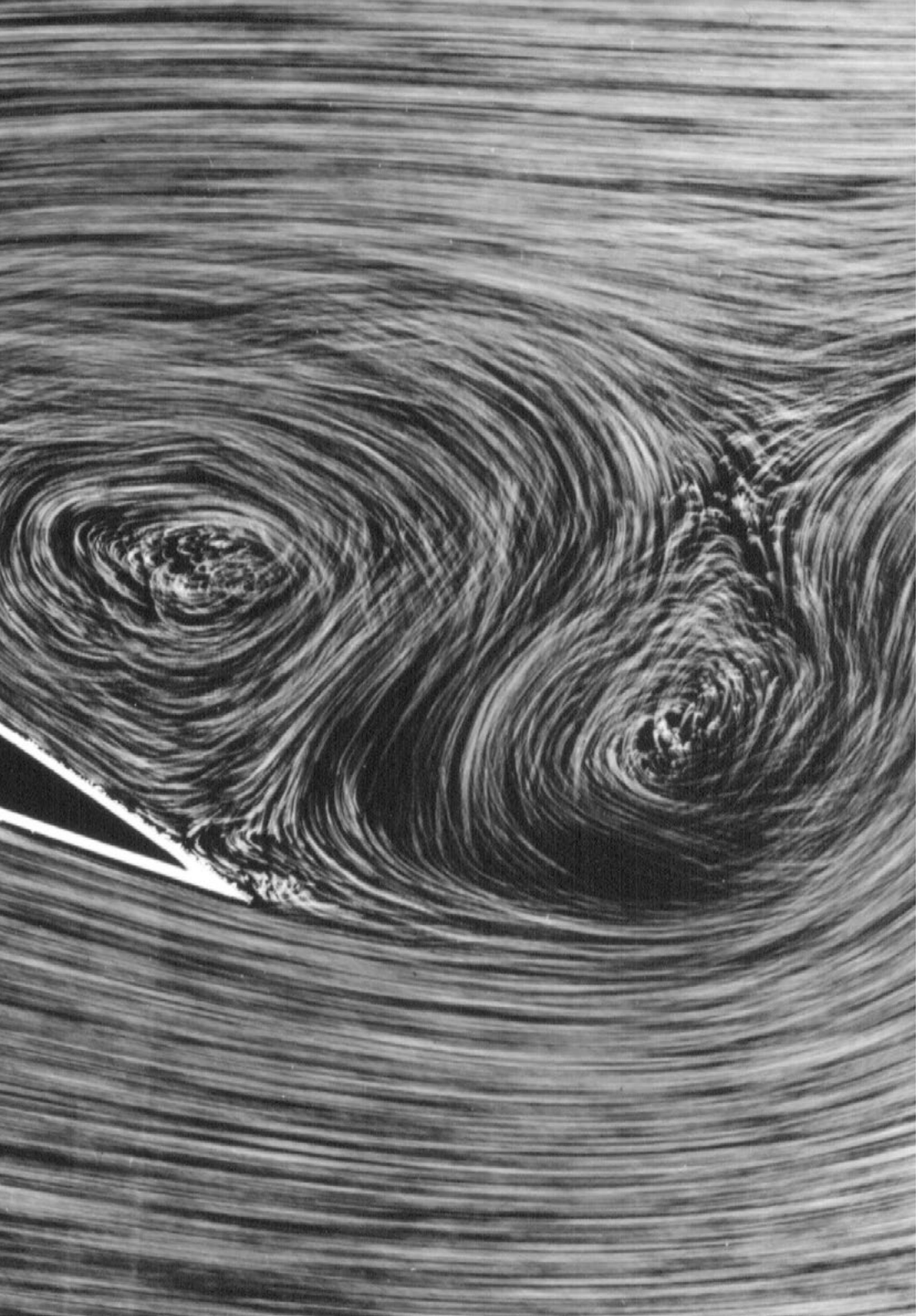


Enroll now and delve into all the essentials of Domain Decomposition and Aerodynamics, from the comfort of your home or work office"

