Postgraduate Certificate

Production and Generation of Electric Energy with Nuclear Technologies and Techniques

tech technological university

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Postgraduate Certificate

Production and Generation of Electric Energy with Nuclear Technologies and Techniques

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

Website: **www.techtitute.com/us/engineering/postgraduate-certificate/production-generation-electric-energy-nuclear-technologies-techniques**

Index

01

Introduction

Although their installation and operation continue to be the subject of controversy, this type of power plant continues to have a great weight among the generation parks, which is why TECH has proposed this program in which its treatment is carried out. It analyzes in depth the fundamental concepts of nuclear energy, its potential and its stability. It studies in detail the different types of nuclear energy that exist and analyzes the composition and operation of the components associated with a nuclear reactor. It also addresses the influence of the different variables involved in the thermodynamic processes that exist in this type of power plant. At the same time, the design, construction, barriers and the different criteria to be taken into account in the implementation of the pertinent safety measures in these plants are discussed in depth.

This program pays special attention to the treatment to be given to the waste generated by nuclear power plants, how their decommissioning should be carried out and the decommissioning procedure to which they are subjected"

The program begins by analyzing the fundamental concepts of nuclear energy, its potential and stability, studying in detail the different types of nuclear energy that exist. The composition and operation of the components associated with a nuclear reactor are analyzed, breaking down the most common types of reactors that exist in the plants currently in operation.

Due to the great importance of safety in this type of power plants, the program goes in depth into their design, construction, barriers and the different criteria to be taken into account in their operation, paying special attention to the treatment to be given to the wastes generated by this type of power plants, how the dismantling of this type of power plants should be carried out and the procedure for their decommissioning.

In addition, the future trends of this type of power plants are discussed, focusing on the so-called Generation IV plants. Finally, the student will discuss the enormous potential of small modular reactors (SMRs) for electric power generation, their advantages and disadvantages, and the different types currently available.

In addition, as it is a 100% online Postgraduate Certificate, it provides the student with the ease of being able to take it comfortably, wherever and whenever they want. All you need is a device with internet access to take your career one step further. A modality in line with the current times with all the guarantees to position the professional in a highly demanded area in continuous change, in line with the SDGs promoted by the UN.

This **Postgraduate Certificate in Production and Generation of Electric Energy with Nuclear Technologies and Techniques** contains the most complete and updated curriculum on the market. The most important features of the program include:

- The development of case studies presented by experts in electrical engineering
- The deepening in Energy Resources Management
- The graphic, schematic, and eminently 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

Thanks to this TECH Postgraduate Certificate, you will know how to evaluate the parameters involved in nuclear reactions with clarity and without any margin of error"

You will analyze the fundamentals of nuclear energy and its potential for energy generation today"

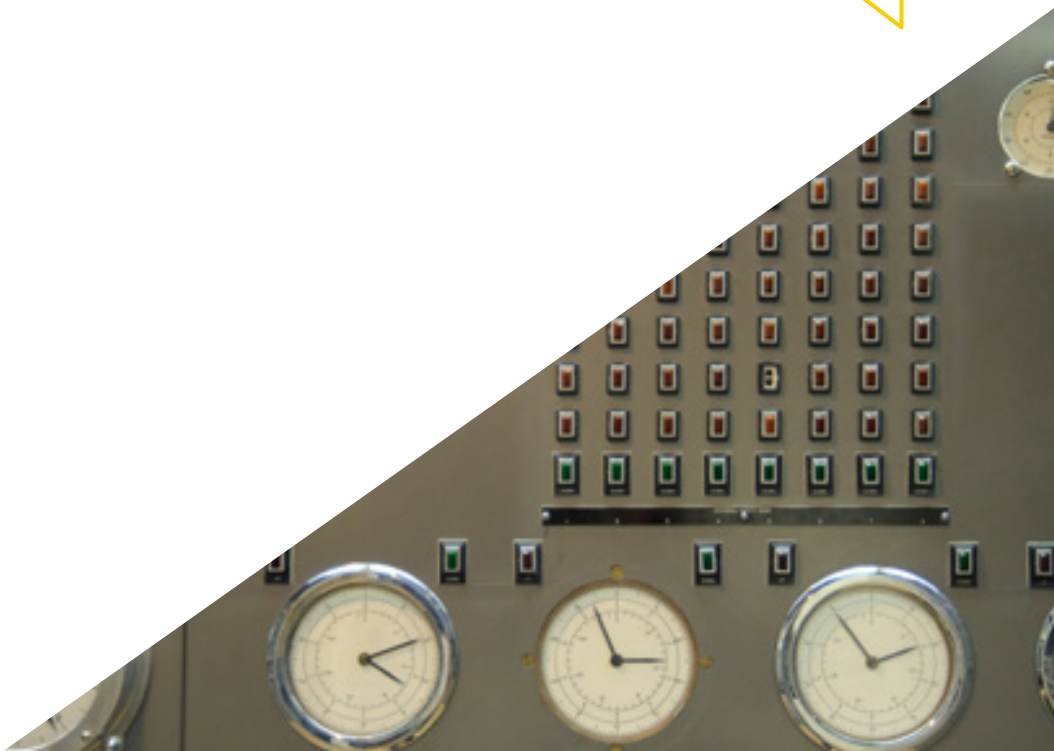
Become an expert and delve into the operation of the different types of reactors currently operating in nuclear power plants"

