



Postgraduate Diploma Audio Engineering

» Modality: online

» Duration: 6 months

» Certificate: TECH Global University

» Credits: 18 ECTS

» Schedule: at your own pace

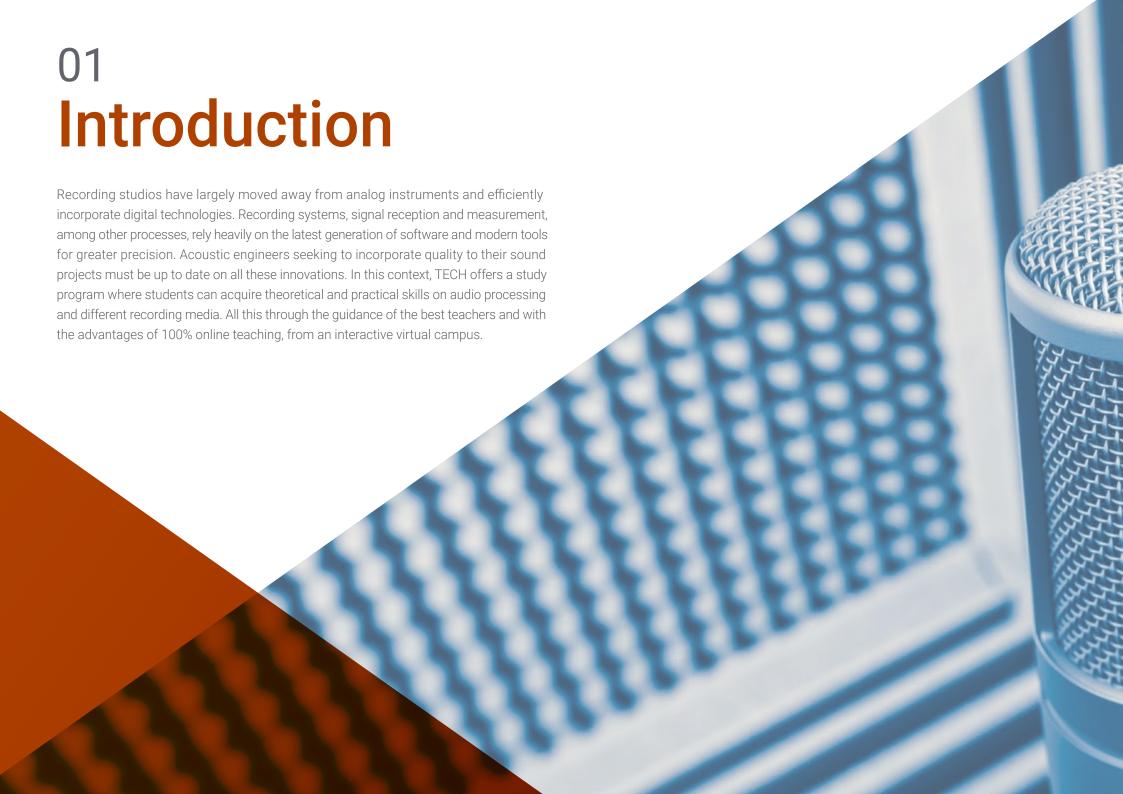
» Exams: online

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Index

> 06 Certificate

> > p. 30





tech 06 | Introduction

The music industry generates, despite new ways of socializing its products, millions of dollars in profits every year. However, consumers are increasingly demanding and seek out sound materials with the highest audio quality and creative experimentation. To be able to implement the latest advances in the industry and make pieces of greater excellence, sound engineers must be highly prepared and fully handle the most advanced techniques and instruments. For this reason, TECH Global University has gathered the most cutting-edge resources and working methods in this field in a program of studies with 3 intensive modules and 6 months of duration.

This Postgraduate Diploma in Audio Engineering examines the most innovative calibration systems that can be applied to analyze noise, vibrations and other aspects of sound. It also addresses pressure, acoustic intensity, excitation sources, impedance and several other parameters. Furthermore, the syllabus focuses on microphones, providing exhaustive criteria on the choice and positioning of these instruments to capture sound information in the most appropriate way.

The curriculum of the program will allow each member of the student body to delve into the theoretical and practical bases of sound mixing techniques, audio editing, multichannel mixing and signal processing. Therefore, graduates will be able to play an essential role in the recording and production of music bands, podcasts, among others.

All these study contents have been chosen in detail by a teaching staff with extensive professional experience and prestige. In addition to the materials, these experts have provided complementary readings, explanatory videos and interactive summaries. The mastery of the advanced aspects of this syllabus will be developed in a ast, intensive and flexible way thanks to its 100% online methodology. The latter is based on the exclusive Relearning teaching system that allows the continuous reiteration of the most complex concepts.