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

- Analyzing the future of artificial intelligence in turbulence
- Apply classical discretization methods to fluid mechanics problems
- Determine the different turbulent structures and their importance
- Show the method of characteristics
- To present the effect of the evolution of supercomputing on CFD problems
- Examine the main open problems in turbulence

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 offer a degree of the highest quality and usefulness, TECH Technological University has selected professionals specialized in CFD as part of the management and faculty. These experts have been in charge of designing the most advanced and updated 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 teaching staff will pass on the latest developments in CFD and support you all along your path to success in this area"

Management

Dr. García Galache, José Pedro

- Development Engineer in XFlow at Dassault Systèmes
- PhD in Aeronautical Engineering from the Polytechnic University of Valencia.
- Degree in Aeronautical Engineering from the Polytechnic University of Valencia
- Professional Master's Degree in Fluid Mechanics Research at The von Karman Institute for Fluid Dynamics
- Short Training Programme at The von Karman Institute for Fluid Dynamics


Castrol
Michelin

04

Structure and Content

The structure and pedagogical resources of this curriculum have been designed by the renowned professionals that make up TECH team of experts in this area of Computer Science. These specialists have used their experience and specialized knowledge to create practical, dynamic and completely updated contents. All of this, based on the most efficient pedagogical methodology Relearning of the TECH.

Thanks to the most efficient teaching methodology, you will be able to acquire new knowledge in a precise way and in only 150 hours"

Module 1. CFD in Research and Modeling Environments

1.1. Research in Computational Fluid Dynamics (CFD)
- 1.1.1. Challenges in turbulence
- 1.1.2. Advances in RANS
- 1.1.3. Artificial Intelligence

1.2. Finite differences
- 1.2.1. Presentation and application to a 1D problem. Taylor's Theorem
- 1.2.2. 2D Applications
- 1.2.3. Boundary Conditions

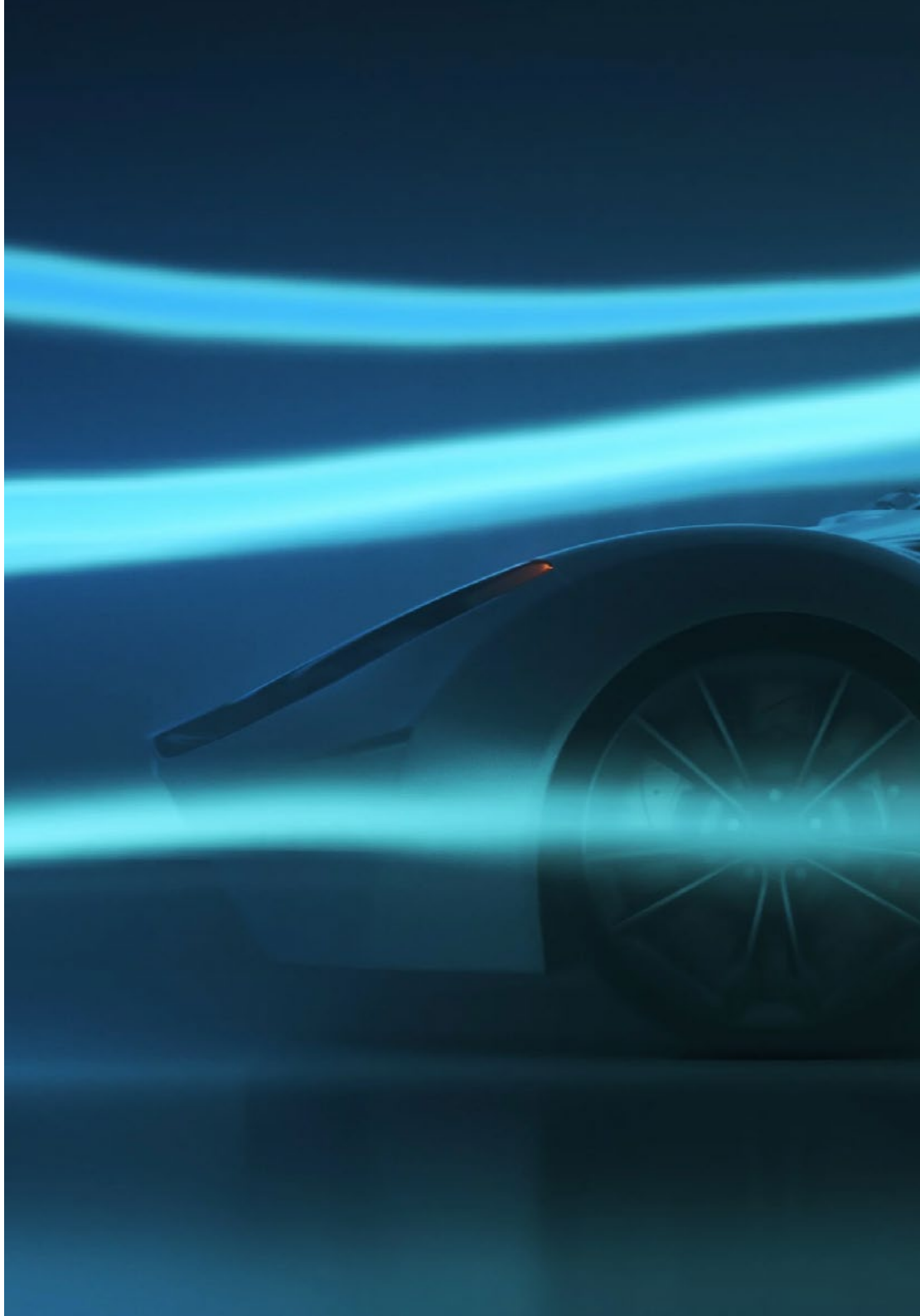
1.3. Compact finite differences
- 1.3.1. Objective SK Lele's article
- 1.3.2. Obtaining coefficients
- 1.3.3. Application to a 1D problem