Deepen your knowledge of the evolution of nuclear power plants and the new generation of power plants to be built in the near future with this program offered by TECH"

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.

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 an immersive training program designed to train 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 academic year. For this purpose, the professional will be assisted by an innovative interactive video system created by renowned and experienced experts.



02

Objectives

The Postgraduate Certificate in Production and Generation of Electrical Energy with Nuclear Technologies and Techniques is designed for the student to acquire the necessary skills in relation to this energy system, with the latest updates and the most innovative aspects of the sector in a safe and efficient manner. Thus, TECH proposes a specific and complete syllabus with quality content that, together with the guidance of experts, will help the professional achieve the following objectives.

One of your objectives in this program will be to optimize the performance of thermodynamic processes in nuclear power plants, something that you will successfully achieve thanks to TECH"

General Objectives

- Interpret the investments and feasibility of power generation plants
- Discover the potential business opportunities offered by electricity generation infrastructures
- Delve into the latest trends, technologies and techniques in electric power generation
- Identify the components necessary for the correct functionality and operation of the facilities that make up the power generation plants
- Establish preventive maintenance plans that ensure and guarantee the proper operation of the power plants, taking into account human and material resources, the environment and the most rigorous quality standards
- Successfully manage maintenance plans for power generation plants
- Analyze the different productivity techniques existing in power generation plants, taking into account the particular characteristics of each facility
- Select the most appropriate contracting model according to the characteristics of the power plant to be built

Specific Objectives

- You will analyze the fundamentals of nuclear energy and its potential for energy generation today
- Evaluate the parameters involved in nuclear reactions
- Identify the components, equipment and functionality of the systems of a nuclear power plant
- Deepen in the operation of the different types of reactors currently operating in nuclear power plants
- Optimize the performance of thermodynamic processes in nuclear power plants
- Establish operational and operating guidelines for safety in this type of plants
- Know in detail the treatment associated with the waste produced in nuclear power plants, together with the decommissioning and decommissioning of a nuclear power plant
- Deepen knowledge of the evolution of nuclear power plants and the new generation of power plants to be built in the near future
- Evaluate the potential of SMR small modular reactors

With this program you will know how to establish guidelines for the operation and safety of a nuclear power plant"

03

Course Management

TECH University, in its maxim of offering an elite education for all, has renowned teachers, professionals in the sector so that the student acquires a solid knowledge in the production and generation of electric energy with nuclear technologies and techniques with the security demanded by the sector so that past mistakes are not repeated. Therefore, this program has a highly qualified professional with extensive experience in the industry, whose trajectory has positioned them as great executives within the sector In this way, it will offer the best tools to the student in the development of their skills during the course, with the guarantees required to specialize in a sector that is currently being rethought, so it will reflect on the different energy production technologies with accuracy and precision to apply it in the transition to a quality and safe industry.

Deepen in nuclear technologies and techniques that generate energy in the XXI century with safety and professional rigor thanks to the teaching staff of this Postgraduate Certificate"

International Guest Director

Adrien Couton is a prominent **international leader in sustainability,** known for his optimistic approach towards transitions to zero net emissions. As such, with extensive **consulting** and **executive management** experience in **strategy and sustainability,** he has established himself as a truly creative problem solver and strategist focused on building high-performing organizations and teams that contribute to keeping **global warming** below 1.5°C.

As such, he has served as Vice President of Sustainability Solutions at ENGIE Impact, where he has helped large public and private entities plan and execute their transitions to **sustainability** and **zero carbon.** Notably, he has also led strategic partnerships and the commercial deployment of digital and advisory solutions to help clients achieve these goals. He has also been **Director** of **Firefly, Paris,** an independent **sustainability** consultancy.

