

# Postgraduate Certificate

## Atmospheric Thermodynamics



## Postgraduate Certificate Atmospheric Thermodynamics

- » Modality: online
- » Duration: 12 months
- » Certificate: TECH Technological University
- » Dedication: 16h/week
- » Schedule: at your own pace
- » Exams: online

Website: [www.techtitute.com/us/engineering/postgraduate-certificate/atmospheric-thermodynamics](http://www.techtitute.com/us/engineering/postgraduate-certificate/atmospheric-thermodynamics)

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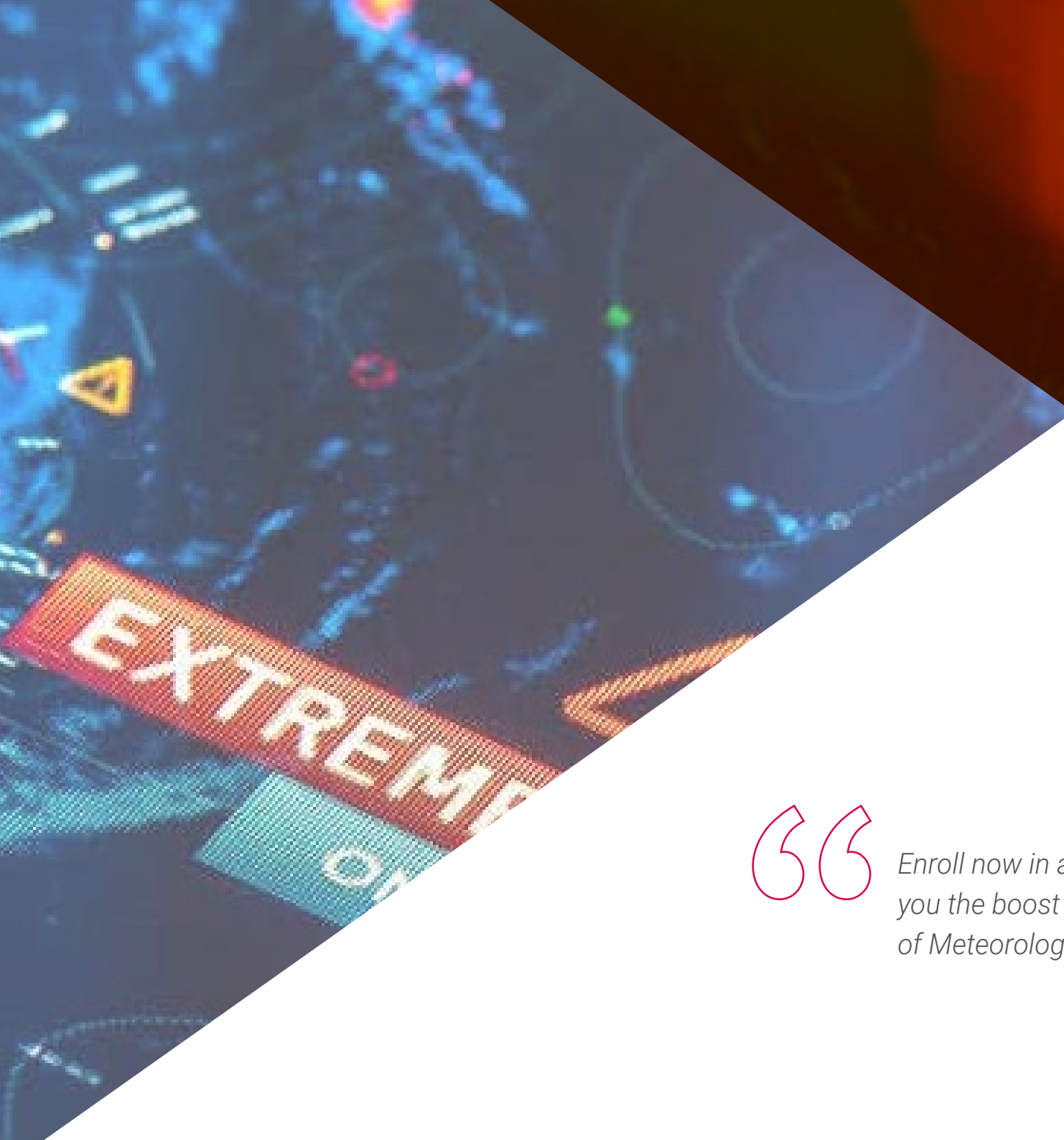
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# 01

