Postgraduate Certificate
Electromagnetism

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Postgraduate Certificate
Electromagnetism

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

Website: **www.techtitute.com/us/engineering/postgraduate-certificate/electromagnetism**

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01

Introduction

Without electromagnetism, everyday objects such as microwave ovens, fans, televisions and computers would not exist today. Likewise, the development of other more advanced technologies such as GPS or wireless communications are based on the application of this branch of science focused on the study of the relationship between electrical and magnetic phenomena. Given its relevance and transcendence in the field of Engineering, TECH has designed this program that offers students the most advanced and intensive learning about electrostatic energy, magnetic induction field or the resolution of any problem in this field thanks to this teaching. For this purpose, students have access to innovative multimedia teaching resources, developed by the specialized teaching team that integrates this 100% online program.

This Postgraduate Certificate in Electromagnetism provides you with the knowledge you need to put your next digital creations into action"

Thanks to the Scottish mathematician and scientist James Clerk Maxwell and his formulation of the classical theory of electromagnetic radiation, nowadays human beings have achieved great technological and industrial progress, such as energy storage, the creation of computer chips, Bluetooth connections or cell phones.

Undoubtedly, a thorough and accurate knowledge of electromagnetism is essential in the field of engineering. Its application by professionals has allowed the development of machines, household appliances and devices that have boosted different productive sectors such as industrial. Given this reality, it is essential that the professional has a solid foundation, which can be achieved through this Postgraduate Certificate in Electromagnetism, designed by TECH to offer the most advanced learning in this area.

An exclusively online program, which over 12 weeks, will allow students to delve into the operation of the electric field and field lines, understand the magnetostatics in natural means or apply Maxwell's equations. For this purpose, it has innovative teaching tools, in which this academic institution has used the latest technology] applied to university teaching.

In addition, the Relearning system will allow students to progress through the content of this program in a much more natural way, reducing the long hours of study that are more frequent in other teaching methods.

The professionals have an excellent opportunity to study a program according to the current academic times and to which they can access comfortably whenever and wherever they wish. Students will only need an electronic device with Internet connection to access the program's syllabus. All you need is an electronic device with Internet connection to view the content of this program.

This **Postgraduate Certificate in Electromagnetism** 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 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

An academic option without in-person attendance or classes with fixed schedules, which adapts to your needs. Enroll now"

Case studies developed by specialists provide a practical approach to university teaching that is highly applicable to engineering"

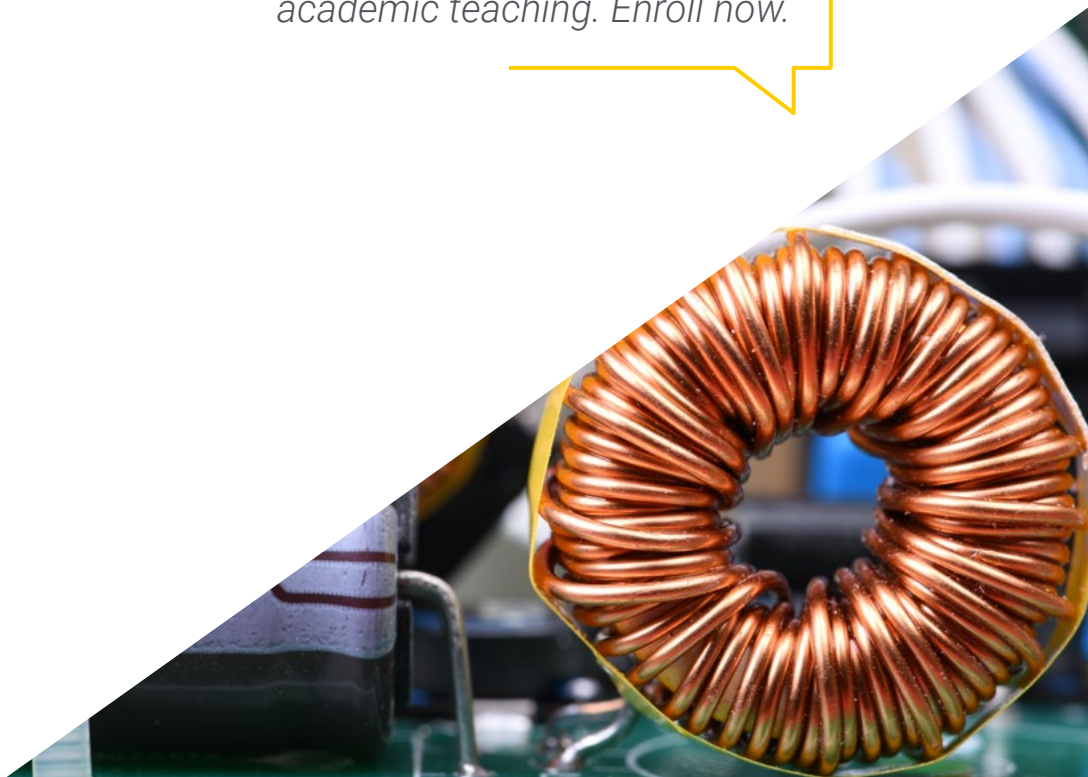
With this program, you will obtain a comprehensive learning about the laws of conservation and electromagnetic energy.