Adrien Couton's career has also developed at the convergence of **private sector** initiatives and **sustainability.** Indeed, he has worked as **Engagement Manager** at **McKinsey & Company,** supporting European utilities, and as **Partner** and **Sustainability Practice Director** at **Dalberg,** a consulting firm focused on **emerging markets.** He has also been **Managing Director** of **India's largest decentralized water systems operator, Naandi Danone JV,** and has held the position of **Private Equity Analyst** at **BNP Paribas.**

To this must be added his time as **Global Portfolio Manager** at **Acumen Fund, New York,** where he has developed two investment portfolios (**Water and Agriculture**) in a pioneering social impact investment fund, applying a VC approach to **sustainability.** In this regard, Adrien Couton has proven to be a dynamic, creative and innovative leader, committed to the fight against **climate change.**

Mr. Couton, Adrien

- Vice President of Sustainability Solutions at ENGIE Impact, San Francisco, United States
- Director at Firefly, Paris
- Partner and Head of Sustainability Practice at Dalberg, India
- Executive Director at Naandi Danone JV, India
- Global Portfolio Manager, Water and Agriculture Portfolios at Acumen Fund, New York
- Engagement Manager at McKinsey & Company, Paris
- Consultant at The World Bank, India
- Private Equity Analyst at BNP Paribas, Paris
- Master's Degree in Public Administration at Harvard University, Harvard University
- Master's Degree in Political Science, Sorbonne University, Paris
- Master's Degree in Business Administration, Ecole d'Etudes Supérieures de Commerce (HECH) Paris

Thanks to TECH, you will be able to learn with the best professionals in the world"

Management

Mr. Palomino Bustos, Raúl

- Director at the Institute for Technical Training and Innovation.
- International Consultant in Engineering, Construction and Maintenance of Energy Production Plants for the company RENOVETEC
- Technological/training expert recognized and accredited by the State Public Employment Service.
- Industrial Engineer, University of Carlos III in Madrid
- Industrial Technical Engineer by the EUITI of Toledo
- Master's Degree in Occupational Risk Prevention from the Francisco de Vitoria University.
- Master's Degree in Quality and Environment by the Spanish Quality Association

04

Structure and Content

The structure of the contents of this program has been designed by engineering professionals focused on the production and generation of electrical energy with nuclear technologies and techniques, thanks to the fact that they have poured their knowledge and experience into a complete and updated syllabus, oriented towards the safety of the sector. The syllabus includes information on the fundamentals of nuclear power plants, nuclear reaction and types and components of a nuclear reactor, as well as everything related to radioactive waste, decommissioning and dismantling of facilities whose use poses a risk. Therefore, this curriculum is essential to learn more about nuclear energy and move towards a more sustainable industry, providing the knowledge that professionals need to be competent in their day-to-day work in this sector.

Learn everything you need to know about nuclear power plants: their fundamentals, reactions and reactor types, as well as the future trends of this type of energy"

Module 1. Economics of Electricity Generation

1.1. Theoretical Foundations
- 1.1.1. Fundamentals
- 1.1.2. Binding Energy
- 1.1.3. Nuclear Stability

1.2. Nuclear Reaction
- 1.2.1. Fission
- 1.2.2. Fusion
- 1.2.3. Other Reactions

1.3. Components of a Nuclear Reactor
- 1.3.1. Fuels
- 1.3.2. Moderator
- 1.3.3. Biological Barriers
- 1.3.4. Control Barriers
- 1.3.5. Reflector
- 1.3.6. Reactor Shell
- 1.3.7. Coolant

1.4. Most Common Reactor Types
- 1.4.1. Types of Reactors
- 1.4.2. Pressurized Water Reactor
- 1.4.3. Boiling Water Reactor

1.5. Other Types of Reactors
- 1.5.1. Heavy Water Reactors
- 1.5.2. Gas-Cooled Reactor
- 1.5.3. Channel Type Reactor
- 1.5.4. Fast Breeder Reactor

