Postgraduate Diploma

Environmental Acoustics Engineering

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Postgraduate Diploma

Environmental Acoustics Engineering

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

Website: **www.techtitute.com/pk/engineering/postgraduate-diploma/postgraduate-diploma-environmental-acoustics-engineering**

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01

Introduction

Noise pollution has become more relevant in the 21st century, due to its repercussions on human beings and the surrounding environment. A concern that has led engineers to address, manage and evaluate it through specialized knowledge. To promote such specific and valuable knowledge, TECH has created this 100% online program that will lead the graduate to increase their skills for the analysis, study of noise levels, the tools used for this purpose, as well as the development of action plans for exposure to noise. All this, in addition, with a methodology that allows access to the content, 24 hours a day, 7 days a week.

Become a real expert in Environmental Acoustics Engineering thanks to the best digital university in the world according to Forbes"

Road traffic, railroads or industrial or recreational activities generate noise pollution that has significant negative effects on the health of people and the environment. These harmful repercussions have led Acoustics Engineering to improve the techniques and tools for the evaluation of noise and vibrations.

Additionally, there is the importance of complying with the acoustic requirements defined in the projects of buildings and facilities. In view of this growing specialization, TECH has developed this 100% online 6-month program in Environmental Acoustics Engineering.

An advanced syllabus, planned and developed by top-level experts in this area who have reflected their deep knowledge and experience in acoustic testing, insulation and the latest advances in the methods used for the measurement and evaluation of vibrations. For this purpose, students have access to numerous teaching materials based on video summaries of each topic, videos in detail or essential readings to complement this program.

The professional is therefore faced with a first-rate academic option that is characterized by a didactic methodology that is flexible teaching methodology that is compatible with daily activities. Students only need an electronic device to view the content of this program whenever and wherever they wish. An ideal option through a university that is at the academic forefront.

This **Postgraduate Diploma in Environmental Acoustics Engineering** contains the most complete and up-to-date program on the market. The most important features include:

- Development of case studies presented by experts in Acoustics engineering
- The graphic, schematic and practical contents of the program provide technical and practical information on those disciplines that are essential for professional practice
- The practical exercises where the self-evaluation 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

In 450 hours you will gain the knowledge you need to generate acoustic reports, analyze and develop different acoustic tests"

You have access to an extensive virtual library, 24 hours a day, 7 days a week"

Enroll now and learn through the highest rated university in the world by its students according to the Trustpilot platform (4.9/5).

With this university program you will be up to date with the tools for environmental noise assessment and management.

The program includes in its teaching staff professionals of the field who pour into this training the experience of their work, in addition to recognized specialists from reference societies and prestigious universities.

Its multimedia content, developed with the latest educational technology, will allow the professional a situated and contextual learning, i.e. a simulated environment that will provide immersive training programmed to train in real situations.

The design of this program focuses on Problem-Based Learning, in which the professional will have to try to solve the different professional practice situations that will arise 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 purpose of this program is to provide students with 6 months of high quality learning. In this way, students will obtain the necessary skills and competences to master Environmental Acoustics. It will also include case study simulations, which will provide you with a practical perspective to solve the main problems for sound insulation and the most current materials used for acoustic conditioning. A unique opportunity of professional growth at the hands of the largest digital university in the world.

With this program you will have the skills to carry out the calculation of sound absorption, TR or the critical distance of a room"