TECH has designed multimedia pills using the latest technology applied to academic teaching. Enroll now.

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.

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.

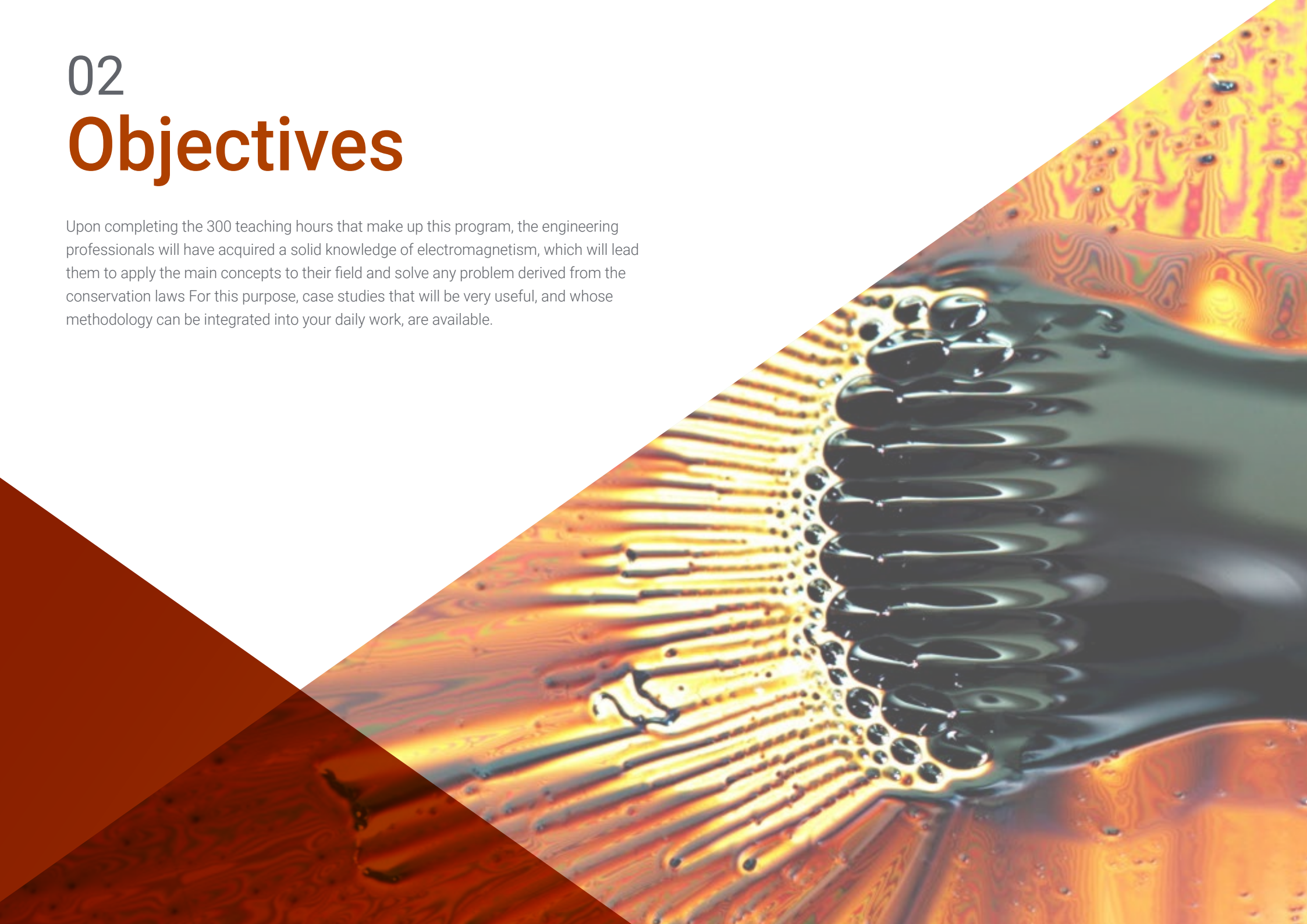
This program is designed around Problem-Based Learning, whereby the professional must try to solve the different professional practice situations that arise throughout the program. For this purpose, the student will be assisted by an innovative interactive video system created by renowned and experienced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



02

Objectives

Upon completing the 300 teaching hours that make up this program, the engineering professionals will have acquired a solid knowledge of electromagnetism, which will lead them to apply the main concepts to their field and solve any problem derived from the conservation laws For this purpose, case studies that will be very useful, and whose methodology can be integrated into your daily work, are available.