# Introduction

Atmospheric observations that attempt to establish thermodynamic models for the diagnosis of natural phenomena are essential in the development of projects in the areas of Meteorology and Aeronautics. In this way, human beings can create artificial systems that serve as protection or contribute to the reduction of air pollution problems in large cities or to environmental control in enclosed spaces. A wide range of possibilities that require a deep knowledge of Atmospheric Thermodynamics. For this reason, TECH Technological University has created this 100% online degree, which allows students to achieve a high level of knowledge in this field, thanks to the advanced syllabus of this program and the numerous didactic materials made available to them.





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*Enroll now in a Diploma that will give you the boost you need in the world of Meteorological Engineering”*

In recent years there have been important advances in remote sensing with precise mathematical models that improve the accuracy of predictions. However, there is still a long way to go in the search for solutions to climate change, adverse weather events or the creation of systems to reduce air pollution in large cities.

In this sense, it is essential that professional engineers have a knowledge base on Atmospheric Thermodynamics that will drive them to create large-scale projects and initiatives with a solid foundation. In this sense, TECH Technological University has designed this Diploma in an exclusively online modality and of 150 teaching hours.

This is an intensive program that leads the graduate to deepen in the laws of energy conservation and thermodynamics, its fundamentals, diagrams, as well as atmospheric condensation by isobaric and adiabatic processes. All this, in addition, with innovative multimedia didactic material, specialized readings and simulations of case studies that will allow you to obtain a much more dynamic and agile teaching.

Likewise, with the Relearning method, based on the continuous reiteration of key concepts during the academic course, the engineer will consolidate them in a simple way. In this way, it will reduce the hours of memorization so frequent in other pedagogical systems.

A degree without attendance, without fixed schedules and with the most exhaustive content in Atmospheric Thermodynamics. The professional is therefore faced with a unique opportunity to progress in his or her sector through a program that offers flexibility and the freedom to self-manage study time.

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

- ◆ Practical case studies are presented by experts in Physics
- ◆ The graphic, schematic, and practical contents with which they are created, provide scientific and 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



*You will be able to self-manage your study time and access a degree that does not require attendance or classes with restricted schedules”*

“

*Acquire advanced learning about conservation laws and thermodynamics in only 6 weeks”*

*Raise your level of competence in the field of Atmospheric Thermodynamics through a 100% online and cutting-edge academic option.*

*Delve into the latest scientific articles on atmospheric condensation from your digital device with internet connection whenever you want.*

The program's teaching staff includes professionals from the 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.