This **Postgraduate Diploma in Audio 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



Make your way in the professional sphere of the acoustic industry with the updated contents of this Postgraduate Diploma"



Looking for a program that fits your schedule and obligations? TECH provides you with academic rigor in an exclusive online format"

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, that is, a simulated environment that will provide an immersive training programmed to train in real situations.

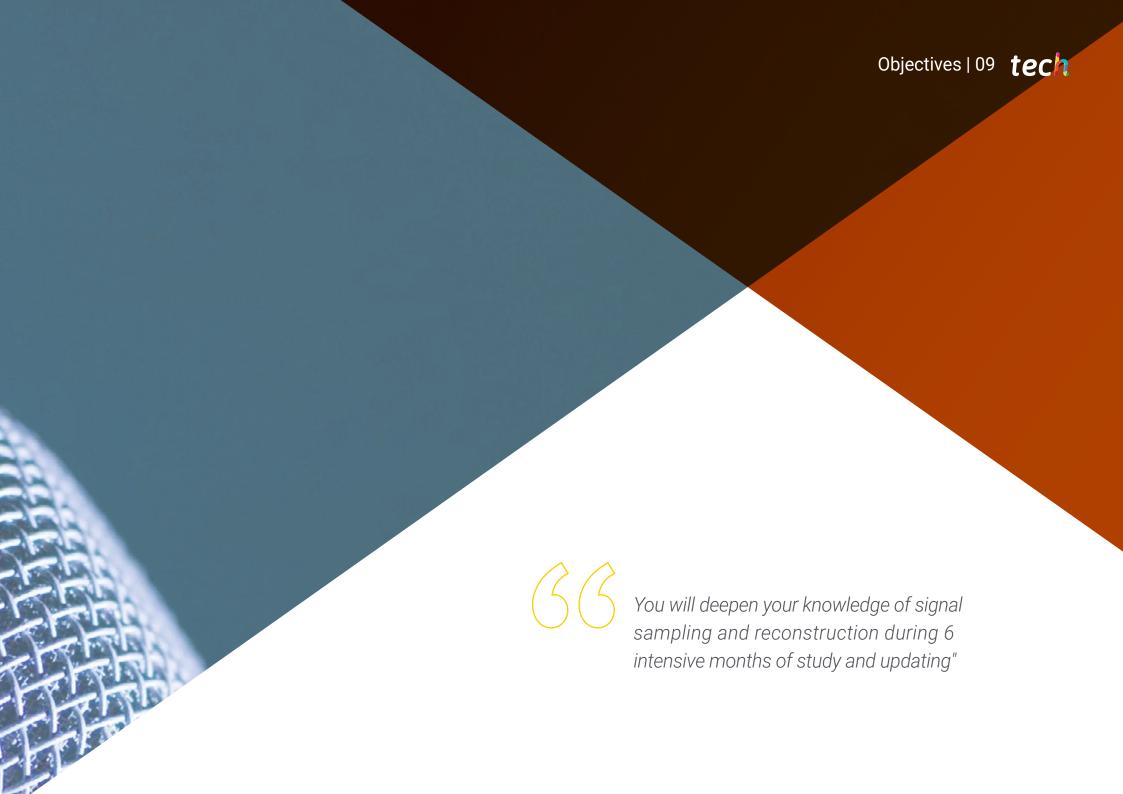
The design of this program focuses on Problem Based Learning, through which the professional must try to solve the different professional practice situations that arise during the academic year. For this purpose, the student will be assisted by an innovative interactive video system created by renowned experts.

The multimedia resources of this program include explanatory videos, interactive summaries and other complementary materials.

Don't miss the opportunity to update your skills from anywhere in the world, with the portable device of your choice.







tech 10 | Objectives



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
- Deepen in 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



Specific Objectives

Module 1. Advanced Acoustic Instrumentation

- Analyze the different noise descriptors and their measurement
- Evaluate the behavior of time and frequency weightings in measurement
- Apply with fluency the general regulations that define instrumentation and its measurements
- Establish the correct handling of a spectrum analyzer to identify noise sources, determine the degree of transmission through a structure or evaluate an acoustic treatment

Module 2. Audio Signal Processing and Systems

- Develop the quantization and sampling process necessary for discrete data acquisition and acquisition errors such as jitter, aliasing or quantization error
- Synthesize the analog-to-digital conversion and the different problems associated with signal discretization, as well as the analysis of periodic functions in the complex field
- Interpret the behavior of filtering and the type of response obtained in measurements.

