Postgraduate Certificate

Coupling with CFD Simulations. Multiphysics Applications

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Postgraduate Certificate
Coupling with CFD Simulations. Multiphysics Applications

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

Website: **www.techtitute.com/us/engineering/postgraduate-certificate/coupling-cfd-simulations-multiphysics-applications**

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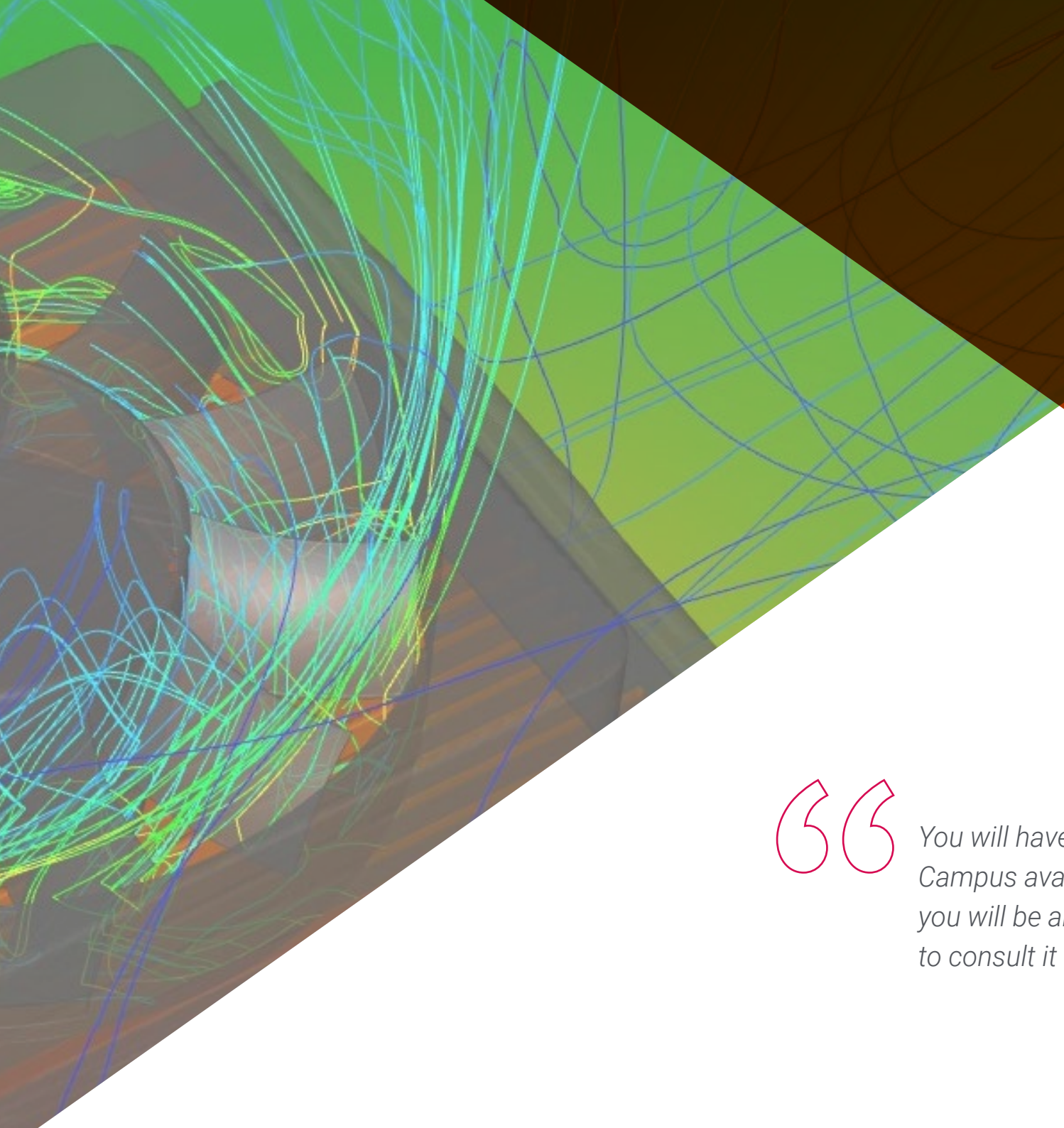
01

Introduction

Numerical simulation using CFD (Computational Fluid Dynamics) has become a key tool for the design and optimization of processes and products in various industrial sectors. In order to meet the growing need for trained professionals in this field, this academic degree is presented. Thus, the program responds to the current demands of the engineer, providing advanced knowledge in multiphysics models, heat transfer, solid-fluid coupling, aeroacoustics and reactive flows, among others. In addition, it is developed in a 100% online format and uses the Relearning methodology, which allows the acquisition of skills through the resolution of practical problems. With this program, participants will be prepared to improve the efficiency and quality of processes and products in their respective work areas.



You will have at your disposal a Virtual Campus available 24 hours a day and you will be able to download the material to consult it whenever you need it"

Nowadays, the use of numerical simulation by means of CFD has acquired great relevance in the industry, being a key tool in the design and optimization of processes and products in different sectors. The growing need to improve the efficiency and quality of processes and products has generated an increasing demand for highly trained professionals in this field.

In order to respond to the growing demand for highly trained professionals in this field, the Postgraduate Certificate in Coupling with CFD Simulations has been created, which provides engineers with advanced knowledge in multiphysics models, heat transfer, aeroacoustics, reactive flows, among others.