With the Relearning method, you will stop investing a lot of study hours and you will advance through this program in a much more fluid way"

General Objectives

- Apply knowledge of vector analysis to electric field studies
- Gain a basic understanding of the magnetic induction field
- Achieve an understanding of magnetostatics both in material means and in vacuum
- Know conservation electromagnetism laws and use them in problem solving

With this 100% online program, you will be able to learn about Faraday's law and its limitations whenever you want"

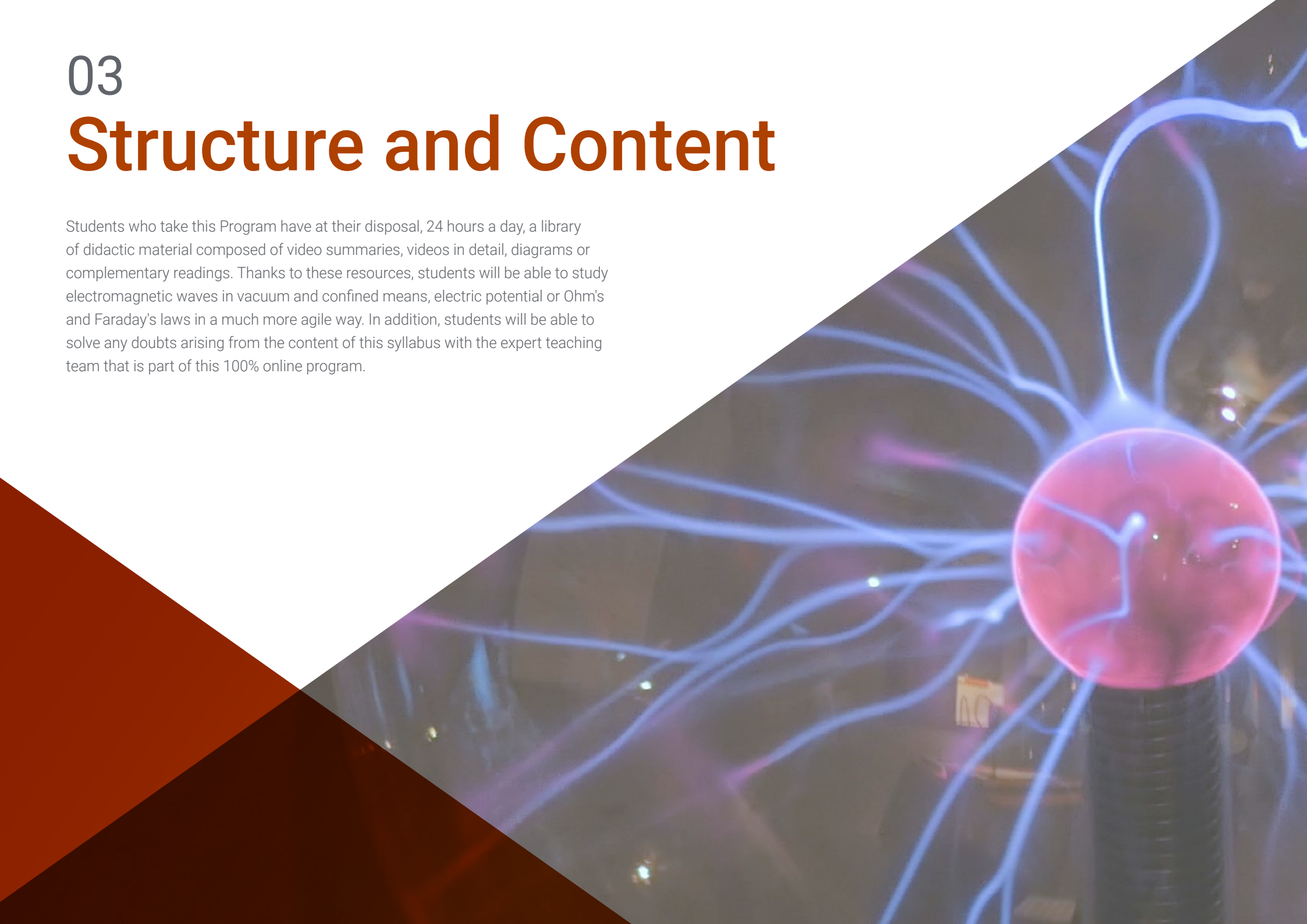
Specific Objectives

- Understand the operation of electrostatic both in material means and in vacuum
- Know dielectric characteristics
- Obtain a basic knowledge of the magnetic field and its properties
- Know Maxwell's equations and be able to calculate various solutions such as electromagnetic waves and their propagation

03

Structure and Content

Students who take this Program have at their disposal, 24 hours a day, a library of didactic material composed of video summaries, videos in detail, diagrams or complementary readings. Thanks to these resources, students will be able to study electromagnetic waves in vacuum and confined means, electric potential or Ohm's and Faraday's laws in a much more agile way. In addition, students will be able to solve any doubts arising from the content of this syllabus with the expert teaching team that is part of this 100% online program.