1.4. The Fourier Transform
- 1.4.1. The Fourier Transform From Fourier to the present day
- 1.4.2. The FFTW package
- 1.4.3. Cosine transform: Tchebycheff

1.5. Spectral Method
- 1.5.1. Application to a fluid problem
- 1.5.2. Pseudo-spectral methods: Fourier + CFD
- 1.5.3. Placement methods

1.6. Advanced methods of temporal discretization
- 1.6.1. The Adams-Bamsford method
- 1.6.2. The Crack-Nicholson method
- 1.6.3. Runge-Kutta

1.7. Structures in turbulence
- 1.7.1. The Vortex
- 1.7.2. The life cycle of a turbulent structure
- 1.7.3. Visualization Techniques



1.8. The Characteristics Method
- 1.8.1. Compressible Fluids
- 1.8.2. Application A breaking wave
- 1.8.3. Application: Burguers equation

1.9. CFD and supercomputing
- 1.9.1. The memory problem and the evolution of computers
- 1.9.2. Parallelization techniques
- 1.9.3. Domain decomposition

1.10. Open problems in turbulence
- 1.10.1. Modeling and the Von-Karma constant
- 1.10.2. Aerodynamics: boundary layers
- 1.10.3. Noise in CFD problems

Acquire new CFD skills and expand your knowledge with a wide variety of additional material available on the Virtual Campus"