In addition, this program gives them the opportunity to apply this knowledge in real situations and to solve complex problems in their daily work, improving the efficiency and quality of processes and products in their companies. All in a completely online format that will allow them to access the best content from anywhere and at any time, facilitating family reconciliation.

This **Postgraduate Certificate in Coupling with CFD Simulations. Multiphysics Applications** 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 Textile Engineering
- The graphic, schematic, and practical contents with which they are created, provide practical information on the 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

Give your career a boost and specialize in one of the most promising areas of engineering"

Forget about memorizing with TECH Relearning. You will learn with the most effective methodology and integrate knowledge efficiently"

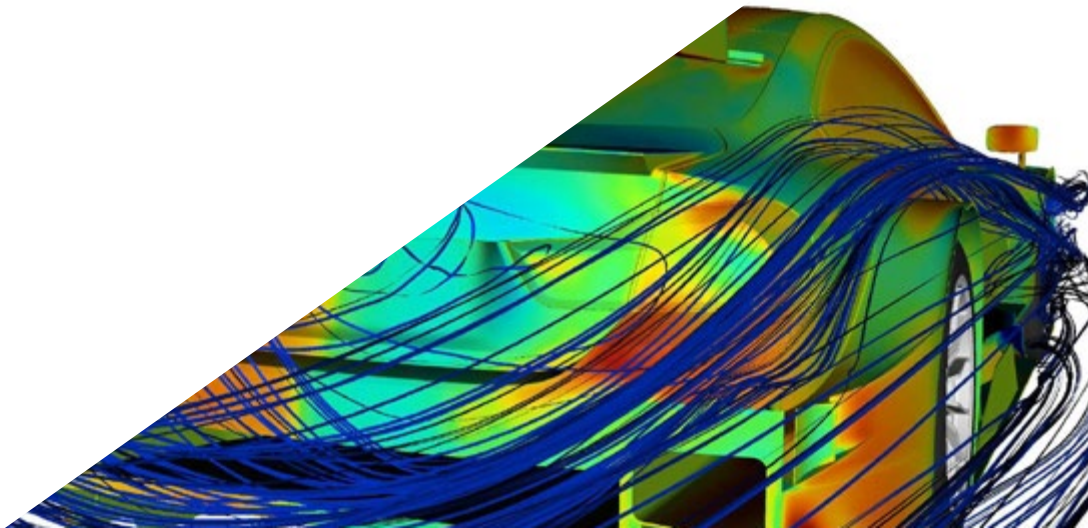
Acquire new skills in Multiphysics Simulations, in a few months and without leaving home.

Access a syllabus rich in content, where you will find a multitude of real examples and practical analysis that contextualize the topics covered.

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.