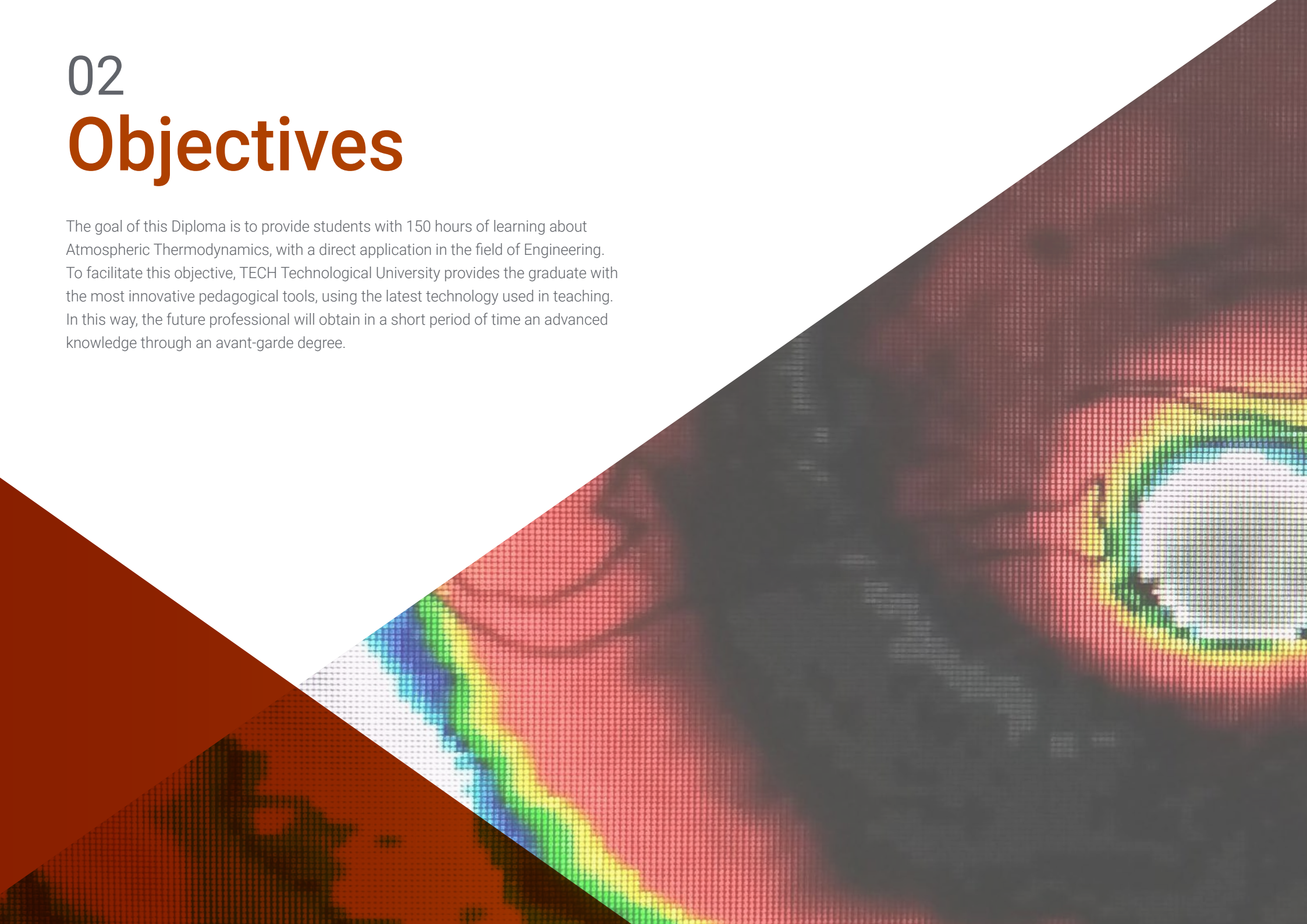
The design of this program focuses on Problem-Based Learning, by means of which the professional must try to solve the different professional practice situations that are presented throughout the academic course. For this purpose, the student will be assisted by an innovative interactive video system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



# 02

# Objectives

The goal of this Diploma is to provide students with 150 hours of learning about Atmospheric Thermodynamics, with a direct application in the field of Engineering. To facilitate this objective, TECH Technological University provides the graduate with the most innovative pedagogical tools, using the latest technology used in teaching. In this way, the future professional will obtain in a short period of time an advanced knowledge through an avant-garde degree.





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*Learn more about the Föhn Effect and  
apply this knowledge to your projects  
for predicting temperature rise”*



## General Objectives

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- ◆ Know the general properties of the climate system and the factors that influence changes in climate
- ◆ Understand the four principles of thermodynamics and apply them to the study of thermodynamic systems
- ◆ Apply processes of analysis, synthesis and critical reasoning





## Specific Objectives

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- ◆ Recognize thermodynamic phenomena
- ◆ Identify the determinant role of water vapor in the atmosphere
- ◆ Be able to characterize atmospheric stability
- ◆ Obtain basic knowledge about current global warming

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*The case studies in this degree will give you the keys to thermodynamic diagrams and their use in Meteorology”*

03

# Structure and Content

Thanks to the effectiveness of the Relearning system, based on the progressive reiteration of the key content of the degree, students will not have to invest long hours of study and will consolidate the most important concepts in a more efficient way. In this way, the graduate will acquire intensive and very useful practical learning about Atmospheric Thermodynamics. In addition, you will be able to further extend this agenda through multimedia teaching resources and specialized readings.