All of this, in a syllabus with a theoretical-practical approach that can be accessed 24 hours a day from your computer with Internet connection"

Module 1. Electromagnetism

1.1. Vector Calculus: Review
- 1.1.1. Vector Operations
  - 1.1.1.1. Scalar Products
  - 1.1.1.2. Vectorial Products
  - 1.1.1.3. Mixed Products
  - 1.1.1.4. Triple Product Properties
- 1.1.2. Vector Transformation
  - 1.1.2.1. Differential Calculus
  - 1.1.2.1. Gradient
  - 1.1.2.2. Divergence
  - 1.1.2.3. Rotational
  - 1.1.2.4. Multiplication Rules
- 1.1.3. Integral Calculus
  - 1.1.3.1. Line, Surface and Volume Integrals
  - 1.1.3.2. Fundamental Calculus Theorem
  - 1.1.3.3. Fundamental Gradient Theorem
  - 1.1.3.4. Fundamental Divergence Theorem
  - 1.1.3.5. Fundamental Rotational Theorem
- 1.1.4. Dirac Delta Function
- 1.1.5. Helmholtz Theorem

1.2. Coordinate Systems and Transformations
- 1.2.1. Line, Surface and Volume Element
- 1.2.2. Cartesian Coordinates
- 1.2.3. Polar Coordinates
- 1.2.4. Spherical Coordinates
- 1.2.5. Cylindrical Coordinates
- 1.2.6. Coordinate Change

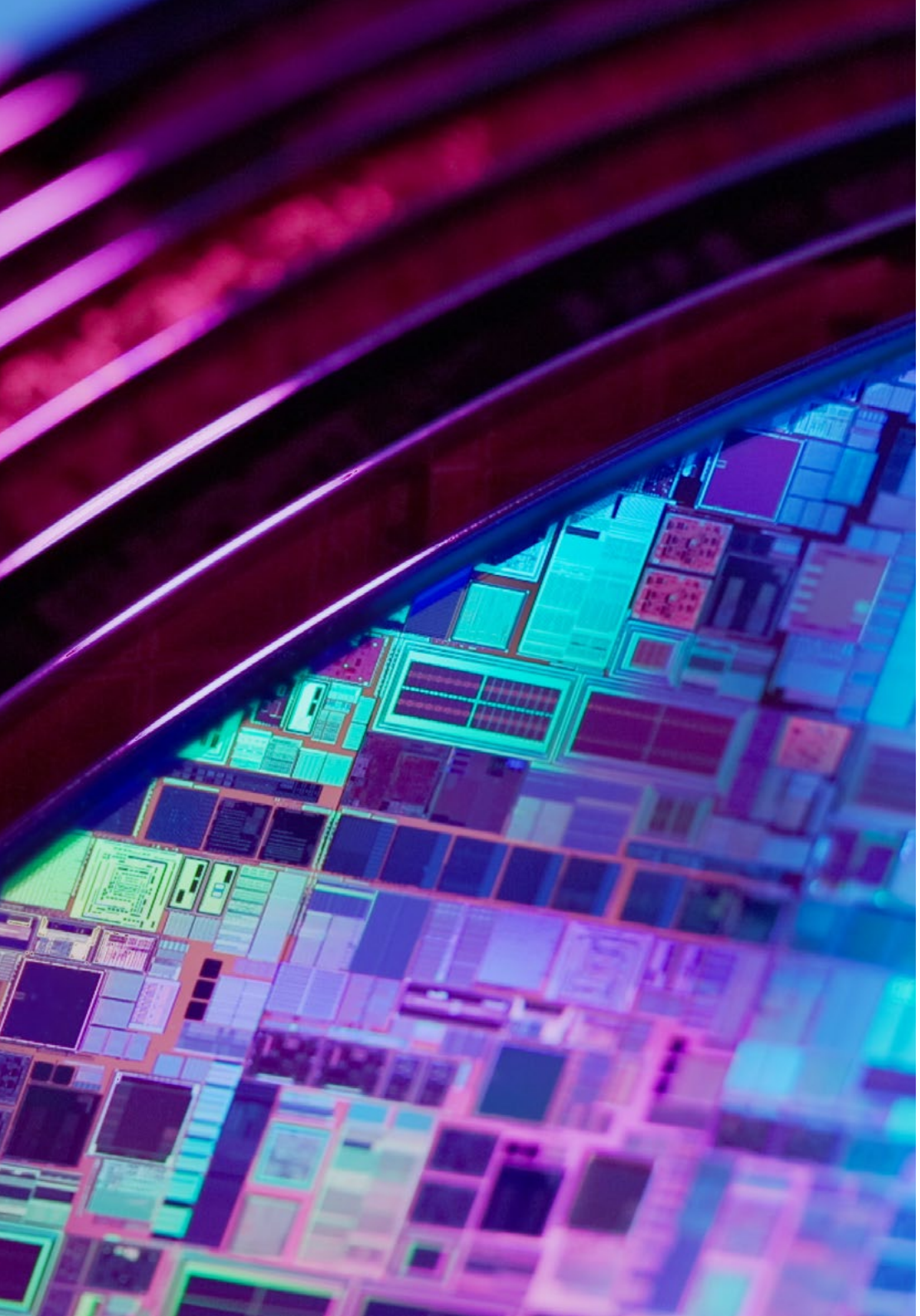
1.3. Electric Field
- 1.3.1. Point Charges
- 1.3.2. Coulomb's Law
- 1.3.3. Electric Field and Field Lines
- 1.3.4. Discrete Charge Distributions
- 1.3.5. Continuous Load Distributions
- 1.3.6. Divergence and Rotational Electric Field
- 1.3.7. Electric Field Flow. Gauss Theorem