02

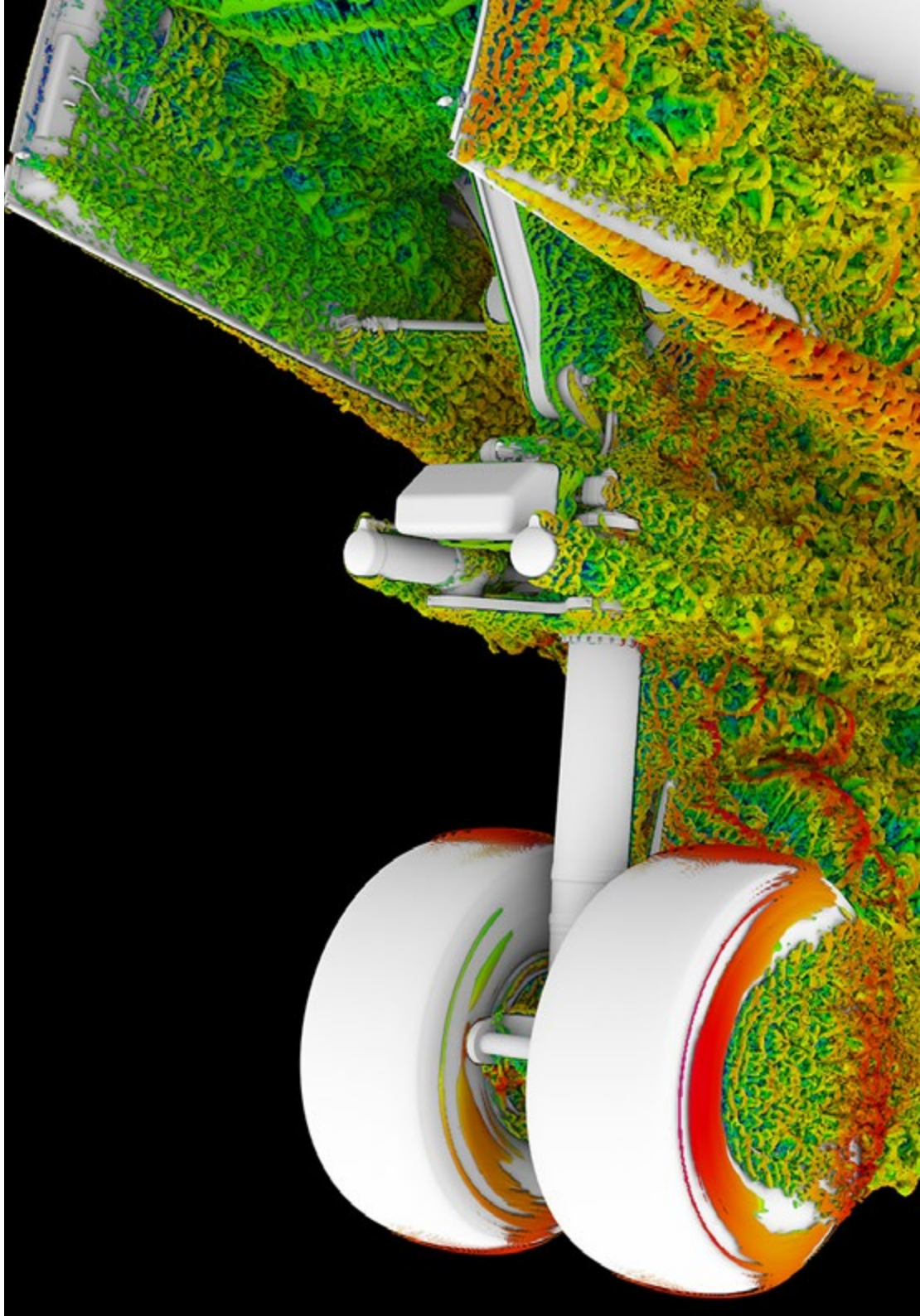
Objectives

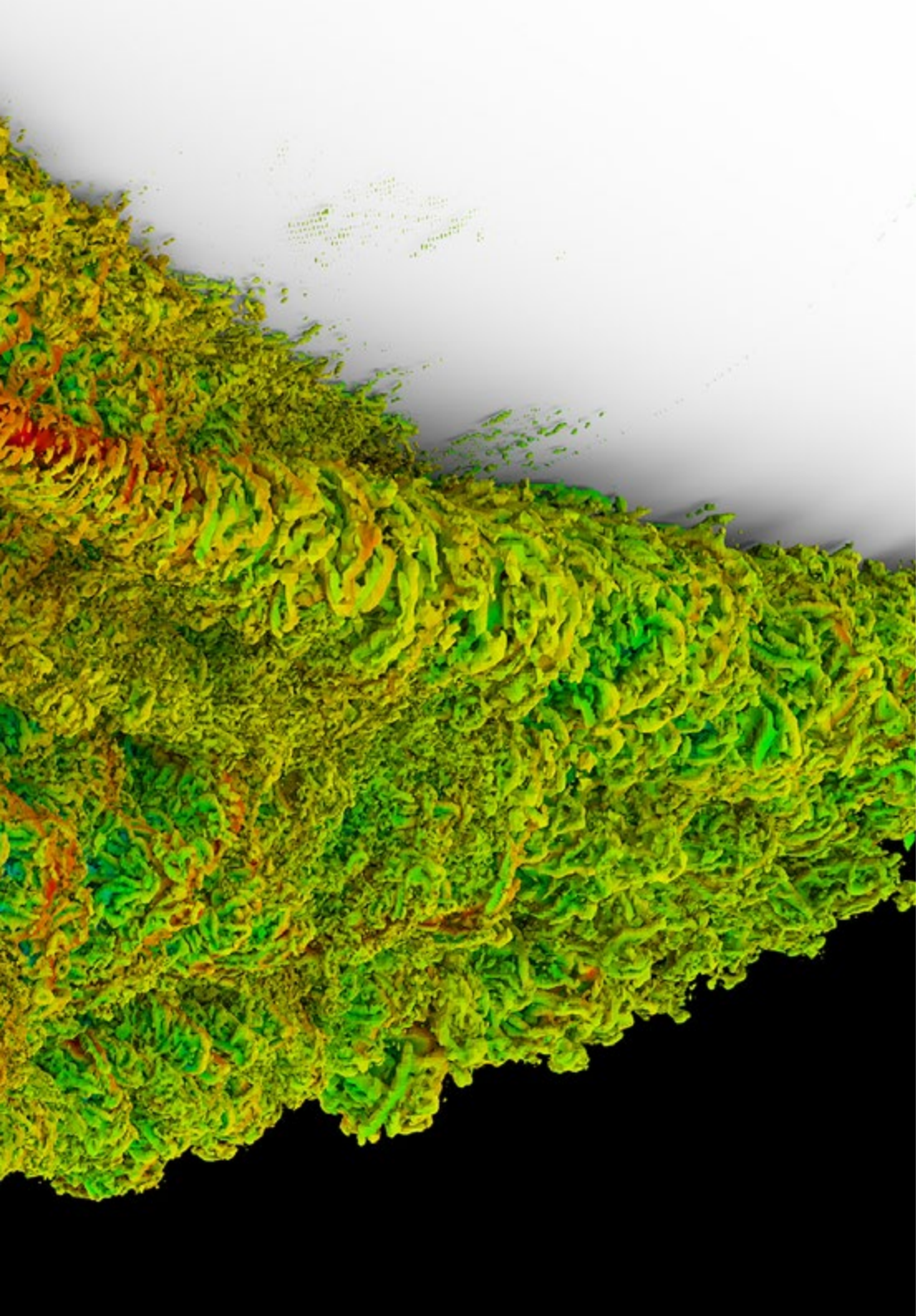
The many advances that have been made in the field of engineering have made it possible to develop increasingly effective teaching strategies that are personalized to the needs of the students. Therefore, the objective of this program is none other than to make available to the professional the most advanced knowledge in key topics such as heat transfer, solid-fluid coupling, aeroacoustics, reactive flows and multiphysics simulations. Thus, the Diploma in Coupling with CFD Simulations is a unique opportunity for engineers seeking to improve their skills and knowledge in computational fluid dynamics.