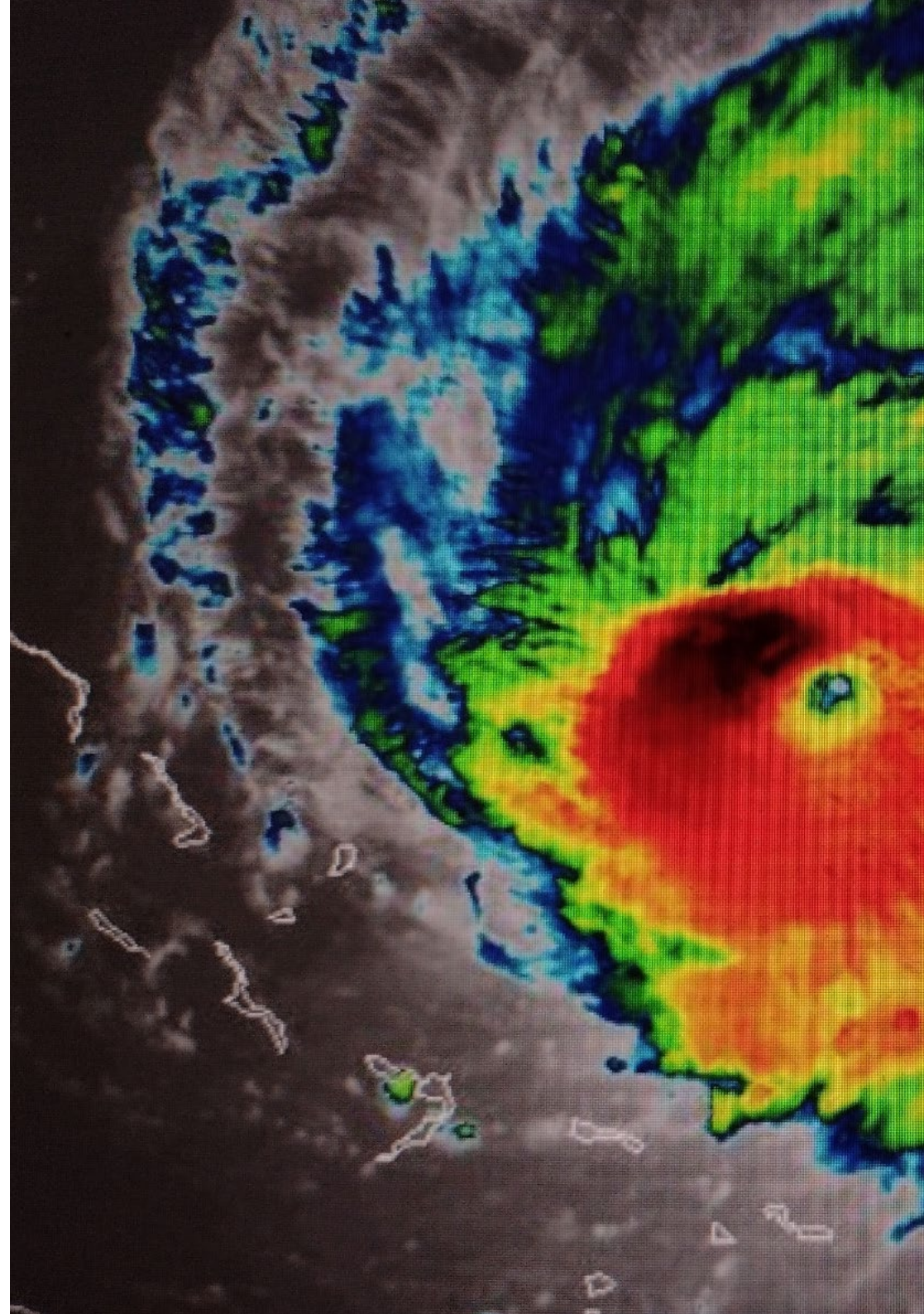


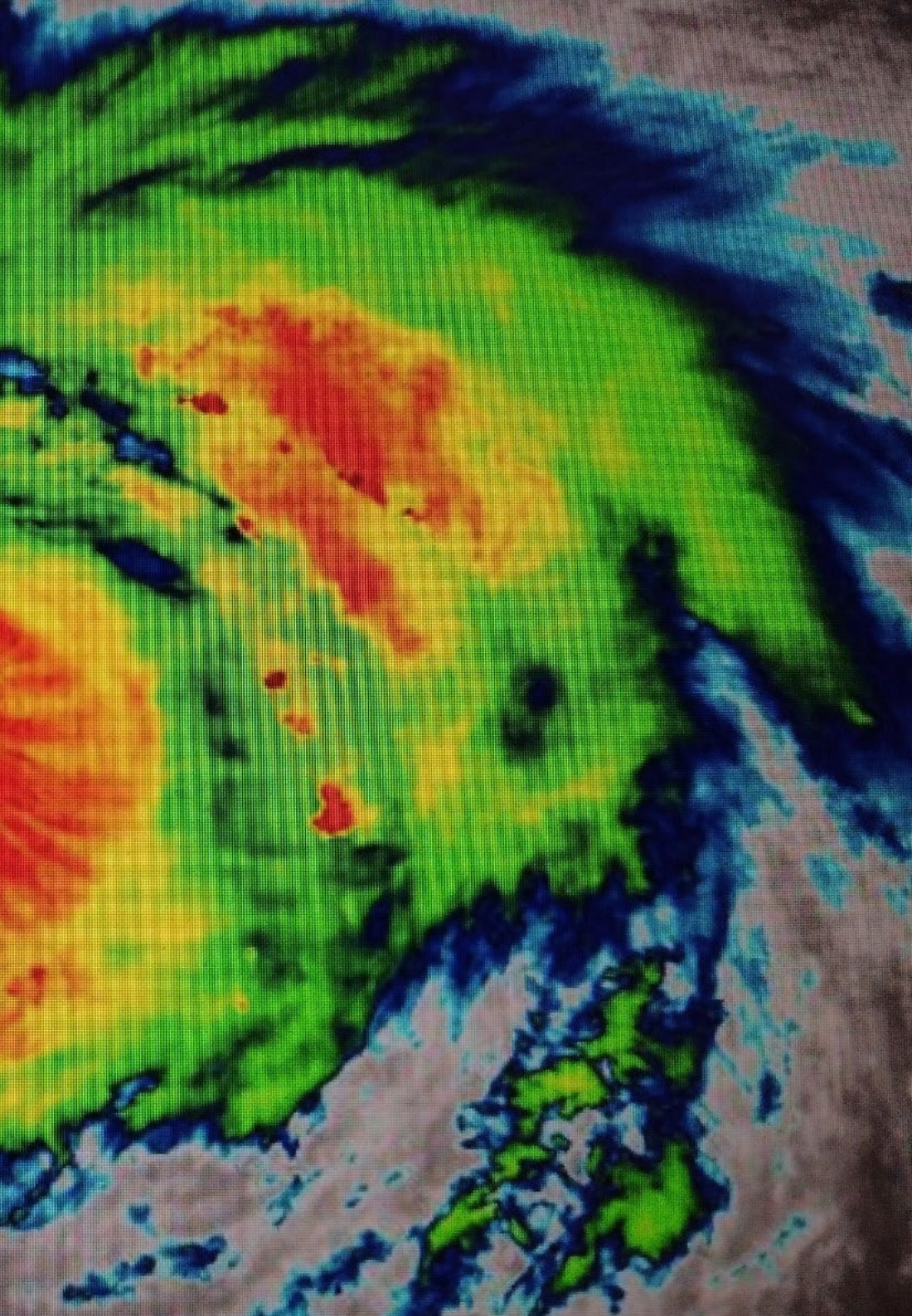
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*A study plan that will allow you to keep abreast of the most rigorous scientific studies on Meteorology and climatology”*