General Objectives

- Develop the laws of physical acoustics that explain the behavior of sound waves such as the acoustic wave equation
- Develop the necessary knowledge on the handling of the essential concepts of sound generation and propagation in fluid media and the models that describe the behavior of sound waves in these media, both in their free propagation and in their interaction with matter from the formal and mathematical point of view
- Determine the nature and peculiarities of the acoustic elements of a system
- Familiarize the student with the terminology and analytical methods to solve acoustic problems
- Analyze the nature of sound sources and human perception
- Conceptualize noise and sound within sound reception
- Distinguish the particularities that affect the psychoacoustic perception of sounds
- Identify and specify the indexes and units of measurement necessary to quantify sound and its effects on sound propagation
- Compile the different acoustic measurement systems and their operating characteristics
- Provide a rationale for the correct use of the appropriate instruments for a specific measurement
- Delve into the methods and tools of digital treatment to obtain acoustic parameters
- Evaluate the different acoustic parameters by means of digital signal processing systems
- Establish the correct criteria for acoustic data acquisition through quantification and sampling
- Provide a solid understanding of the fundamentals and key concepts related to audio recording and the instrumentation used in recording studios
- Promote up-to-date knowledge of the constantly evolving technology in the field of audio recording and associated instrumentation
- Determine the protocols for handling advanced recording equipment and their application in practical acoustical engineering situations
- Analyze and classify the main sources of environmental noise and their consequences
- Measure environmental noise using appropriate acoustic indicators

It explores the most advanced and innovative materials used for acoustic conditioning. Enroll now"

Specific Objectives

Module 1. Acoustic Insulation

- Calculate the axial, tangential and oblique modes of a rectangular room and their influence on the Schroeder frequency
- Choose the dimensions of a room according to the various modal distribution criteria and calculate their optimization
- Be able to calculate the sound absorption, TR or critical distance of a room
- Calculate QRD or PRD diffusers among others

Module 2. Acoustic Installations and Testing

- Evaluate the spectral adaptation term C and Ctr in acoustic reports and tests
- Distinguish the planning of various noise tests depending on whether they are airborne or structural transmission in various building elements or environments (facades, impact, etc.) for the choice of measurement equipment and test layout
- Develop the procedures for measuring TRs in various environments
- Analyze the various noise limiting equipment and their application and peripherals
- Define the contents and minimum requirements of acoustic studies and reports and evaluate the results obtained in the tests

Module 3. Environmental acoustics and action plans

- Analyze environmental noise indicators Lden and Ldn and define standards, protocols and environmental noise measurement and procedures for environmental noise measurement
- Develop other indicators such as traffic noise TNI or sound exposure SEL
- Establish the measurement of traffic, railroad, aircraft or activity noise
- Design noise barriers, noise mapping or human noise exposure limitation techniques

03

Course Management

In order to provide a first class education, TECH carries out a thorough process of each and every one of the teachers that make up this program. In this way, students have the guarantee of obtaining advanced learning from professionals with extensive professional experience in Environmental Acoustics projects and scientific research in this sector. Additionally, thanks to the proximity of the teaching staff, the graduate will be able to resolve any doubts they may have about the content of this program.

You have a syllabus prepared by a teaching team, expert in analysis and evaluation of indoor environmental quality factors in buildings"

Management

Mr. Espinosa Corbellini, Daniel

- Expert Consultant in Audio Equipment and Room Acoustics
- Professor at the School of Engineering of Puerto Real from the University of Cadiz
- Design Engineer at Coelan Electrical Installations Company
- Audio Technician in Sales and Installations in the Daniel Sonido company
- Industrial Technical Engineer in Industrial Electronics at the University of Cadiz
- Industrial Engineer in Industrial Organization by the University of Cadiz
- Official Master's Degree in Evaluation and Management of Noise Pollution by the University of Cadiz
- Official Master's Degree in Acoustic Engineering from the University of Cadiz and the University of Granada

Professors

Dr. De La Hoz Torres, María Luisa

- Technical Architect in the Department of Works and Urbanism in the City Council of Porcuna
- Research Teaching Staff at the University of Granada
- Lecturer in Building Degree at the School of Building Engineering at the University of Granada
- Professor in Degree in Architectural Studies at the School of Architecture at the University of Granada
- Professor in Physics Degree, at University of Granada
- Professor in Chemical Engineering Degree at the School of Civil Engineering of Roads, Canals and Ports at the University of Granada
- Professor in Telecommunication Technologies Engineering Degree at the School of Civil Engineering of Roads, Canals and Ports at the University of Granada
- Andrés Lara Prize 2019 to the young acoustics researcher awarded by the Spanish Society of Acoustics
- PhD in the Civil Engineering Program at the University of Granada
- Degree in Technical Architecture from the University of Granada
- Degree in Building from the University of Granada
- Master's Degree in Management and Integral Safety in Building by the University of Granada
- Master's Degree in Acoustics Engineering from the University of Granada
- University Master's Degree in Compulsory Secondary and High School Education, Vocational Training and Language Teaching Specialization in Technology, Computer Science and Industrial Processes