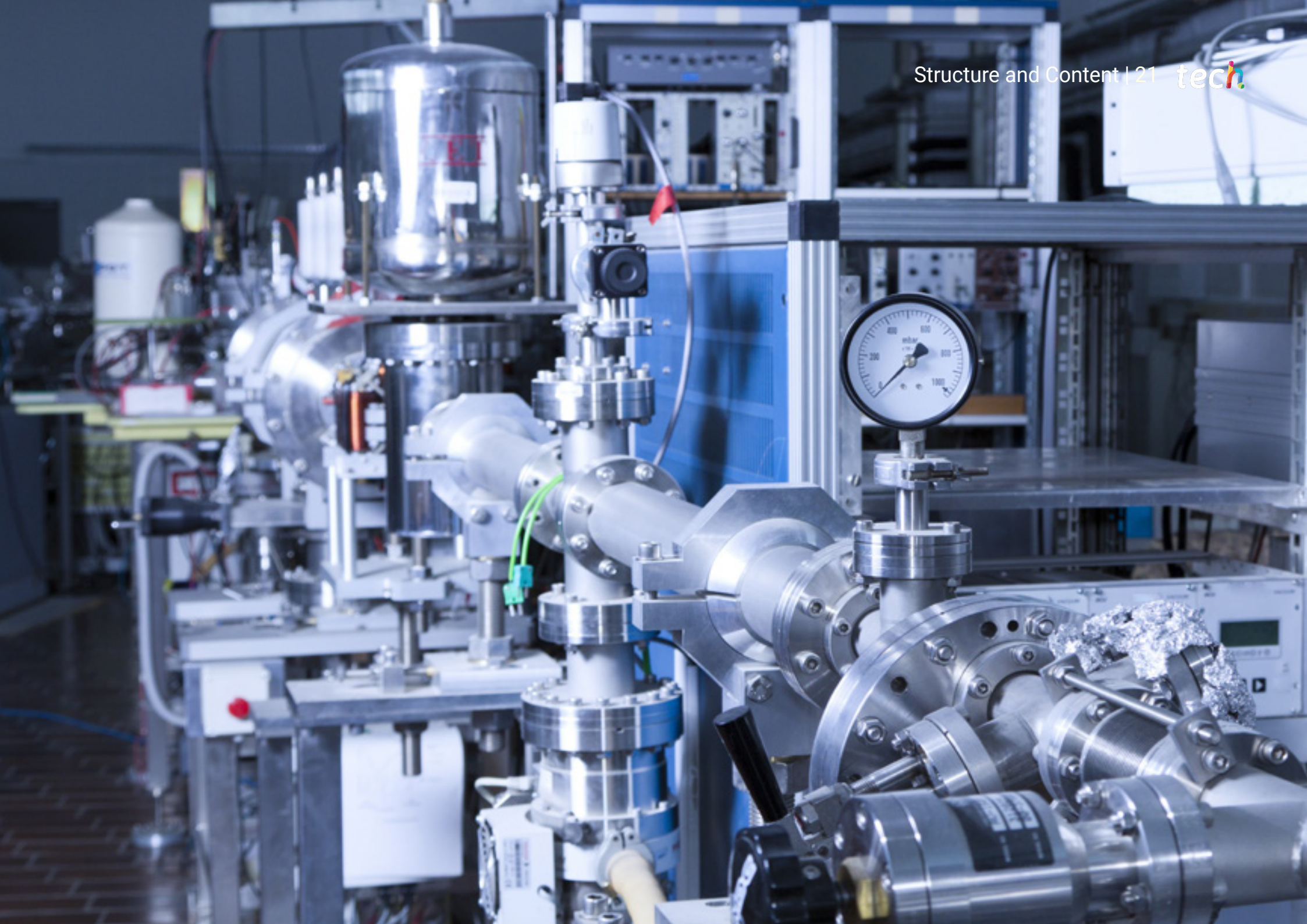
1.6. Rankine Cycle in Nuclear Power Plants
- 1.6.1. Differences between Thermal and Nuclear Power Plant Cycles
- 1.6.2. Rankine Cycle in Boiling Water Power Plants
- 1.6.3. Rankine Cycle in Heavy Water Power Plants
- 1.6.4. Rankine Cycle in Pressurized Water Power Plants

1.7. Nuclear Power Plant Safety
- 1.7.1. Safety in Design and Construction
- 1.7.2 Safety by Means of Barriers against the Release of Fission Products
- 1.7.3. Safety through Systems
- 1.7.4. Redundancy, Single Fault and Physical Separation Criteria
- 1.7.5. Operation Safety

1.8. Radioactive Waste, Decommissioning and Decommissioning of Facilities
- 1.8.1. Radioactive Waste
- 1.8.2 Dismantling
- 1.8.3. Closing

1.9. Future Tendencies Generation IV
- 1.9.1. Gas-Cooled Fast Reactor
- 1.9.2. Lead-Cooled Fast Reactor
- 1.9.3. Molten Salt Fast Reactor
- 1.9.4. Water-Cooled Supercritical Water Reactor
- 1.9.5. Sodium-Cooled Fast Reactor
- 1.9.6. Very High Temperature Reactor
- 1.9.7. Evaluation Methodologies
- 1.9.8. Risk of Explosion Evaluation