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

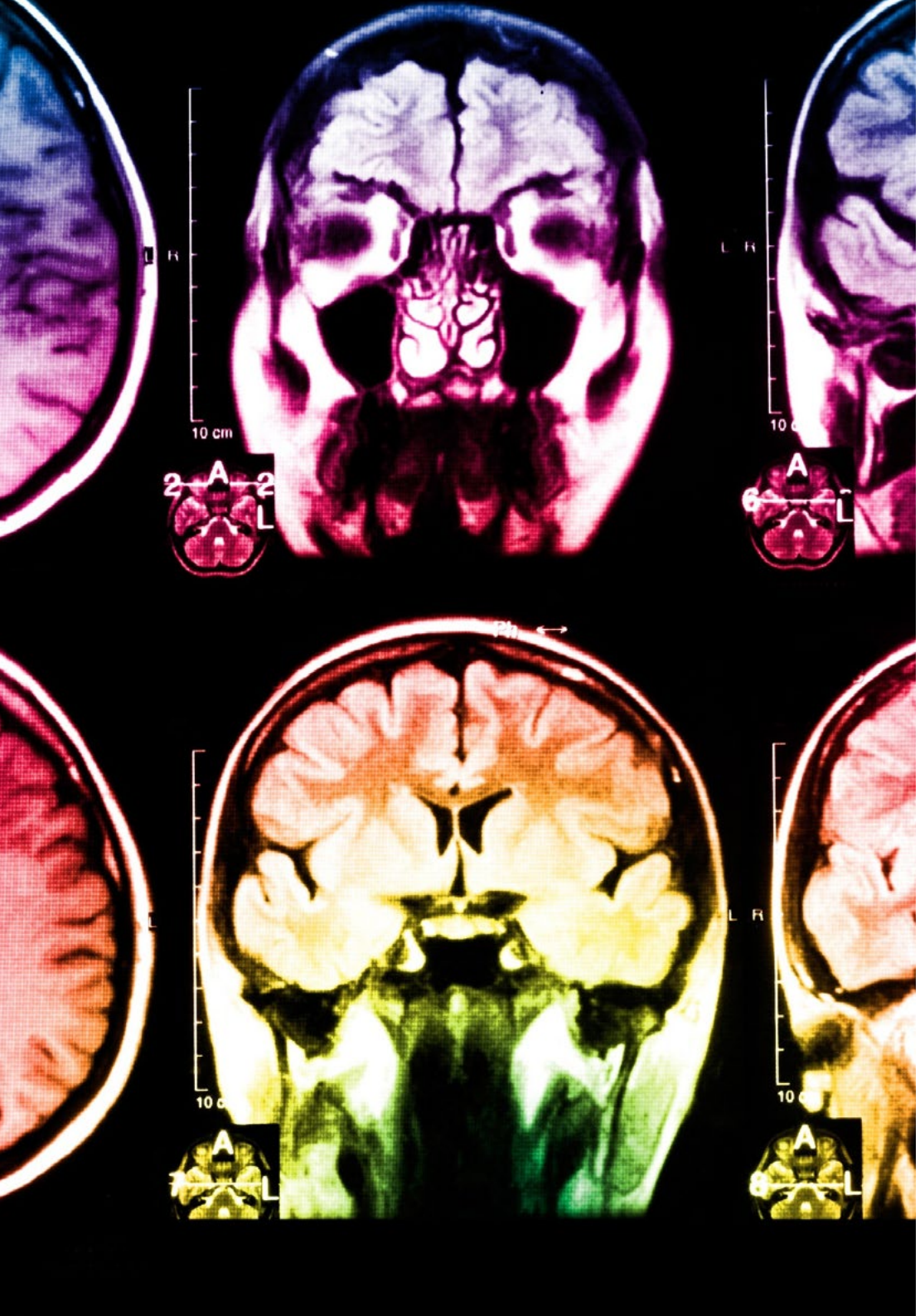
TECH effectively combines the Case Study methodology with a 100% online learning system based on repetition, which combines different teaching elements in each lesson.

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.