Dr. Aguilar Aguilera, Antonio

- Technical Architect Department of Works and Urbanism in the Town Hall of Villanueva del Trabuco
- Teaching and Research Staff at the University of Granada
- Researcher of the group TEP-968 Technologies for the Circular Economy (TEC)
- Professor in the Degree in Building Engineering in the Department of Architectural Constructions of the University of Granada in the following subjects of Organization and Programming in Building and Prevention and Safety
- Professor in the Degree in Physics in the Department of Applied Physics of the University of Granada. of the University of Granada in the subject Physics of the Environment
- Andrés Lara Prize, awarded by the Spanish Society of Acoustics (SEA), for the best paper in the field of Environmental Physics

This program will allow you to advance in your career comfortably"

04

Structure and Content

Thanks to the Relearning, method, based on the reiteration of content, students will achieve advanced learning in Environmental Acoustic Engineering in less time and in a progressive manner. Additionally, the exhaustive syllabus of this program is complemented with the best didactic materials. In this way, the student will learn in a dynamic way about acoustic installations and tests, acoustic treatment techniques and action plans.

A complete syllabus that will provide you with the most advanced knowledge on acoustic insulation"

Module 1. Acoustic Insulation

1.1. Acoustic Characterization in Enclosures
- 1.1.1. Sound Propagation in Free Space
- 1.1.2. Sound Propagation in an Enclosure. Reflected Sound
- 1.1.3. Theories of Room Acoustics: Wavelet, Statistical and Geometrical Theory

1.2. Analysis of Wavelet Theory (f≤fs)
- 1.2.1. Modal Problems of a Room Derived from the Acoustical Wave Equation
- 1.2.2. Axial, Tangential and Oblique Modes
  - 1.2.2.1. Three-Dimensional Equation and Modal Reinforcement Characteristics of Different Types of Modes
- 1.2.3. Modal Density. Schroeder Frequency. Spectral Curve of Application of Theories

1.3. Modal Distribution Criteria
- 1.3.1. Aurean Measures
  - 1.3.1.1. Other Posterior Measures (Bolt, Septmeyer, Louden, Boner, Sabine)
- 1.3.2. Walker and Bonello Criterion
- 1.3.3. Bolt Diagram

1.4. Statistical Theory Analysis (fs≤f≤4fs)
- 1.4.1. Homogeneous Diffusion Criterion. Sound Temporal Energy Balance
- 1.4.2. Direct and Reverberant Field. Critical Distance and Room Constant
- 1.4.3. TR. Sabine Calculation. Energy Decay Curve (ETC curve)
- 1.4.4. Optimal Reverberation Time. Beranek Tables

1.5. Geometric Theory Analysis (f≥4fs)
- 1.5.1. Specular and Non-specular Reflection. Application of Snell's Law for f≥4fs.geometry Theory Analysis (f≥ 4fs)
- 1.5.2. First-order Reflections. Echogram
- 1.5.3. Floating Echo

1.6. Materials for Acoustic Conditioning. Absorption
- 1.6.1. Absorption of Membranes and Fibers. Porous Materials
- 1.6.2. Acoustic Reduction Coefficient NRC
- 1.6.3. Variation of Absorption as a Function of Material Characteristics (Thickness, Porosity, Density, etc.)

