

# Postgraduate Certificate Alternative Internal Combustion Engines Diagnosis and Maintenance





## Postgraduate Certificate Alternative Internal Combustion Engines Diagnosis and Maintenance

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

Website: [www.techtute.com/us/postgraduate-certificate/alternative-internal-combustion-engines-diagnosis-maintenance](http://www.techtute.com/us/postgraduate-certificate/alternative-internal-combustion-engines-diagnosis-maintenance)

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# 01

# Introduction

Power plants and the automotive industry need to keep all their engines and state-of-the-art equipment up-to-date. To this end, they establish complex strategies for the prevention and maintenance of work teams. At the same time, implementing these security and control plans requires properly trained professionals. TECH guarantees maximum preparation in this field through this study program. The university program analyzes diagnostic imaging techniques and tools, offering an intensive tour of the most advanced tests in this area. In addition, to become experts in these contents, graduates only need a device with Internet access, since this syllabus has a 100% online academic modality and no pre-established schedules.



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*You will have at your disposal a 100% online study methodology and the most up-to-date criteria on MCIA fault diagnosis through this exclusive Postgraduate Certificate"*

Alternative Internal Combustion Engines play a key role in a wide range of applications, from automobiles to industrial machinery. For this reason, efficient operation is essential. However, wear and tear and failures can significantly affect their performance and service life. In this regard, technological innovation has been a valuable source of solutions. For example, diagnostic imaging, such as thermography or ultrasound, greatly supports the early detection of faults. Also, the development of non-destructive techniques to identify small faults has been of vital importance.

Implementing these state-of-the-art tests is complex and requires highly skilled professionals. In this way, engineers seeking success in this field need to keep up-to-date in a comprehensive way. To broaden your skills in these areas, TECH has a rigorous educational program, developed by the best experts in the field.

The university program performs an in-depth analysis of vibration and abnormal noise monitoring models as indicators of problems in engine operation. It also examines strategies for maintenance schedules and ensuring safety and international regulatory compliance in engine design. It also addresses the differences between prevention, prediction and correction when developing controls.

For the study of all these contents, the Postgraduate Certificate has a disruptive methodology in 100% online mode. It stands out the Relearning method, of which TECH is a pioneer, and which allows the assimilation of the fundamental concepts of the syllabus through repetition in a natural and progressive way. In addition, access to the university's Virtual Campus is completely personalized, allowing each member of the student body to organize their schedules individually, without responding to rigid chronograms.

This **Postgraduate Certificate in Alternative Internal Combustion Engines Diagnosis and Maintenance** contains the most complete and up-to-date educational program on the market. The most important features include:

- ♦ The development of case studies presented by experts in Aeronautical and Automotive Engineering
- ♦ 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 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



*You will master the use of flowcharts and checklists for engine diagnostics using this TECH program"*



*Delve into the techniques of Thermography and Ultrasound imaging that allow early diagnosis of various problems in the MCIA"*

The program's teaching staff includes professionals from the field who contribute their work experience to this educational program, as well as renowned specialists from leading societies and prestigious universities.

The 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 immersive education programmed to learn in real situations.

This program is designed around Problem-Based Learning, whereby the professional must try to solve the different professional practice situations that arise during the educational year. For this purpose, the students will be assisted by an innovative interactive video system created by renowned and experienced experts.

*Get up-to-date on MCIA with TECH, the world's top-rated university by its students according to Trustpilot.*

*Complete this educational itinerary in a comfortable and flexible way, thanks to its 100% online methodology.*



# 02

# Objectives

TECH is firmly committed to offering its students exclusive content based on the latest scientific evidence. In this way, graduates of this university program are able to update their skills in an intensive and comprehensive manner. Likewise, in their daily practices, they will be able to innovate and face different challenges. In short, it is a program of the highest educational quality that will allow engineers to broaden their knowledge and practice the diagnosis and maintenance of MCIA with the highest excellence.







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*The central objective of this program is to provide you with the skills that will propel your engineering career towards rigor and excellence"*



## General Objectives

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- ♦ Analyze the state of the art of Alternative Internal Combustion Engines (AICE)
- ♦ Examine the different aspects to be taken into account in the life cycle of AICEs
- ♦ Compile the fundamental principles of design, manufacture and simulation of reciprocating internal combustion engines
- ♦ Fundamentals of engine testing and validation techniques, including data interpretation and iteration between design and empirical results
- ♦ Determine the natural vibration of internal combustion engines, modally analyzing their frequency and dynamic response, the impact on engine noise in normal and abnormal operation
- ♦ Analyze how the latest technologies are redefining energy efficiency and reducing emissions in internal combustion vehicles
- ♦ Analyze the technologies that enable compression ratio adjustment and their impact on efficiency and performance
- ♦ Delve into the principles of engine data analysis
- ♦ Analyze the different alternative fuels on the market, their properties and characteristics, storage, distribution, emissions and energy balance
- ♦ Analyze the different systems and components of hybrid and electric motors
- ♦ Determine the energy control and management methods, their optimization criteria and their implementation in the transportation sector