With the new skills you will acquire after completing the program, you will position yourself as an expert engineer in Coupling with CFD Simulations"

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 multiphysics and thermal analysis
- Interpret the results obtained by correct post-processing





Specific Objectives

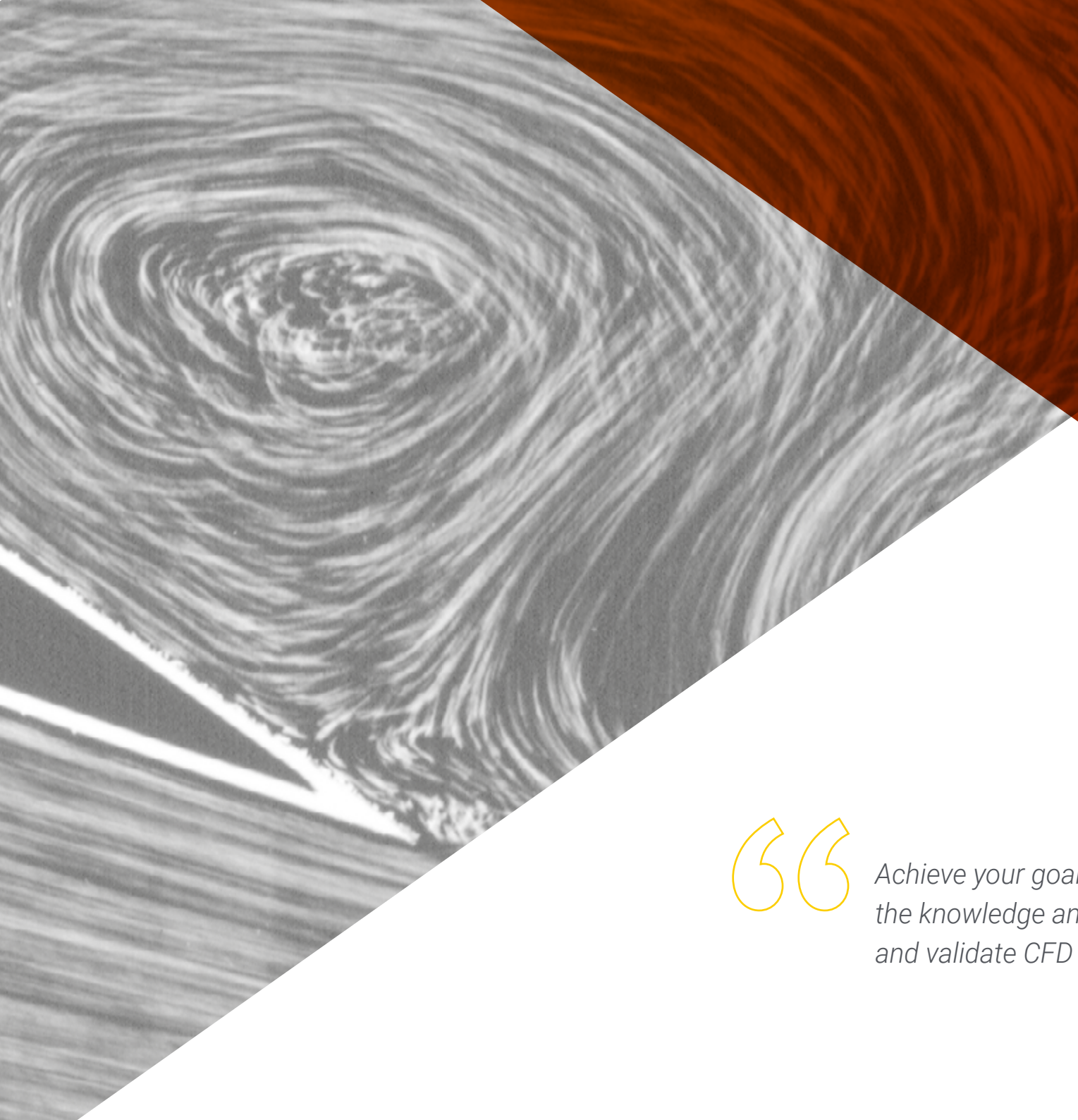
- Distinguish what type of physical interactions are to be simulated: fluid-structure, such as a wing subject to aerodynamic forces, fluid coupled with rigid body dynamics, such as simulating the motion of a buoy floating in the sea, or thermofluid, such as simulating the distribution of temperatures in a solid subject to air currents
- Distinguish the most common data exchange schemes between different simulation software and when one or the other can or is best to be applied
- Examine the various heat transfer models and how they can affect a fluid
- Model convection, radiation and diffusion phenomena from a fluid point of view, model sound creation by a fluid, model simulations with advection-diffusion terms to simulate continuous or particulate media and model reactive flows

Enhance your professional profile with new knowledge in CFD and stand out in a booming sector"

03

Course Management

The Postgraduate Certificate in Coupling with CFD Simulations offers a high quality syllabus developed by recognized professionals in the field. These experts have excellent knowledge in multiphysics and cosimulation, ensuring that participants will have access to the most current and relevant information in the field of computational fluid dynamics. In this way, students will be able to benefit from the experience and knowledge of the best experts in the field and will be prepared to face the current challenges in the field of numerical simulation using CFD.