1.7. Parameters for the evaluation of the acoustic quality in enclosures
- 1.7.1. Energetic Parameters (G, C50, C80, ITDG)
- 1.7.2. Reverberation Parameters (TR, EDT, BR, Br)
- 1.7.3. Spatiality Parameters (IACCE, IACCL, LG, LFE, LFCE)

1.8. Room Acoustic Design Procedures and Considerations
- 1.8.1. Reduction of Direct Sound Attenuation from Room Shape
- 1.8.2. Analysis of Room Shape in Relation to Reflections
- 1.8.3. Prediction of the Noise Level in a Room

1.9. Acoustic Diffusers
- 1.9.1. Polycylindrical Diffusers
- 1.9.2. Maximum Sequence Length (MLS) Schroeder Diffusers
- 1.9.3. Quadratic Residual Schroeder Diffusers (QRD)
  - 1.9.3.1. One-dimensional QRD Diffusers
  - 1.9.3.2. Two-dimensional QRD Diffusers
  - 1.9.3.3. Primitive Root Schroeder Diffusers (PRD)

1.10. Variable Acoustics in Multifunctional Spaces. Elements for its Design
- 1.10.1. Design of Variable Acoustic Spaces from Variable Physical Elements
- 1.10.2. Design of Variable Acoustic Spaces from Electronic Systems
- 1.10.3. Comparative Analysis of the Use of Physical Elements vs Electronic Systems

Module 2. Acoustic Installations and Testing

2.1. Acoustic Study and Reports
- 2.1.1. Types of Acoustic Technical Reports
- 2.1.2. Contents of Studies and Reports
- 2.1.3. Types of Acoustic Tests

2.2. Planning and Development of Airborne Sound Insulation Tests
- 2.2.1. Measurement Requirements
- 2.2.2. Recording of Results
- 2.2.3. Test Report

2.3. Evaluation of the Global Magnitudes for Airborne Sound Insulation in Buildings and Building Elements
- 2.3.1. Procedure for the Evaluation of Global Magnitudes
- 2.3.2. Comparison Method
- 2.3.3. Spectral Fitting Terms (C or Ctr)
- 2.3.4. Results Evaluation

2.4. Planning and Development of Impact Sound Insulation Tests
- 2.4.1. Measurement Requirements
- 2.4.2. Recording of Results
- 2.4.3. Test Report

2.5. Evaluation of the Global Magnitudes for Impact Sound Insulation in Buildings and Building Elements
- 2.5.1. Procedure for the Evaluation of Global Magnitudes
- 2.5.2. Comparison Method
- 2.5.3. Results Evaluation

2.6. Planning and Development of Airborne Sound Insulation Tests facades
- 2.6.1. Measurement Requirements
- 2.6.2. Recording of Results
- 2.6.3. Test Report

2.7. Planning and Development of Reverberation Time Tests
- 2.7.1. Measurement Requirements: Showgrounds
- 2.7.2. Measurement Requirements Ordinary Enclosures
- 2.7.3. Measurement Requirements: Open-plan Offices
- 2.7.4. Recording of Results
- 2.7.5. Test Report

2.8. Planning and Development of Speech Transmission Index (STI) Measurement Tests in Enclosures
- 2.8.1. Measurement Requirements
- 2.8.2. Recording of Results
- 2.8.3. Test Report

2.9. Planning and Development of Tests for the Evaluation of the Transmission of Interior Noise to the Exterior
- 2.9.1. Basic Measurement Requirements
- 2.9.2. Recording of Results
- 2.9.3. Test Report

2.10. Noise Control
- 2.10.1. Types of Sound Limiters
- 2.10.2. Sound Limiters
  - 2.10.2.1. Peripherals
- 2.10.3. Environmental Noise Meter

Module 3. Environmental Acoustics and Action Plans

3.1. Analysis of Environmental Acoustics
- 3.1.1. Sources of Environmental Noise
- 3.1.2. Types of Environmental Noise According to their Temporal Evolution
- 3.1.3. Effects of Environmental Noise on Human Health and Environment

3.2. Indicators and Magnitudes of Environmental Noise
- 3.2.1. Aspects that Influence the Measurement of Environmental Noise
- 3.2.2. Environmental Noise Indicators
  - 3.2.2.1. Day-evening-night Level (Lden)
  - 3.2.2.2. Day-night Level (Ldn)
- 3.2.3. Other Environmental Noise Indicators
  - 3.2.3.1. Traffic Noise Index (TNI)
  - 3.2.3.2. Noise Pollution Level (NPL)
  - 3.2.3.3. SEL Level