1.10. Small Modular Reactors SMR
- 1.10.1. SMR
- 1.10.2. Advantages and Disadvantages
- 1.10.3. Types of SMR

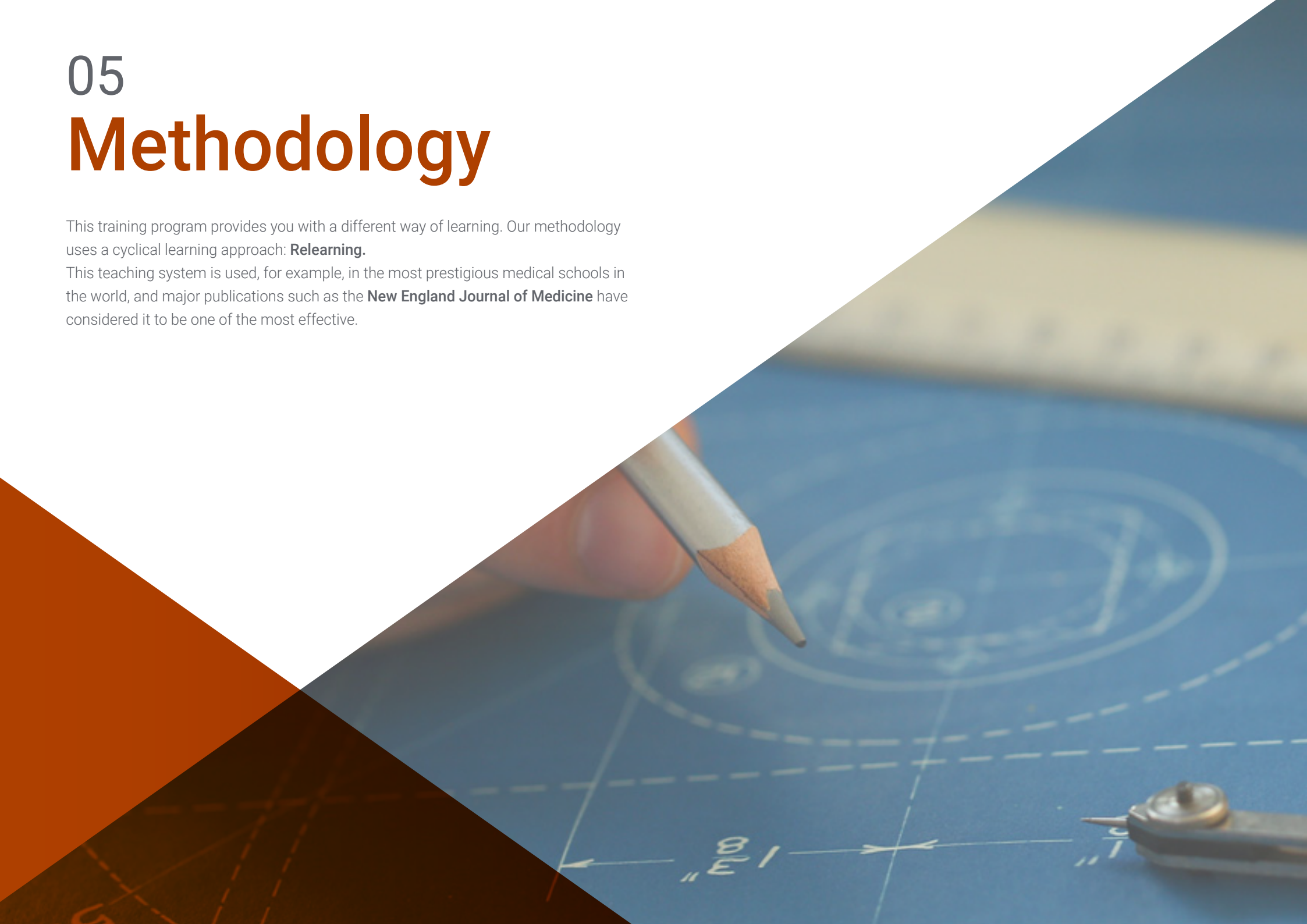


05

Methodology

This training program provides you with 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.