Achieve your goals with the best and acquire the knowledge and skills you need to process and validate CFD simulation results"

Management

Dr. José Pedro García Galache

- XFlow Development Engineer at Dassault Systèmes
- PhD in Aeronautical Engineering from the Polytechnic University of Valencia
- Degree in Aeronautical Engineering from the Polytechnic University of Valencia
- Master's Degree in Research in Fluid Mechanics from the Von Kármán Institute for Fluid Dynamics
- Short Training Programme en el Von Kármán Institute for Fluid Dynamics

Professors

Mr. Enrique Mata Bueso

- Senior Thermal Conditioning and Aerodynamics Engineer at Siemens Gamesa
- Application Engineer and CFD R&D Manager at Dassault Systèmes
- Thermal Conditioning and Aerodynamics Engineer in Gamesa-Altran
- Fatigue and Damage Tolerance Engineer at Airbus-Atos
- R&D CFD Engineer at UPM
- Aeronautical Technical Engineer with specialization in Aircraft by UPM
- Master's Degree in Aerospace Engineering from the Royal Institute of Technology in Stockholm

Mr. Mata Bueso, Enrique

- Senior Engineer of Thermal Conditioning and Aerodynamics at Siemens Gamesa
- Application Engineer and CFD R&D Manager in Dassault Systèmes
- Thermal Conditioning & Aerodynamics Engineer at Gamesa-Altran
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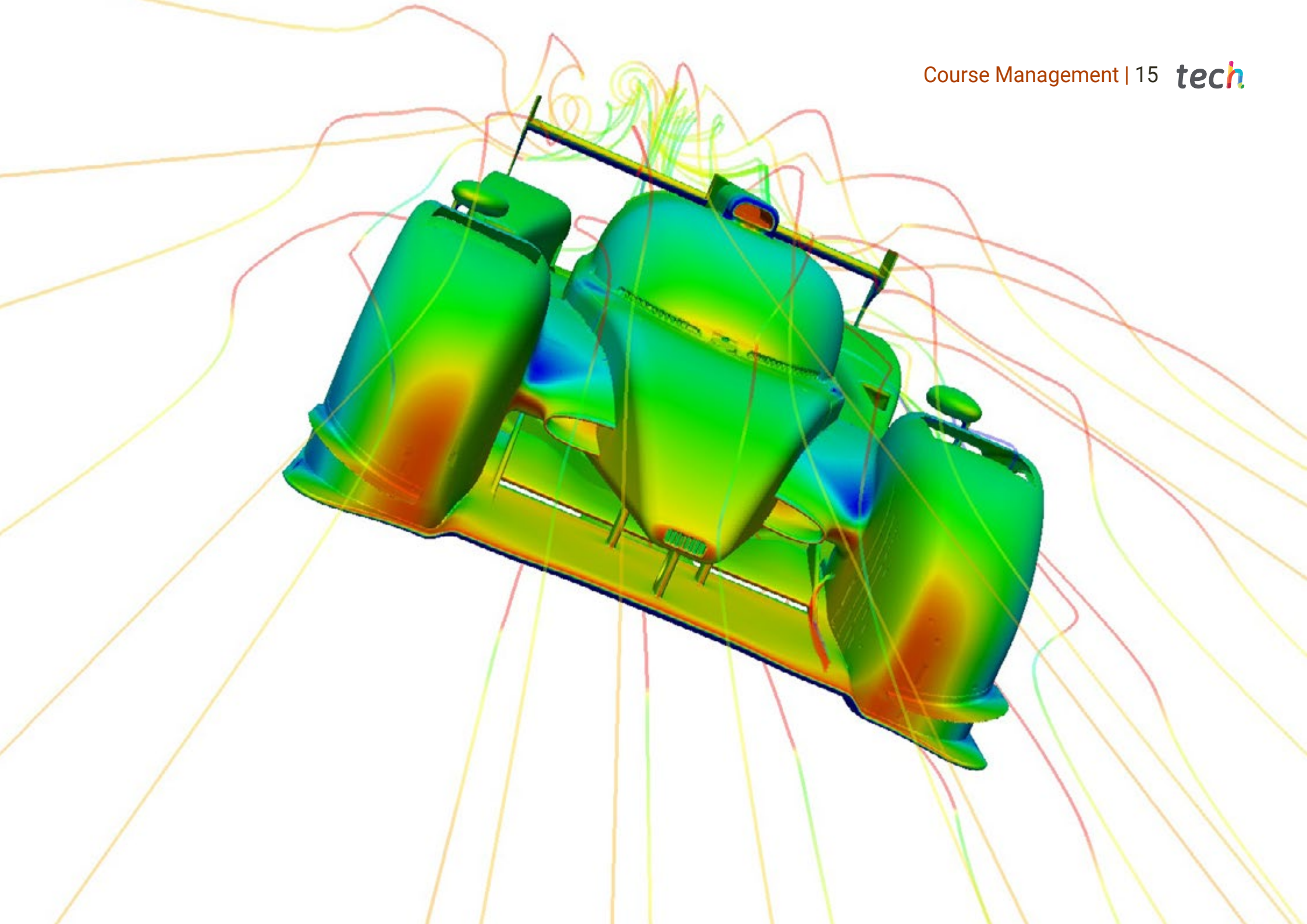

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Structure and Content

TECH's team of experts in Computational Fluid Mechanics has been in charge of designing the structure and content of the program, which ensures that the syllabus is of the highest quality. In addition, the program is developed under the Relearning pedagogical methodology, which guarantees an optimal assimilation of the contents by the students in a natural, agile and precise way. As a result, the theoretical and practical materials offered are the latest and most complete on the academic market. In this way, students will be able to acquire the knowledge and skills necessary to face the current challenges in the field of numerical simulation using CFD in an effective and efficient manner.