3.3. Environmental Noise Measurement
- 3.3.1. International Measurement Standards and Protocols
- 3.3.2. Measurement Procedures
- 3.3.3. Environmental Noise Assessment Report

3.4. Noise Maps and Action Plans
- 3.4.1. Acoustic Measures
- 3.4.2. General Noise Mapping Process
- 3.4.3. Noise Control Action Plans

3.5. Sources of Environmental Noise: Types
- 3.5.1. Traffic Noise
- 3.5.2. Railroad Noise
- 3.5.3. Aircraft Noise
- 3.5.4. Activity Noise

3.6. Noise Sources: Control Measures
- 3.6.1. Control at the Source
- 3.6.2. Propagation Control
- 3.6.3. Receiver Control

3.7. Traffic Noise Prediction Models
- 3.7.1. Traffic Noise Prediction Methods
- 3.7.2. Theories of Generation and Propagation
- 3.7.3. Factors Influencing Noise Generation
- 3.7.4. Factors Affecting Propagation

3.8. Acoustic Barriers
- 3.8.1. Functioning of an Acoustic Barrier Principles
- 3.8.2. Types of Acoustic Barriers
- 3.8.3. Design of Acoustic Barriers

3.9. Evaluation of Noise Exposure in the Work Environment
- 3.9.1. Identification of the Consequences of Exposure to High Noise Levels
- 3.9.2. Methods for Measuring and Assessing Noise Exposure (ISO 9612:2009)
- 3.9.3. Exposure Indices and Maximum Exposure Values
- 3.9.4. Technical Measures to Limit Exposure

3.10. Assessment of Exposure to Mechanical Vibration Transmitted to the Human Body
- 3.10.1. Identification of the Consequences of Exposure to Whole-Body Vibration
- 3.10.2. Measurement and Assessment Methods
- 3.10.3. Exposure Rates and Maximum Exposure Values
- 3.10.4. Technical Measures to Limit Exposure

Thanks to the Relearning method, based on the reiteration of content, it will allow you to reduce the long hours of study and memorization"

05

Methodology

This academic program offers students a different way of learning. Our methodology uses a cyclical learning approach: **Relearning.**

This teaching system is used, for example, in the most prestigious medical schools in the world, and major publications such as the **New England Journal of Medicine** have considered it to be one of the most effective.

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

Case Study to contextualize all content

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

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

You will have access to a learning system based on repetition, with natural and progressive teaching throughout the entire syllabus.

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

A learning method that is different and innovative

This TECH program is an intensive educational program, created from scratch, which presents the most demanding challenges and decisions in this field, both nationally and internationally. This methodology promotes personal and professional growth, representing a significant step towards success. The case method, a technique that lays the foundation for this content, ensures that the most current economic, social and professional reality is taken into account.

> *Our program prepares you to face new challenges in uncertain environments and achieve success in your career"*

The case method is the most widely used learning system in the best faculties in the world. The case method was developed in 1912 so that law students would not only learn the law based on theoretical content. It consisted of presenting students with real-life, complex situations for them to make informed decisions and value judgments on how to resolve them. In 1924, Harvard adopted it as a standard teaching method.

What should a professional do in a given situation? This is the question that you are presented with in the case method, an action-oriented learning method. Throughout the program, the studies will be presented with multiple real cases. They will have to combine all their knowledge and research, and argue and defend their ideas and decisions.