1.4. Electric Potential
- 1.4.1. Electric Potential Definition
- 1.4.2. Poisson's Equation
- 1.4.3. Laplace's Equation
- 1.4.4. Potential Charge Distribution Calculation

1.5. Electrostatic Energy
- 1.5.1. Electrostatic Work
- 1.5.2. Discrete Charge Distribution Energy
- 1.5.3. Continuous Charge Distribution Energy
- 1.5.4. Electrostatic Equilibrium Conductors
- 1.5.5. Induced Charges

1.6. Vacuum Electrostatics
- 1.6.1. Laplace's Equation in One, Two and Three Dimensions
- 1.6.2. Laplace's Equation - Boundary Conditions and Uniqueness Theorems
- 1.6.3. Image Method
- 1.6.4. Variable Separation

1.7. Multi-Polar Expansion
- 1.7.1. Approximate Potentials Away from the Source
- 1.7.2. Multi-Polar Development
- 1.7.3. Mono-Polar Term
- 1.7.4. Di-Polar Term
- 1.7.5. Coordinate Origins in Multipole Expansions
- 1.7.6. Electric Field of an Electric Dipole



1.8. Electrostatics in Material Media I
- 1.8.1. Dielectric Field
- 1.8.2. Dielectric Types
- 1.8.3. Vector Displacement
- 1.8.4. Gauss's Law in Dielectric Presence
- 1.8.5. Boundary Conditions
- 1.8.6. Electric Field within Dielectrics

1.9. Electrostatics in Material Media II: Linear Dielectrics
- 1.9.1. Electrical Susceptibility
- 1.9.2. Electrical Permittivity
- 1.9.3. Dielectric Constant
- 1.9.4. Dielectric Systems Energy
- 1.9.5. Dielectric Forces

1.10. Magnetostatics
- 1.10.1. Magnetic Induction Field
- 1.10.2. Electric Currents
- 1.10.3. Magnetic Field Calculation: Biot and Savart's Law
- 1.10.4. Lorentz Force
- 1.10.5. Divergence and Rotational Magnetic Field
- 1.10.6. Ampere's Law
- 1.10.7. Magnetic Vector Potential