A curriculum created to guarantee you professional success in a market with a growing demand for highly qualified experts"

Module 1. Advanced CFD Models

1.1. Multiphysics
- 1.1.1. Multiphysics Simulations
- 1.1.2. System Types
- 1.1.3. Application Examples

1.2. Unidirectional Cosimulation
- 1.2.1. Unidirectional Cosimulation. Advanced Aspects
- 1.2.2. Information exchange schemes
- 1.2.3. Applications

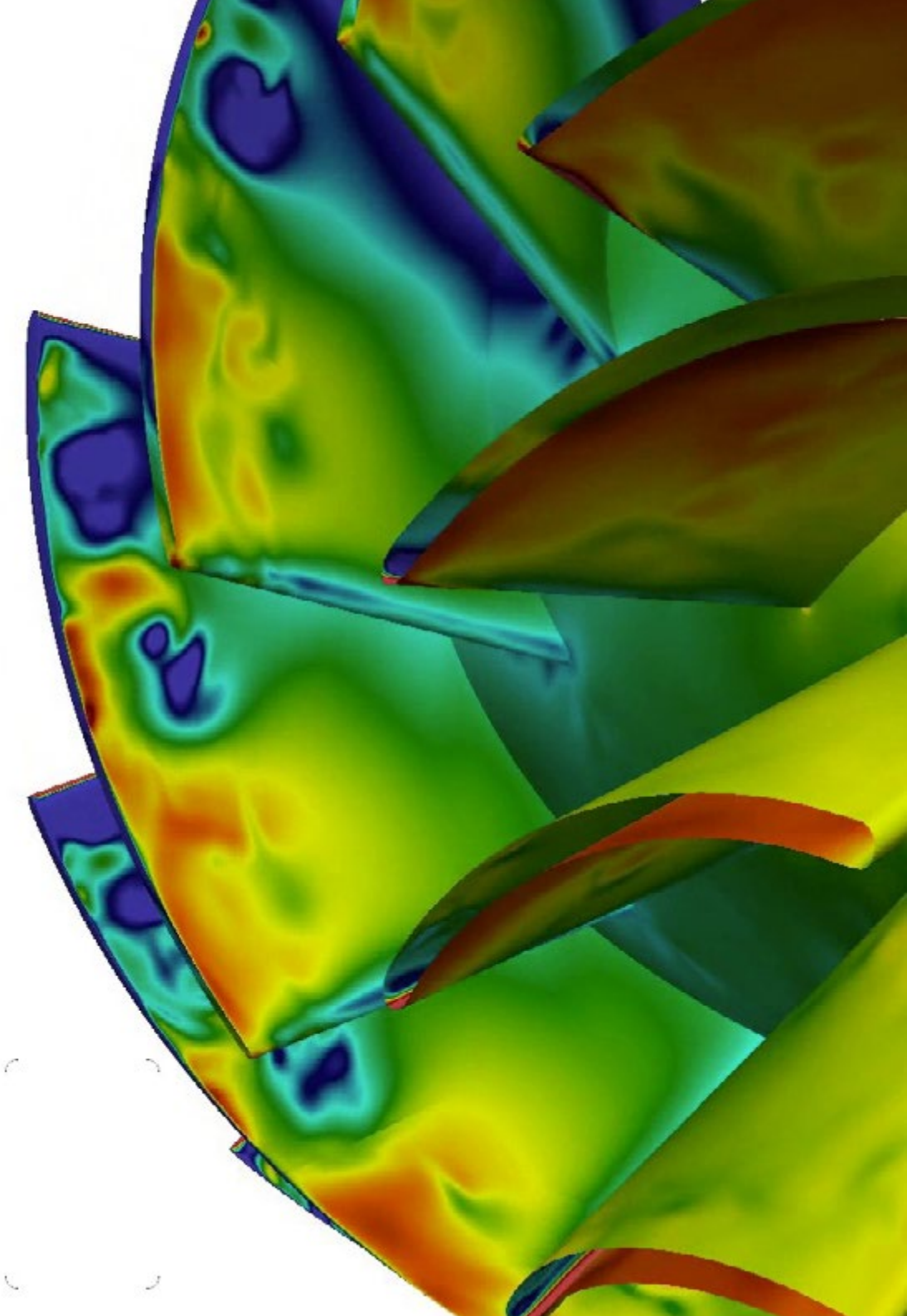
1.3. Bidirectional Cosimulation
- 1.3.1. Bidirectional Cosimulation. Advanced Aspects
- 1.3.2. Information exchange schemes
- 1.3.3. Applications

1.4. Convection Heat Transfer
- 1.4.1. Heat Transfer by Convection. Advanced Aspects
- 1.4.2. Convective heat transfer equations
- 1.4.3. Methods for solving convection problems

1.5. Conduction Heat Transfer
- 1.5.1. Conduction Heat Transfer. Advanced Aspects
- 1.5.2. Conductive heat transfer equations
- 1.5.3. Methods of solving driving problems