Relearning Methodology

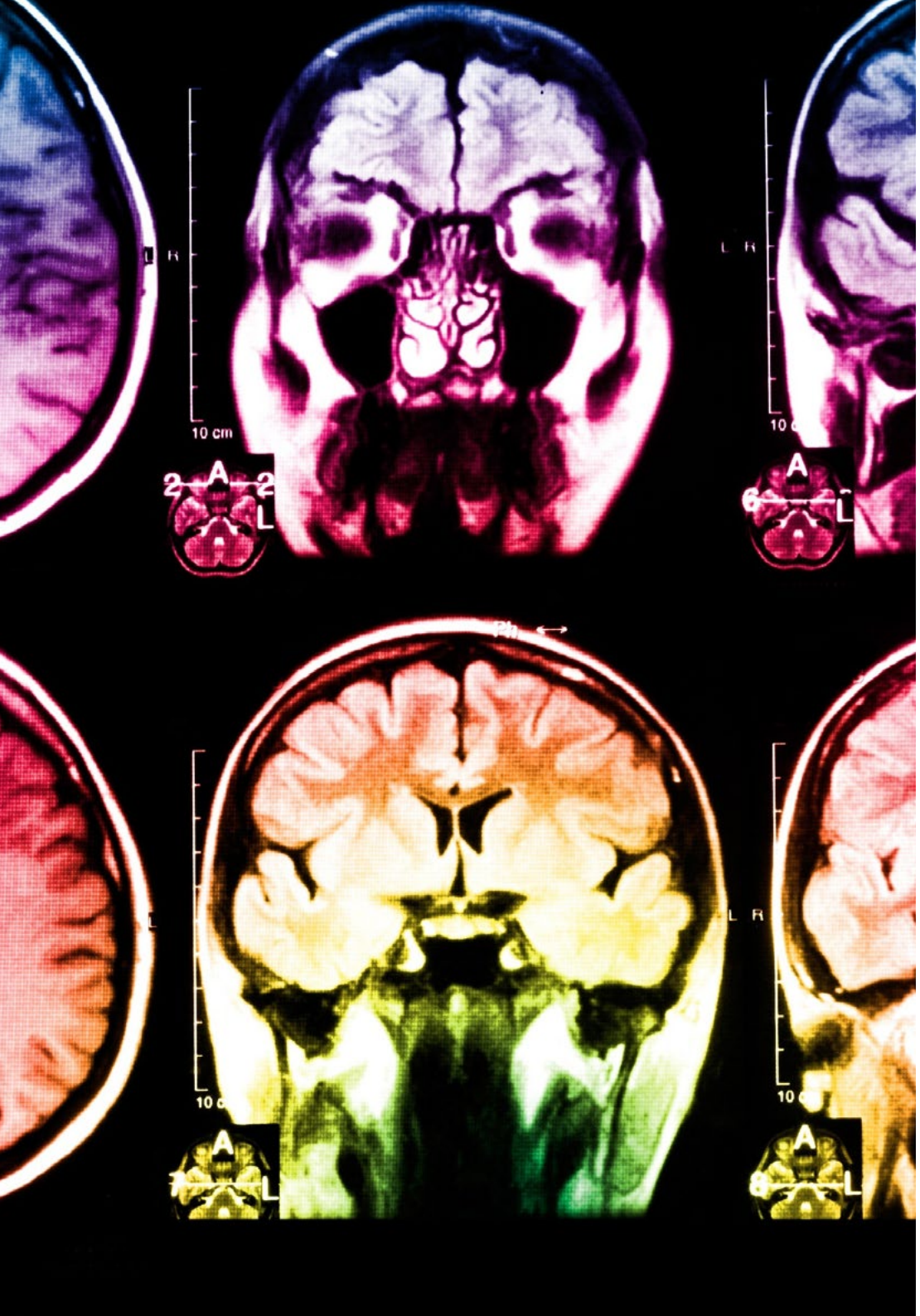
TECH effectively combines the Case Study methodology with a 100% online learning system based on repetition, which combines 8 different teaching elements in each lesson.

We enhance the Case Study with the best 100% online teaching method: Relearning.

In 2019, we obtained the best learning results of all online universities in the world.

At TECH, you will learn using a cutting-edge methodology designed to train the executives of the future. This method, at the forefront of international teaching, is called Relearning.

Our university is the only one in the world authorized to employ this successful method. In 2019, we managed to improve our students' overall satisfaction levels (teaching quality, quality of materials, course structure, objectives...) based on the best online university indicators.