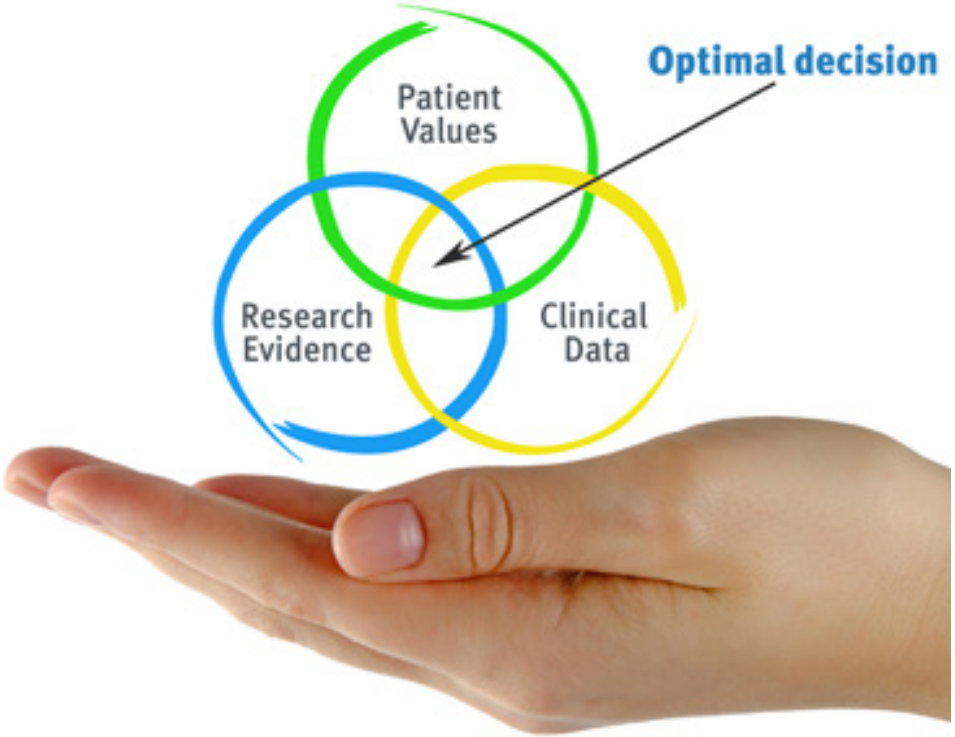


Discover Relearning, a system that abandons conventional linear learning, to take you through cyclical teaching systems: A way of learning that has proven to be extremely effective, especially in subjects that require memorization"

At TECH we use the Case Method

Our program offers a revolutionary method of skills and knowledge development. Our goal is to strengthen skills in a changing, competitive, and highly demanding environment.

At TECH you will experience a way of learning that is shaking the foundations of traditional universities around the world"



We are the first online university to combine Harvard Business School case studies with a 100% online learning system based on repetition.

The student will learn, through collaborative activities and real cases, how to solve complex situations in real business environments.

A learning method that is different and innovative

This Intensive Engineering Program at TECH Technological University prepares you to face all the challenges in this field, both nationally and internationally. We are committed to promoting your personal and professional growth, the best way to strive for success, that is why at TECH Technological University you will use Harvard *case studies*, with which we have a strategic agreement that allows us, to offer you material from the best university in the world.

> *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 by 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

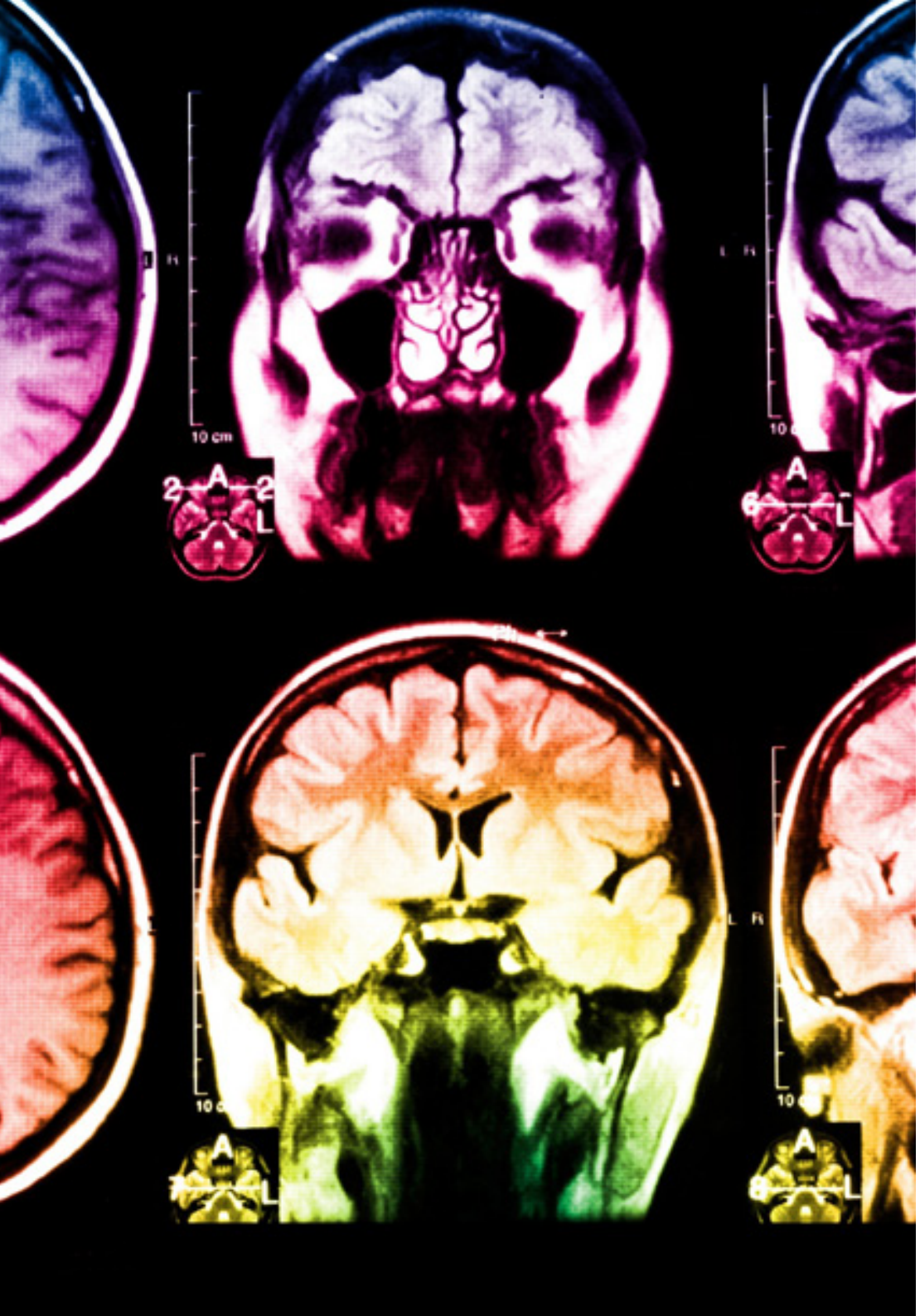
TECH is the first university in the world to combine Harvard University *case studies*with a 100% online learning system based on repetition, which combines 8 different didactic elements in each lesson.