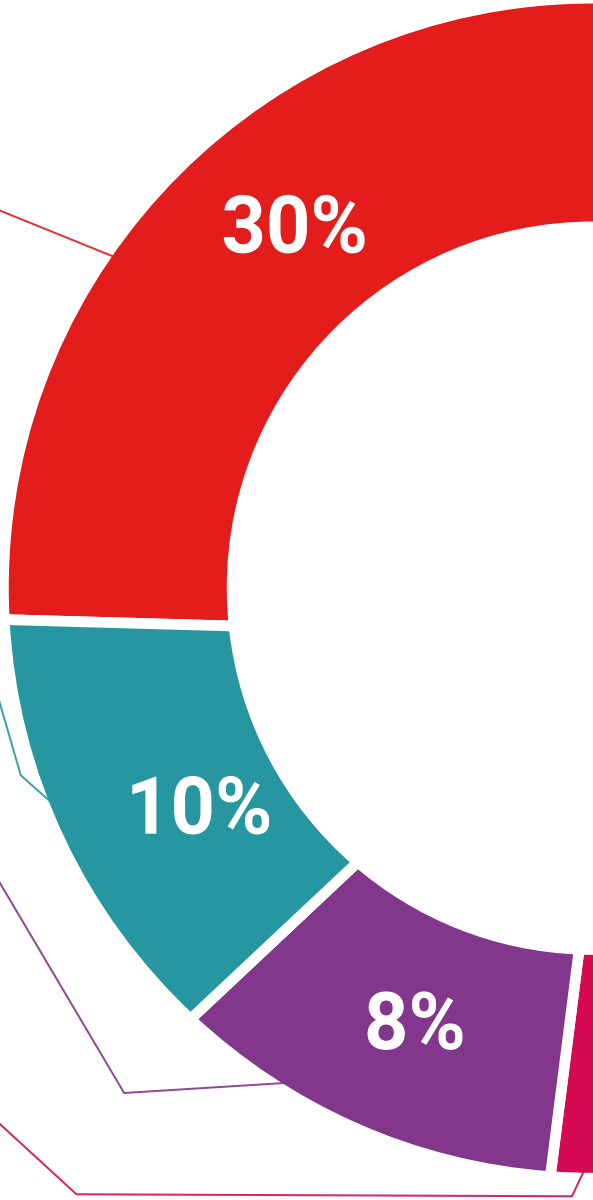
Learning from an Expert strengthens knowledge and memory, and generates confidence in future difficult decisions.

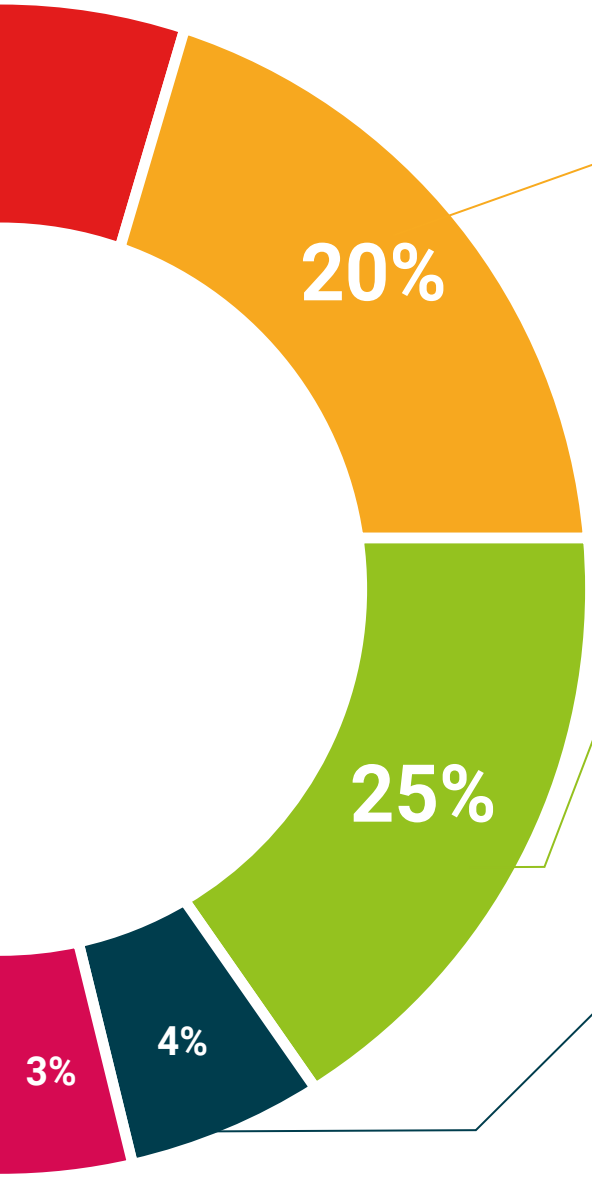
Practising Skills and Abilities

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 Certificate in CFD Techniques for Predesign and Analysis guarantees, in addition to the most rigorous and updated training, access to a Postgraduate Certificate degree issued by TECH Technological University.