In our program, learning is not a linear process, but rather a spiral (learn, unlearn, forget, and re-learn). Therefore, we combine each of these elements concentrically. This methodology has trained more than 650,000 university graduates with unprecedented success in fields as diverse as biochemistry, genetics, surgery, international law, management skills, sports science, philosophy, law, engineering, journalism, history, and financial markets and instruments. All this in a highly demanding environment, where the students have a strong socio-economic profile and an average age of 43.5 years.

Relearning will allow you to learn with less effort and better performance, involving you more in your training, developing a critical mindset, defending arguments, and contrasting opinions: a direct equation for success.

From the latest scientific evidence in the field of neuroscience, not only do we know how to organize information, ideas, images and memories, but we know that the place and context where we have learned something is fundamental for us to be able to remember it and store it in the hippocampus, to retain it in our long-term memory.

In this way, and in what is called neurocognitive context-dependent e-learning, the different elements in our program are connected to the context where the individual carries out their professional activity.

This program offers the best educational material, prepared with professionals in mind:

Study Material

All teaching material is produced by the specialists who teach the course, specifically for the course, so that the teaching content is highly specific and precise.

These contents are then applied to the audiovisual format, to create the TECH online working method. All this, with the latest techniques that offer high quality pieces in each and every one of the materials that are made available to the student.

Classes

There is scientific evidence suggesting that observing third-party experts can be useful.

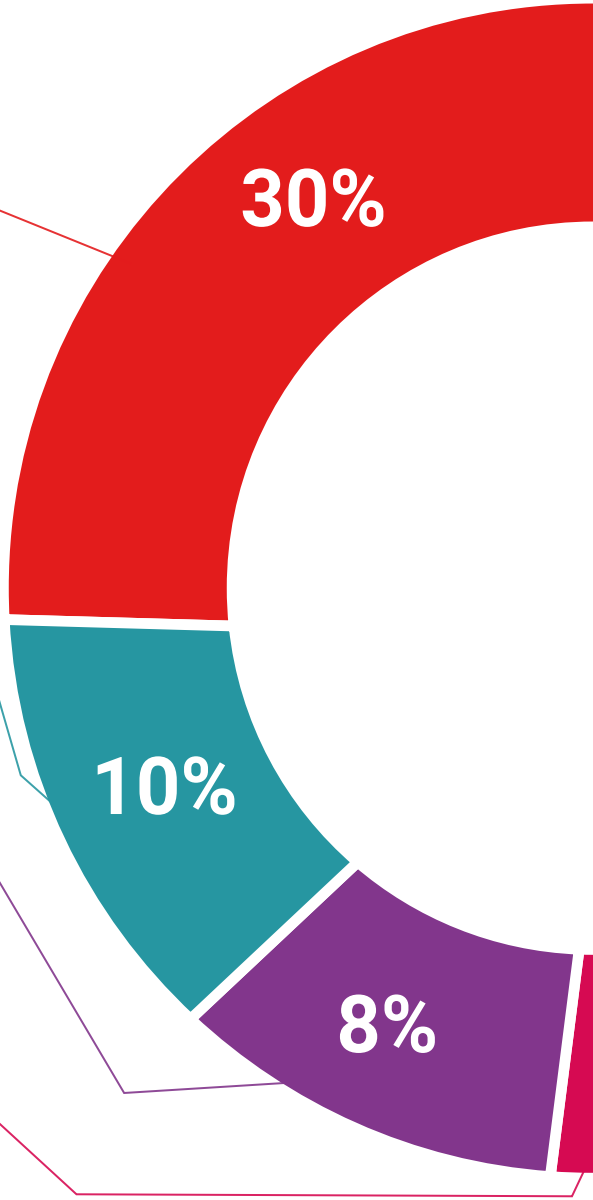
Learning from an Expert strengthens knowledge and memory, and generates confidence in future difficult decisions.