Module 2. Electromagnetism II

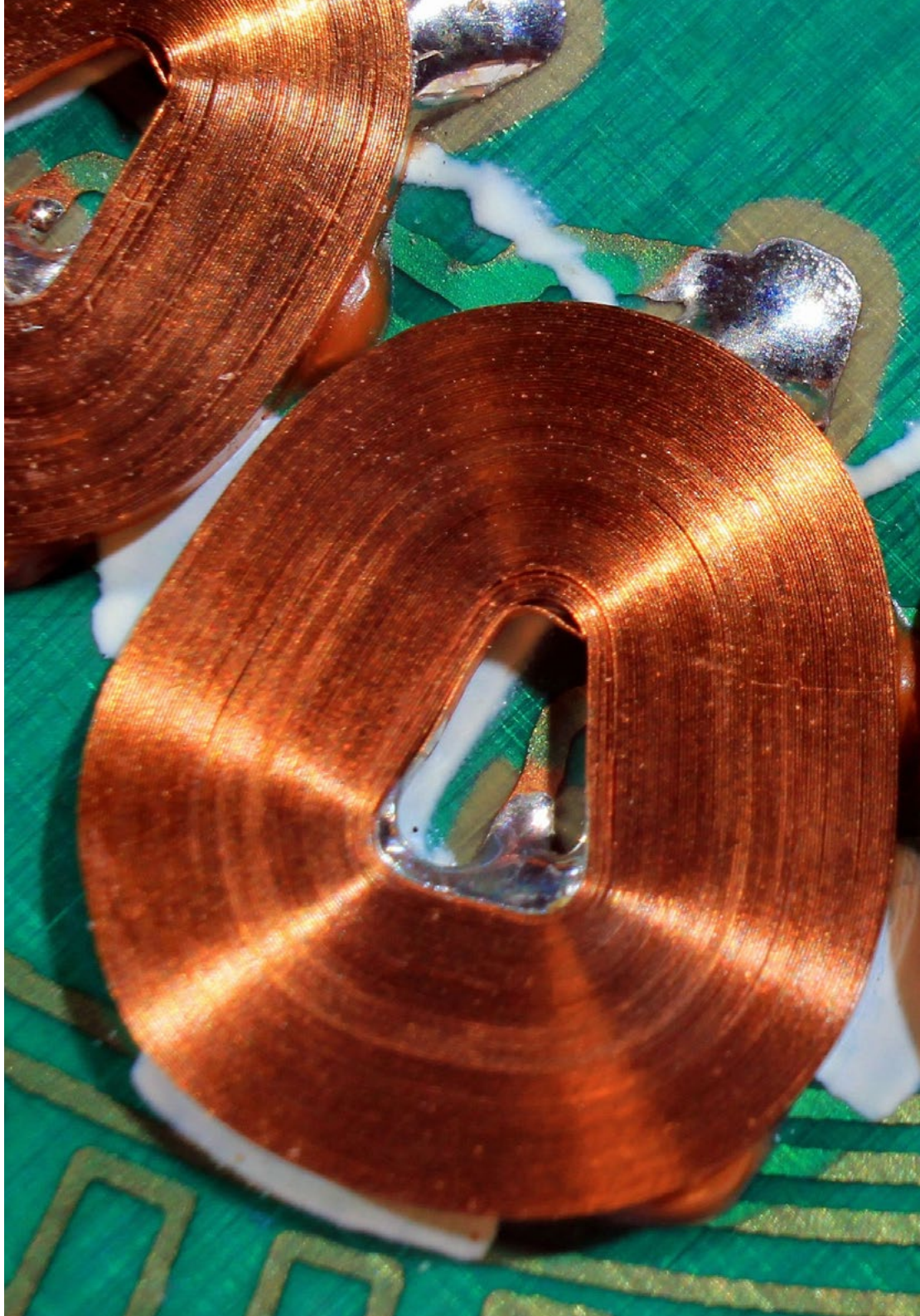
2.1. Magnetism in Material Mediums
- 2.1.1. Multi-Polar Development
- 2.1.2. Magnetic Dipole
- 2.1.3. Field Created by a Magnetic Material
- 2.1.4. Magnetic Intensity
- 2.1.5. Types of Magnetic Materials: Diamagnetic, Paramagnetic and Ferromagnetic
- 2.1.6. Border Conditions

2.2. Magnetism in Material Media II
- 2.2.1. Auxiliary Field H
- 2.2.2. Ampere's Law in Magnetized Media
- 2.2.3. Magnetic Susceptibility
- 2.2.4. Magnetic Permeability
- 2.2.5. Magnetic Circuits

2.3. Electrodynamics
- 2.3.1. Ohm's Law
- 2.3.2. Electromotive Force
- 2.3.3. Faraday's Law and its Limitations
- 2.3.4. Mutual Inductance and Self-Inductance
- 2.3.5. Induced Electric Field
- 2.3.6. Inductance
- 2.3.7. Magnetic Field Energy

2.4. Maxwell's Equations
- 2.4.1. Displacement Current
- 2.4.2. Maxwell's Equations in Vacuum and in Material Media
- 2.4.3. Boundary Conditions
- 2.4.4. Solution Uniqueness
- 2.4.5. Electromagnetic Energy
- 2.4.6. Electromagnetic Field Drive
- 2.4.7. Angular Momentum of Electromagnetic Fields

2.5. Conservation Laws
- 2.5.1. Electromagnetic Energy
- 2.5.2. Continuity Equation
- 2.5.3. Poynting's Theorem
- 2.5.4. Newton's Third Law in Electrodynamics



2.6. Electromagnetic Waves: Introduction
- 2.6.1. Wave Motion
- 2.6.2. Wave Equation
- 2.6.3. Electromagnetic Spectrum
- 2.6.4. Plane Waves
- 2.6.5. Sine Waves
- 2.6.6. Boundary Conditions:
- 2.6.7. Polarization

2.7. Electromagnetic Waves in Vacuums
- 2.7.1. Wave Equation for Electric Fields and Magnetic Induction
- 2.7.2. Monochromatic Waves
- 2.7.3. Electromagnetic Wave Energy
- 2.7.4. Electromagnetic Wave Momentum

2.8. Electromagnetic Waves in Materials
- 2.8.1. Flat Dielectric Waves
- 2.8.2. Flat Conductor Waves
- 2.8.3. Wave Propagation in Linear Media
- 2.8.4. Medium Dispersive
- 2.8.5. Reflection and Refraction