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

This **Postgraduate Certificate in CFD Techniques for Predesign and Analysis** 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 diploma 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 CFD Techniques for Predesign and Analysis**

Official Nº of Hours: **150 h.**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Awards the following

DIPLOMA

to

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

For having passed and accredited the following program

POSTGRADUATE CERTIFICATE

in

CFD Techniques for Predesign and Analysis

This is a qualification awarded by this University, equivalent to 150 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.

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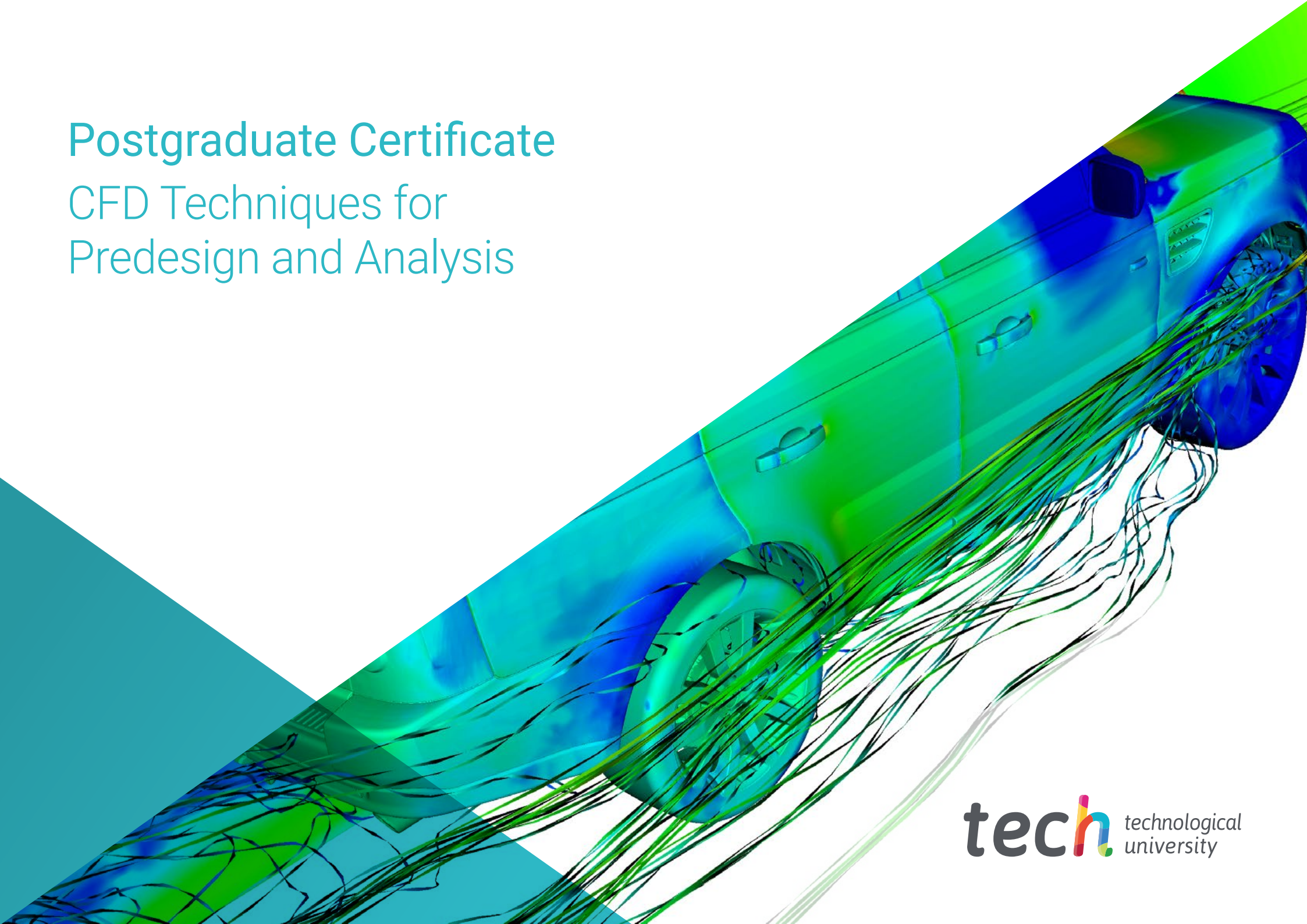

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