We enhance Harvard *case studies* with the best 100% online teaching method: Relearning.

In 2019 we obtained the best learning results of all Spanish-language 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 Spanish-speaking university qualified 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 Spanish 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.

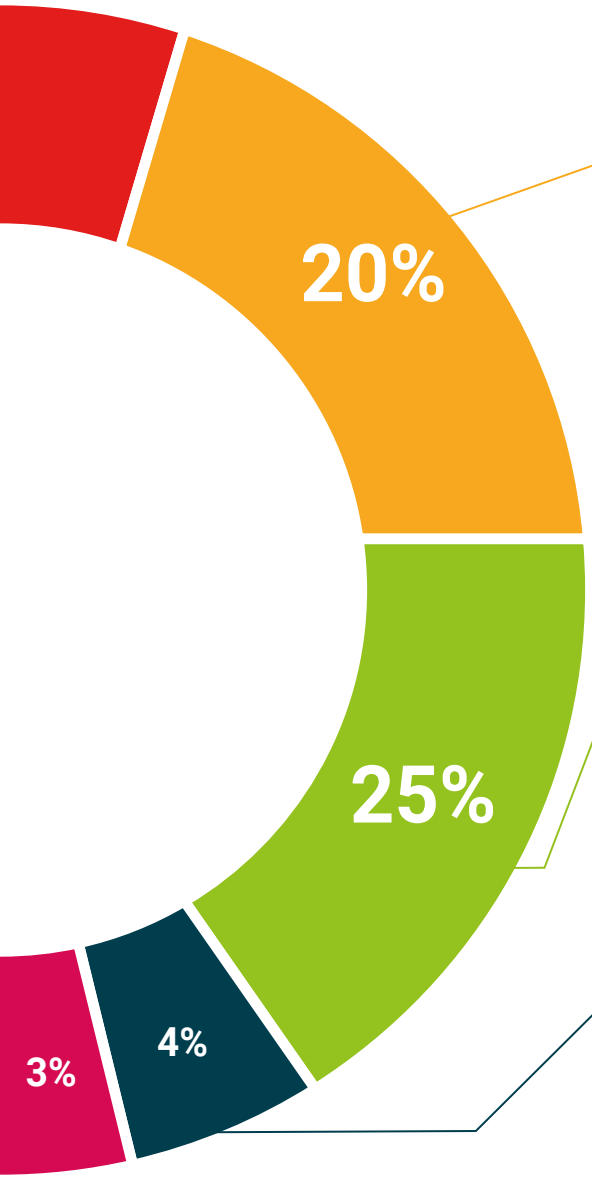
Learning from an Expert strengthens knowledge and memory, and generates confidence in future difficult decisions.

Practising Skills and Abilities

They will carry out activities to develop specific competencies and skills in each thematic area. Exercises and activities to acquire and develop the skills and abilities that a specialist needs to develop in the context of the globalization we live in.

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

They will complete a selection of the best case studies in the field used at Harvard. Cases that are presented, analyzed, and supervised by the best senior management specialists in Latin America.

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 multimedia content presentation training Exclusive system was awarded by Microsoft as a "European Success Story".

Testing & Re-testing

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 your goals.