1.6. Radiative Heat Transfer
- 1.6.1. Radiative Heat Transfer. Advanced Aspects
- 1.6.2. Radiation heat transfer equations
- 1.6.3. Radiation troubleshooting methods

1.7. Solid-fluid-heat coupling
- 1.7.1. Solid-fluid-heat coupling
- 1.7.2. Solid-fluid thermal coupling
- 1.7.3. CFD and FEM



1.8. Aeroacoustics
- 1.8.1. Computational aeroacoustics
- 1.8.2. Acoustic analogies
- 1.8.3. Resolution methods

1.9. Advection-diffusion problems
- 1.9.1. Diffusion-advection problems
- 1.9.2. Scalar Fields
- 1.9.3. Particle methods

1.10. Coupling models with reactive flow
- 1.10.1. Reactive Flow Coupling Models. Applications
- 1.10.2. System of differential equations. Solving the chemical reaction
- 1.10.3. CHEMKINs
- 1.10.4. Combustion: flame, spark, Wobee
- 1.10.5. Reactive flows in a non-stationary regime: quasi-stationary system hypothesis.
- 1.10.6. Reactive flows in turbulent flows.
- 1.10.7. Catalysts

A complete and dynamic content, designed under the most precise and efficient pedagogical methodology, 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.

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 is the most widely used learning system in the best faculties in the world. 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 program, the studies 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

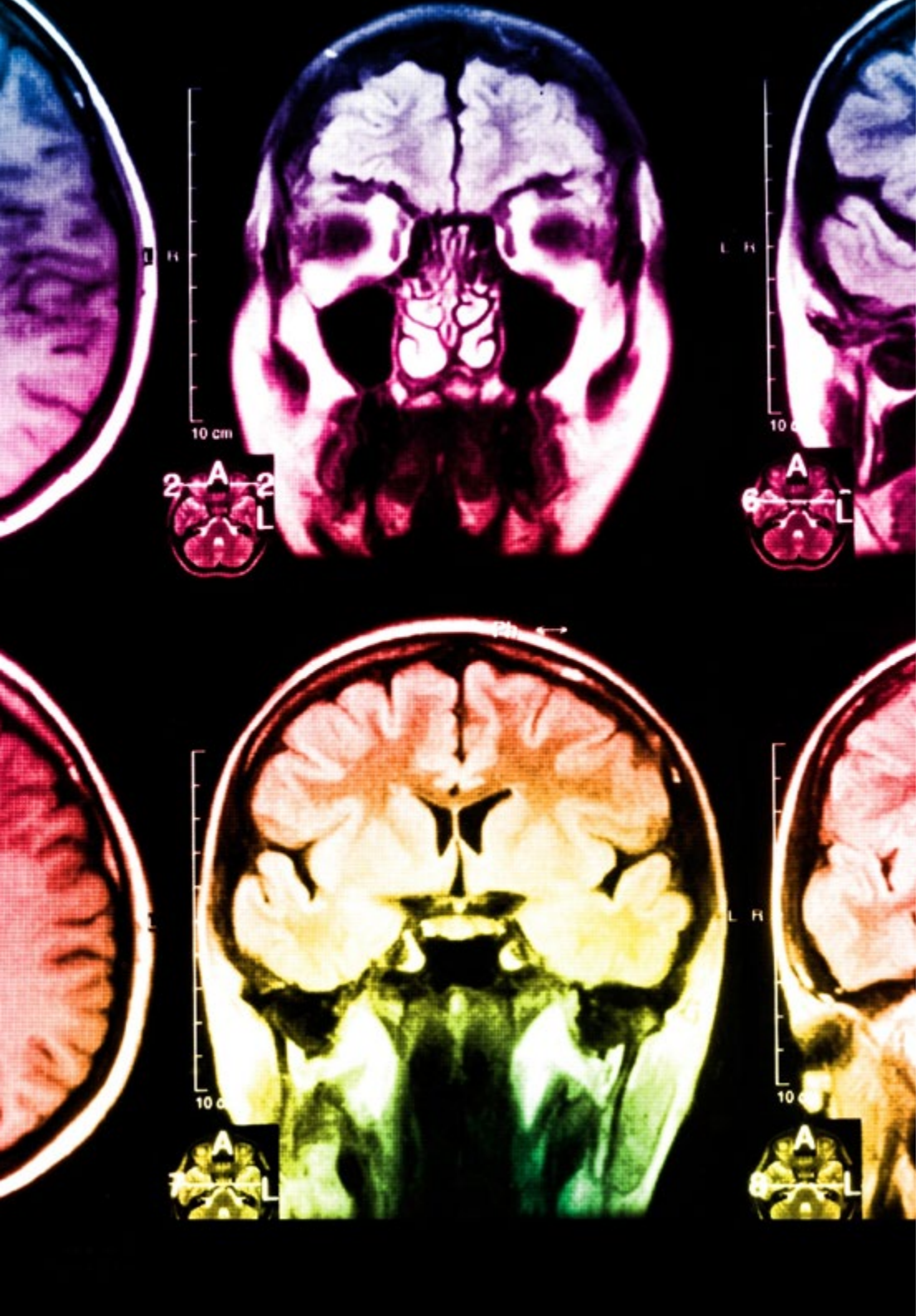
TECH effectively combines the Case Study methodology with a 100% online learning system based on repetition, which combines 8 different teaching elements in each lesson.