## Specific Objectives

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- Compile diagnostic methods and maintenance types
- Identify the types of existing tests and diagnostics
- Develop optimization measures for maintenance
- Demonstrate the validity of good maintenance practices

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*Acquire the necessary training to achieve your professional goals through this 6-week Postgraduate Certificate”*

# 03

# Course Management

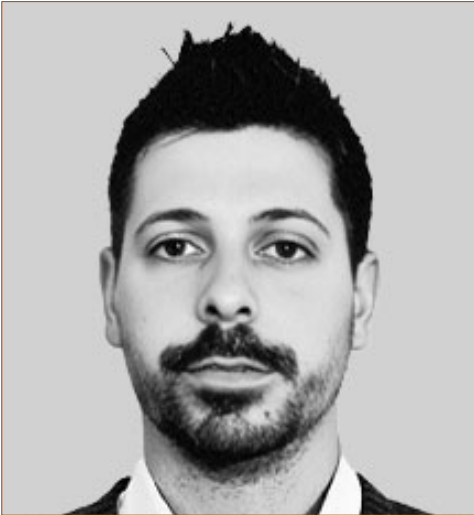
The faculty of this program accumulates a very high level of experience in the field of Diagnostics and Maintenance of MCIA. Their professional careers have focused on the design and development of engineering projects of excellence, with optimized fuel costs and the inclusion of technological innovations such as Artificial Intelligence in their operation. These experts have put together a rigorous syllabus where graduates will update their skills in a holistic manner. Thanks to their trajectories and educational guidance, they will promote greater specialization in the practice of their students.



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*Don't miss the opportunity to expand your theoretical and practical skills with the best experts: the TECH teaching community"*

## Management



### Mr. Del Pino Luengo, Isatsi

- Airbus Defence & Space CC295 FWSAR program certification and airworthiness technical manager
- Airworthiness and certification engineer for the engine section in charge of the MTR390 program at the National Institute for Aerospace Technology (NIAT)
- Airworthiness engineer and certification for the VSTOL section by the National Institute for Aerospace Technology (NIAT)
- Aeronautical design and certification engineer for the life extension project of the Spanish Navy AB212 helicopters (PEVH AB212) at Babcock MCSE
- Design and Certification Engineer in the DOA department at Babcock MCSE
- Fleet Technical Office Engineer AS 350 B3/ BELL 212/ SA 330 J.Babcock MCSE
- Qualifying Master's Degree in Aeronautical Engineering from the University of León
- Aeronautical Technical Engineer in Aeromotors, Polytechnic University of Madrid



# 04

# Structure and Content

This syllabus will address the potential failures of an Alternative Internal Combustion Engine and strategies to prevent or resolve them. In this way, within this syllabus, engineers will examine various diagnostic methods and tools for measuring thermal values. In addition, they will delve into data management, inspection mechanisms and the keys to optimizing performance and fuel economy. For this analysis, the program will rely on the disruptive Relearning system, a teaching method pioneered by TECH, which implements the periodic reiteration of the most complex concepts for their complete assimilation.





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*An exclusive and rigorous syllabus with explanatory videos, interactive summaries and other multimedia resources”*

## Module 1. Diagnosis and Maintenance of Alternate Internal Combustion Engines

- 1.1. Diagnostic Methods and Failure Analysis
  - 1.1.1. Identification and Use of Different Diagnostic Methods
  - 1.1.2. Failure Code Analysis and OBD Diagnostics Systems
  - 1.1.3. Use of Advanced Diagnostic Tools
    - 1.1.3.1. Scanners and Oscilloscopes
  - 1.1.4. Interpretation of Data to Identify Problems and Improve Performance
- 1.2. Maintenance Types
  - 1.2.1. Differentiation between Preventive, Predictive and Corrective Maintenance
  - 1.2.2. Selecting the Appropriate Maintenance Strategy According to the Context
  - 1.2.3. Planned Maintenance to Minimize Costs and Downtime
  - 1.2.4. Focus on Extended Engine Life and Optimal Engine Performance
- 1.3. Repair and Adjustment of Components
  - 1.3.1. Repair and Adjustment Techniques for Key Components
    - 1.3.1.1. Injectors, Spark Plugs and Timing Systems
  - 1.3.2. Identification and Troubleshooting of Ignition and Combustion Related Problems
  - 1.3.3. Fine-Tuning to Optimize Performance and Efficiency
- 1.4. Performance and Fuel Economy Optimization
  - 1.4.1. Strategies for Improving Fuel Efficiency and Engine Performance
  - 1.4.2. Adjustment of Injection and Ignition Parameters to Maximize Fuel Economy
  - 1.4.3. Evaluation of the Relationship between Performance and Emissions to Comply with International Environmental Regulations
- 1.5. Failure Analysis and Troubleshooting
  - 1.5.1. Systematic Processes for Identifying and Resolving Engine Failures
  - 1.5.2. Use of Flowcharts and Diagnostic Checklists
  - 1.5.3. Testing and Analysis to Isolate Specific Problems in Components
- 1.6. Data Management and Engine Performance Logging
  - 1.6.1. Engine Performance Data Collection and Analysis
  - 1.6.2. Use of Logs to Monitor Trends and Anticipate Problems
  - 1.6.3. Implementation of Recording Systems to Improve Traceability and Preventive Maintenance