2.9. Waves in Confined Mediums I
- 2.9.1. Maxwell's Guide Equations
- 2.9.2. Dielectric Guides
- 2.9.3. Modes in a Guide
- 2.9.4. Propagation speed
- 2.9.5. Rectangular Guide

2.10. Waves in Confined Mediums
- 2.10.1. Resonant Cavities
- 2.10.2. Transmission Lines
- 2.10.3. Transitional Regime
- 2.10.4. Permanent Regime

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

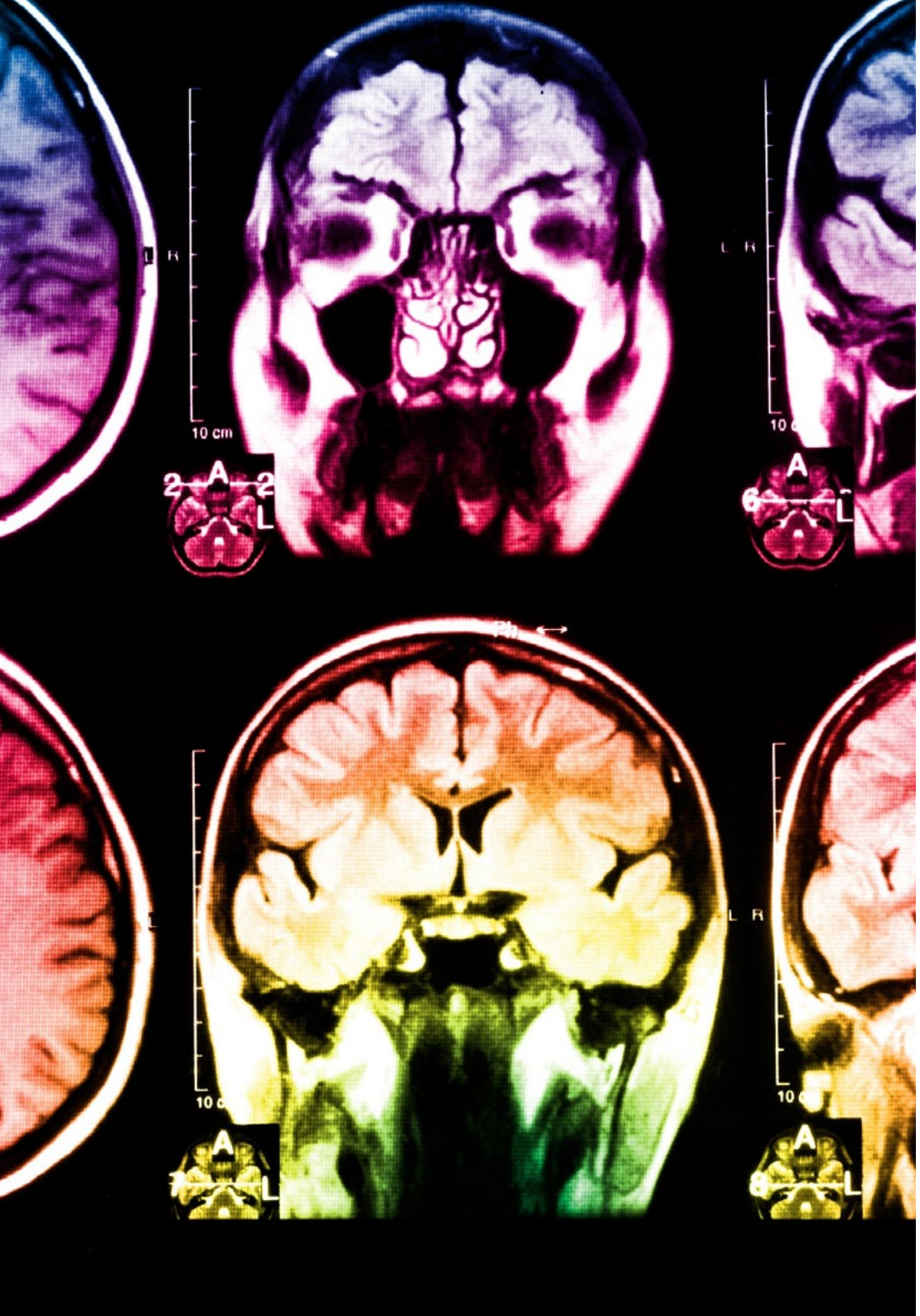
TECH effectively combines the Case Study methodology with a 100% online learning system based on repetition, which combines 8 different teaching elements in each lesson.

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.