06

Certificate

The **Postgraduate Certificate in Production and Generation of Electric Energy with Nuclear Technologies and Techniques** , in addition to the most rigorous and up-to-date training, access to a Postgraduate Certificate issued by TECH Technological University.

With this degree offered by TECH you are positioning your academic and professional career at the highest level"

This **Postgraduate Certificate in Production and Generation of Electric Energy with Nuclear Technologies and Techniques** contains the most complete and up-to-date scientific program on the market.

After the student has passed the evaluations, 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, meeting the requirements commonly demanded by the labor exchanges, competitive examinations and professional career evaluation committees.

Title: **Postgraduate Certificate in Production and Generation of Electric Energy with Nuclear Technologies and Techniques**

Official N° of Hours: **150 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

Production and Generation of Electric Energy with Nuclear Technologies and Techniques

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

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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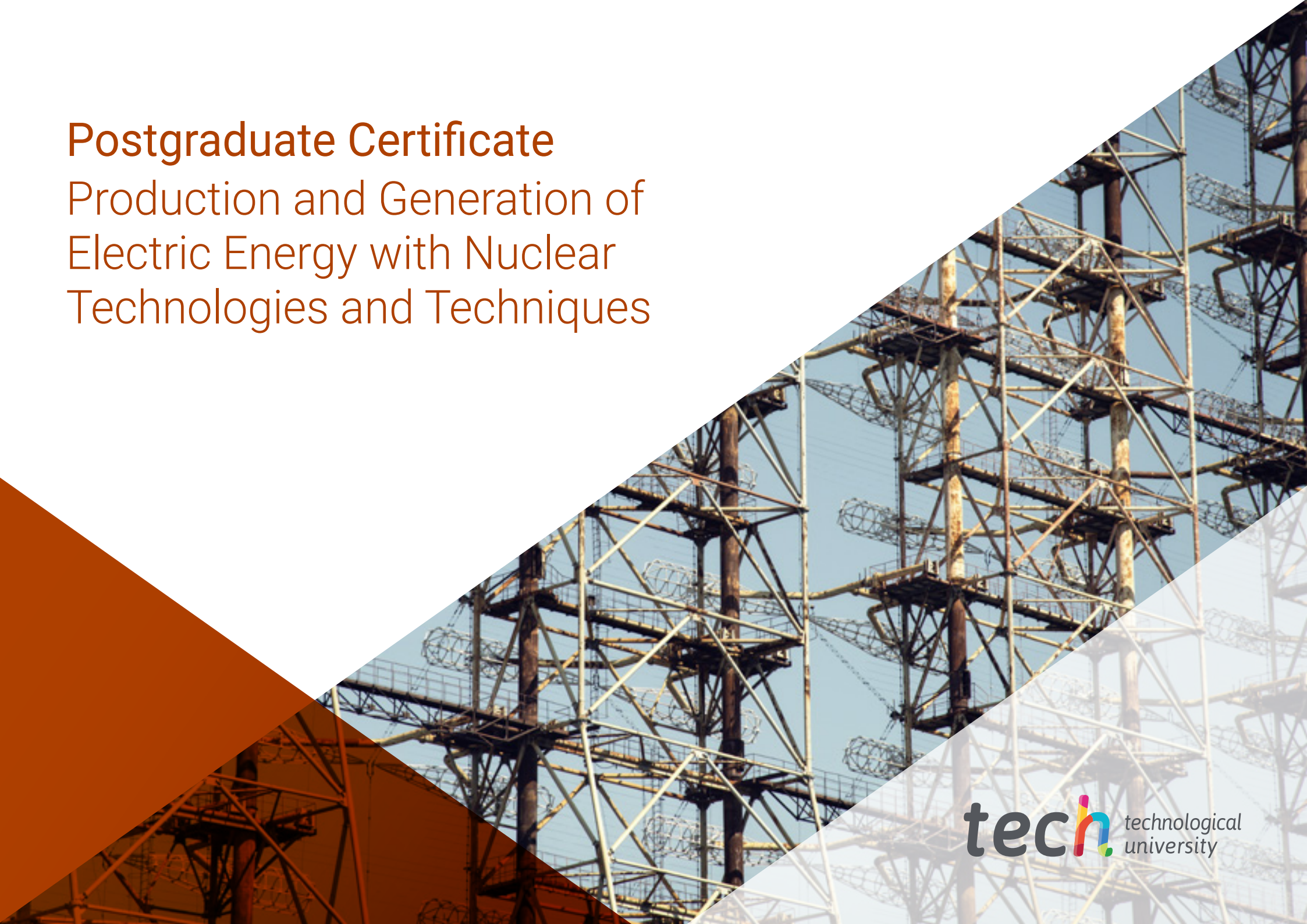

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