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.

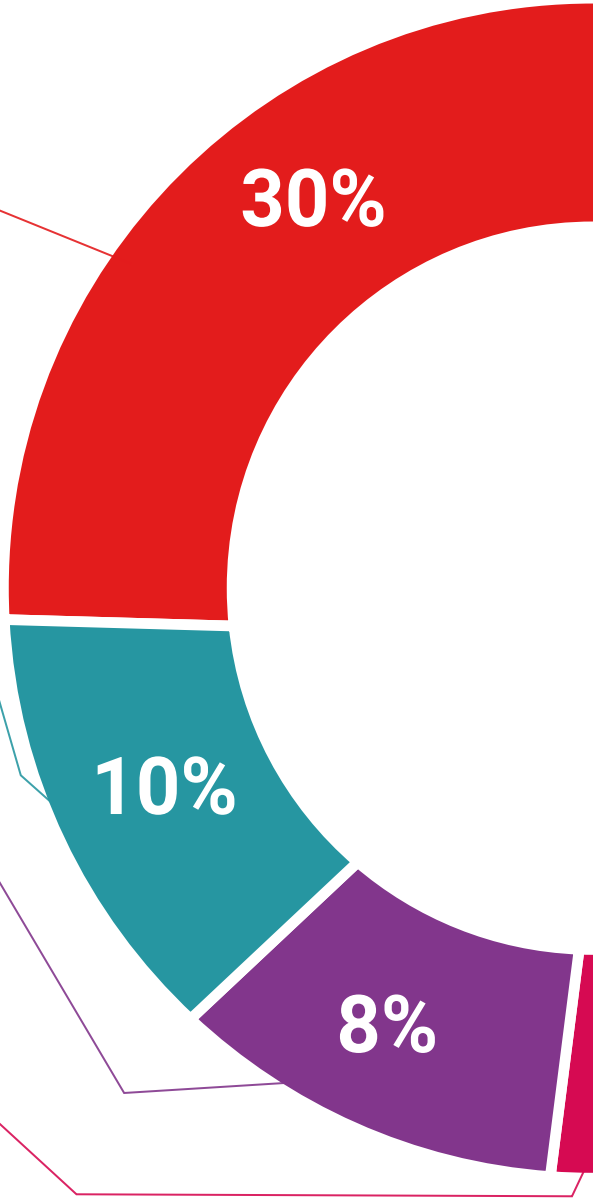
Learning from an Expert strengthens knowledge and memory, and generates confidence in future difficult decisions.

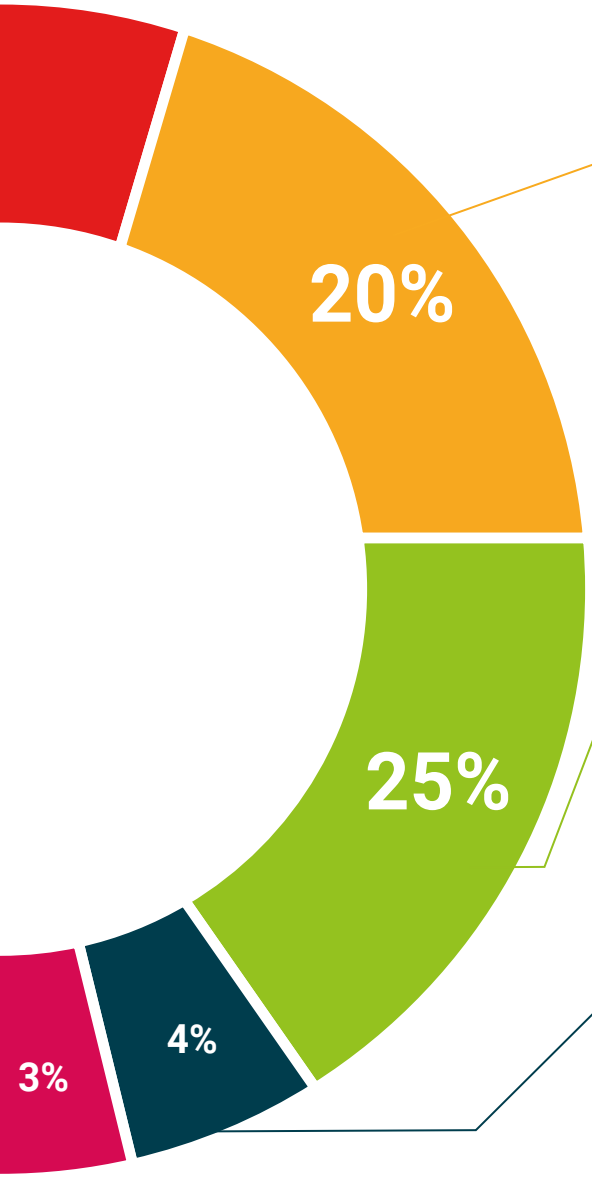
Practising Skills and Abilities

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

Postgraduate Certificate in Coupling with CFD Simulations. Multiphysical Applications guarantees students, in addition to the most rigorous and up-to-date education, access to a Postgraduate Certificate issued by TECH Technological 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 Coupling with CFD Simulations. Multiphysics Applications** 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 Coupling with CFD Simulations. Multiphysics Applications**

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 Coupling with CFD Simulations. Multiphysics Applications

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

This qualification must always be accompanied by the university degree issued by the competent authority to practice professionally in each country. 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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