## Module 1. Thermodynamics of the Atmosphere

- 1.1. Introduction
  - 1.1.1. Thermodynamics of the Ideal Gas
  - 1.1.2. Laws of Conservation of Energy
  - 1.1.3. Laws of Thermodynamics
  - 1.1.4. Pressure, Temperature and Altitude
  - 1.1.5. Maxwell-Boltzmann Distribution of Velocities
- 1.2. The Atmosphere
  - 1.2.1. The Physics of the Atmosphere
  - 1.2.2. Air Composition
  - 1.2.3. Origin of the Earth's Atmosphere
  - 1.2.4. Atmospheric mass Distribution and Temperature
- 1.3. Fundamentals of Atmospheric Thermodynamics
  - 1.3.1. Equation of State of Air
  - 1.3.2. Humidity Indices
  - 1.3.3. Hydrostatic Equation: Meteorological Applications
  - 1.3.4. Adiabatic and Diabatic Processes
  - 1.3.5. Entropy in Meteorology
- 1.4. Thermodynamic Diagrams
  - 1.4.1. Relevant Thermodynamic Diagrams
  - 1.4.2. Properties of Thermodynamic Diagrams
  - 1.4.3. Emagrams
  - 1.4.4. Oblique Diagram: Applications
- 1.5. Study of Water and its Transformations
  - 1.5.1. Thermodynamic Properties of Water
  - 1.5.2. Phase Transformation in Equilibrium
  - 1.5.3. Clausius-Clapeyron Equation
  - 1.5.4. Approximations and Consequences of the Clausius-Clapeyron Equation
- 1.6. Condensation of Water Vapor in the Atmosphere
  - 1.6.1. Phase Transitions of Water
  - 1.6.2. Thermodynamic Equations of Saturated Air
  - 1.6.3. Equilibrium of Water Vapor with Water Droplets: Kelvin and Köhler Curves
  - 1.6.4. Atmospheric Processes that Give Rise to Water Vapor Condensation





- 1.7. Atmospheric Condensation by Isobaric Processes
  - 1.7.1. Dew and Frost Formation
  - 1.7.2. Formation of Radiative and Advection Fogs
  - 1.7.3. Isoenthalpic Processes
  - 1.7.4. Equivalent Temperature and Wet Thermometer Temperature
  - 1.7.5. Isoenthalpic Mixtures of Air Masses
  - 1.7.6. Mixing Mists
- 1.8. Atmospheric Condensation by Adiabatic Ascent
  - 1.8.1. Saturation of Air by Adiabatic Rise
  - 1.8.2. Reversible Adiabatic Saturation Processes
  - 1.8.3. Pseudo-Adiabatic Processes
  - 1.8.4. Equivalent Pseudo-Potential and Wet-Thermometer Temperature
  - 1.8.5. Föhn Effect
- 1.9. Atmospheric Stability
  - 1.9.1. Stability Criteria in Unsaturated Air
  - 1.9.2. Stability Criteria in Saturated Air
  - 1.9.3. Conditional Instability
  - 1.9.4. Convective Instability
  - 1.9.5. Analysis of Stabilities by Means of the Oblique Diagram
- 1.10. Thermodynamic Diagrams
  - 1.10.1. Conditions for Equivalent Area Transformations
  - 1.10.2. Examples of Thermodynamic Diagrams
  - 1.10.3. Graphical Representation of Thermodynamic Variables in a T-In(p) Diagram
  - 1.10.4. Use of Thermodynamic Diagrams in Meteorology

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*A university degree that will enable you to keep abreast of the latest paleoclimatic techniques used and data collection”*

# 04

# 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.



05

# Certificate

The Postgraduate Certificate in Atmospheric Thermodynamics 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 Atmospheric Thermodynamics** 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 Atmospheric Thermodynamics**

Official N° of Hours: **150 h.**



\*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.

future  
health confidence people  
education information tutors  
guarantee accreditation teaching  
institutions technology learning  
community commitment  
personalized service innovation  
knowledge present  
development language  
virtual classroom



**Postgraduate Certificate**  
Atmospheric  
Thermodynamics

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

# Postgraduate Certificate

## Atmospheric Thermodynamics