- 1.7. Motor Inspection and Monitoring Techniques
  - 1.7.1. Visual and Auditory Inspection of Components for Wear and Damage
  - 1.7.2. Vibration and Abnormal Noise Monitoring as Indicators of Problems
  - 1.7.3. Use of Sensors and Real-Time Monitoring Systems for Detecting Subtle Changes
- 1.8. Diagnostic Imaging and Non-Destructive Testing
  - 1.8.1. Application of Imaging Techniques to Detect Problems
    - 1.8.1.1. Thermography, Ultrasound
  - 1.8.2. Non-Destructive Testing for Early Defect Detection
  - 1.8.3. Interpretation of Imaging Test Results for Maintenance Decisions
- 1.9. Planning and Execution of Maintenance Programs
  - 1.9.1. Design of Customized Maintenance Programs for Different Engines Applications
  - 1.9.2. Scheduling of Maintenance Intervals and Activities
  - 1.9.3. Coordination of Resources and Teams for Efficient Program Execution
- 1.10. Best Practices in Engine Maintenance
  - 1.10.1. Integration of Techniques and Approaches to Achieve Optimal Results
  - 1.10.2. International Safety and Regulatory Compliance During Maintenance
  - 1.10.3. Encouraging a Culture of Continuous Improvement in Engine Maintenance

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*Enroll in this Postgraduate Certificate!  
TECH will expand your professional  
skills through innovative teaching  
methods such as 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.

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*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

The Postgraduate Certificate in Alternative Internal Combustion Engines Diagnosis and Maintenance guarantees students, in addition to the most rigorous and up-to-date education, access to a Postgraduate Certificate issued by TECH Global University.



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*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 Alternative Internal Combustion Engines Diagnosis and Maintenance** 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.

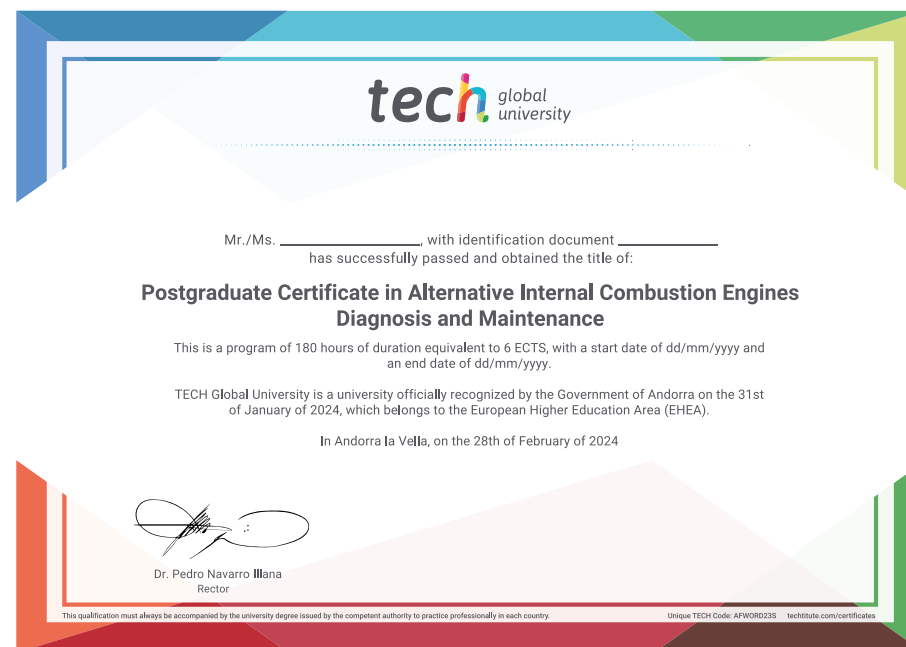
This **TECH Global University** title is a European program of continuing education and professional updating that guarantees the acquisition of competencies in its area of knowledge, providing a high curricular value to the student who completes the program.

Title: **Postgraduate Certificate in Alternative Internal Combustion Engines Diagnosis and Maintenance**

Modality: **online**

Duration: **6 weeks**

Accreditation: **6 ECTS**



\*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.



**Postgraduate Certificate**  
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# Postgraduate Certificate

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