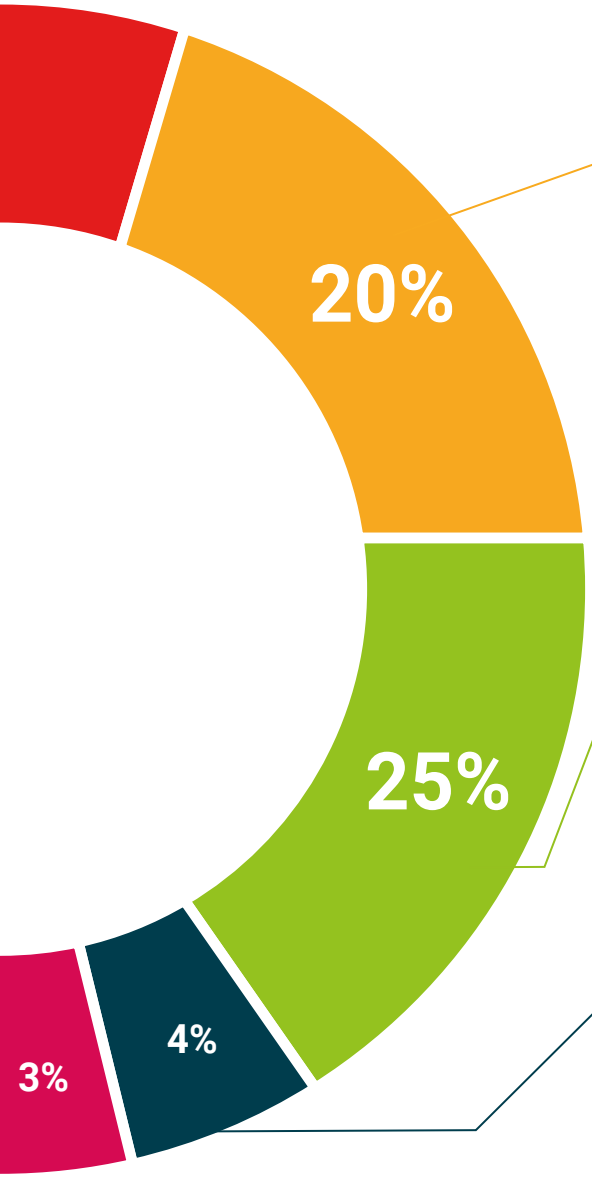
Practising Skills and Abilities

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

Additional Reading

Recent articles, consensus documents and international guidelines, among others. In TECH's virtual library, students will have access to everything they need to complete their course.





Case Studies

Students will complete a selection of the best case studies chosen specifically for this program. Cases that are presented, analyzed, and supervised by the best specialists in the world.

Interactive Summaries

The TECH team presents the contents attractively and dynamically in multimedia lessons that include audio, videos, images, diagrams, and concept maps in order to reinforce knowledge.

This exclusive educational system for presenting multimedia content was awarded by Microsoft as a "European Success Story".

Testing & Retesting

We periodically evaluate and re-evaluate students' knowledge throughout the program, through assessment and self-assessment activities and exercises, so that they can see how they are achieving their goals.

06

Certificate

The Postgraduate Diploma in Environmental Acoustics Engineering guarantees students, in addition to the most rigorous and up-to-date education, access to a Postgraduate Diploma 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 Diploma in Environmental Acoustics Engineering** 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 Diploma** issued by **TECH Technological University** via tracked delivery*.

The certificate issued by **TECH Technological University** will reflect the qualification obtained in the Postgraduate Diploma, and meets the requirements commonly demanded by labor exchanges, competitive examinations, and professional career evaluation committees.

Title: **Postgraduate Diploma in Environmental Acoustics Engineering**

Official N° of Hours: **450 h.**


tech technological university

Awards the following

CERTIFICATE

to

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

For having passed and accredited the following program

POSTGRADUATE DIPLOMA

in

Environmental Acoustics Engineering

This is a qualification awarded by this University, equivalent to 450 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 certificate issued with an apostille, TECH EDUCATION will make the necessary arrangements to obtain it, at an additional cost.

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