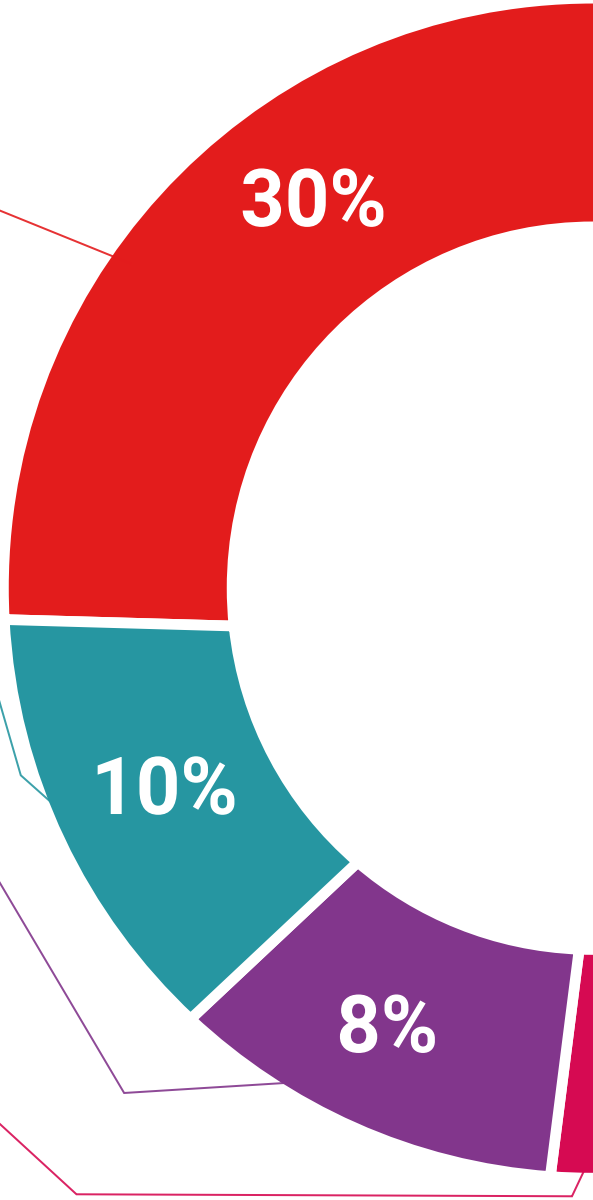
Learning from an Expert strengthens knowledge and memory, and generates confidence in future difficult decisions.

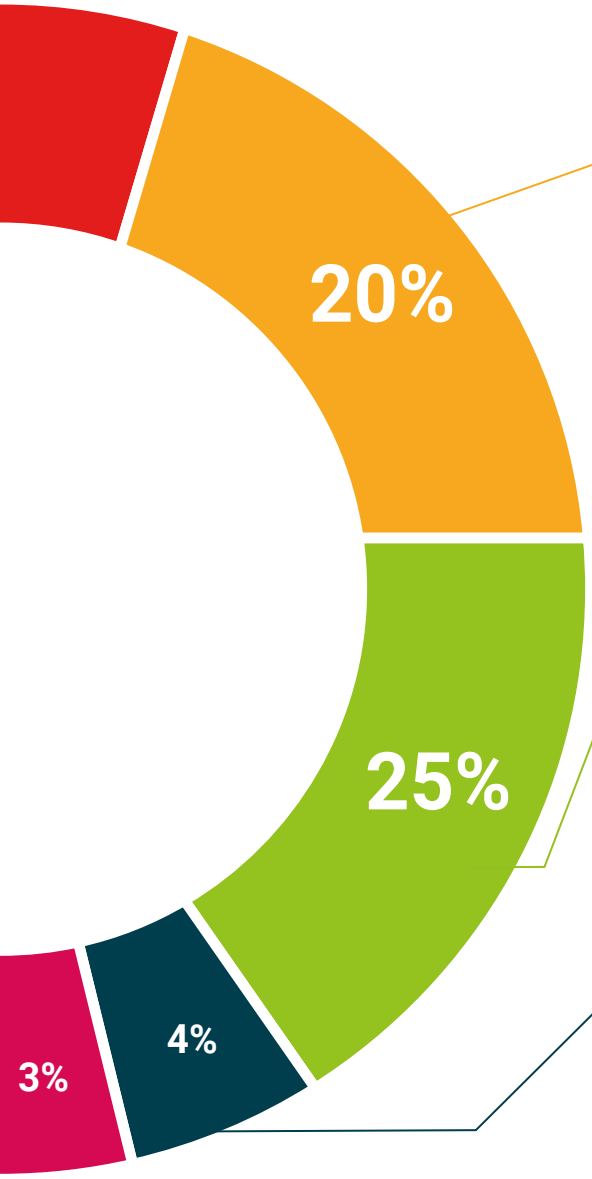
Practising Skills and Abilities

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 Electromagnetism 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 **Postgraduate Certificate in Electromagnetism** 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 Electromagnetism**

Official N° of hours: **300 h.**


tech technological university

Awards the following

DIPLOMA

to

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

For having passed and accredited the following program

POSTGRADUATE CERTIFICATE

in

Electromagnetism

This is a qualification awarded by this University, equivalent to 300 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

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 EDUCATION will make the necessary arrangements to obtain it, at an additional cost.

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