 Use digital signal generation for acoustic excitation
- Evaluate the use of the Laplace transform and other tools of mathematical analysis to obtain response curves in the complex frequency and phasor response curves, as well as other statistical presentations of results for various acoustic parameters

Module 3. Recording Systems and Studio Recording Techniques

- Identify and effectively use recording equipment, cables, connectors, and other essential devices used in recording studios
- Develop specific miking and microphone positioning techniques to capture high-quality audio in a variety of situations, such as vocal, instrumental, and group recordings
- Manage the audio chain, from input signal to recording and monitoring, ensuring an
 efficient and high quality workflow
- Evaluate different audio interfaces for specific projects
- Solve common audio recording problems, such as unwanted noise, phase problems, and noise cancellation, to ensure the quality of the recordings of recordings



You will gain access to a position of excellence in the Sound Engineering industry thanks to TECH's employability rates exceeding 99%"





tech 14 | Course Management

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
- Diploma of Advanced Studies by the University of Cadiz

Professors

Dr. Nava, Enrique

- Researcher specialized in Radiological Imaging
- Professor at the University of Malaga
- Responsible for the TIC128 research group of the Andalusian Research Plan
- Coordinating professor of Telecommunication and Biomedical Engineering degrees, as well as collaborator in different masters offered by the universities of Cadiz and Granada
- PhD in Telecommunication Engineering from the Polytechnic University of Madrid
- Telecommunications Engineer from Universidad Politécnica de Madrid

Ms. Cuervo Bernal, Ana Teresa

- Audiotec Technician
- Technician accredited by ENAC and the Generalitat de Catalunya (ECPCA), for the realization of acoustic measurements in all fields
- Sound teacher at the Film School "Cine en Acción"
- Master's Degree in Architectural and Environmental Acoustics by the University of La Salle in Barcelona
- Graduate in Acoustic Engineering from the San Buenaventura University of Bogota
- Diploma in Art and Visual Communication from San Buenaventura University of Bogota. Diploma in Audiovisual Production by Cine en Acción Barcelona
- Diploma in Audiovisual Sound by Cine en Acción Barcelona



Course management | 15 tech

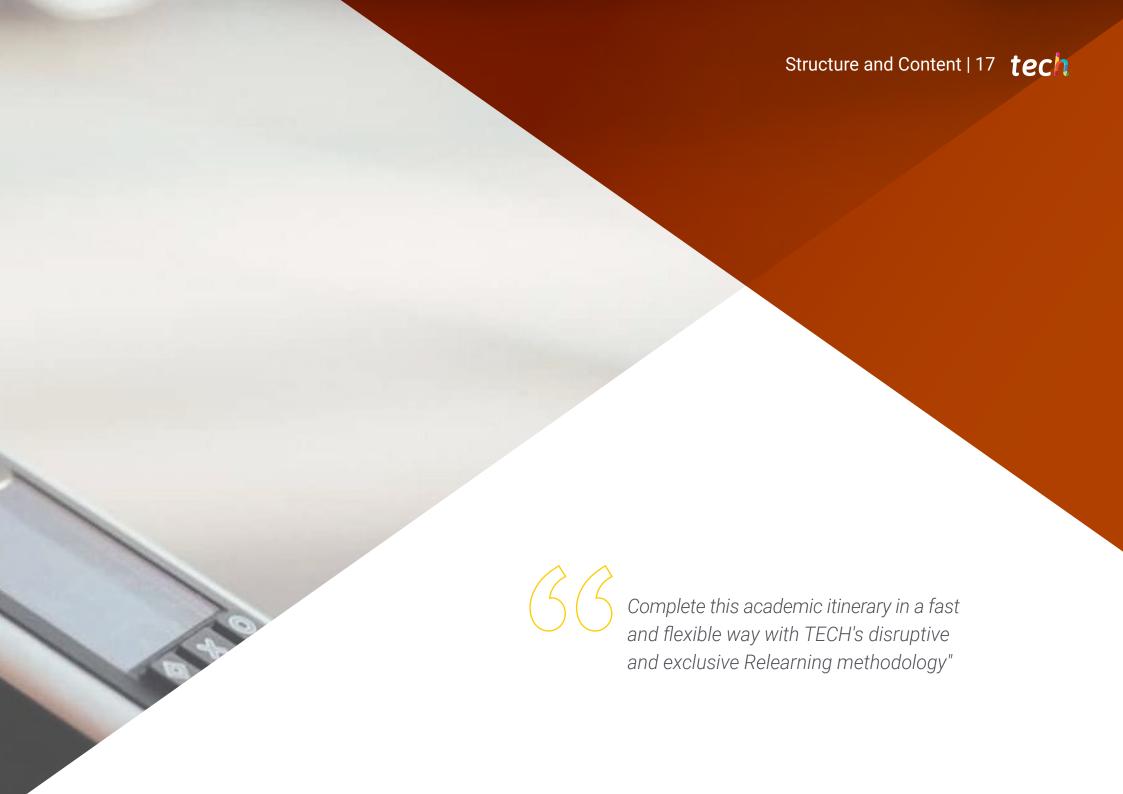
Dr. Muñoz Montoro, Antonio Jesús

- Researcher in musical and biomedical signals and their applications
- Assistant Professor at the University of Oviedo
- Teaching and Research Staff at the of Distance Learning University of Madrid
- Interim Substitute Professor at the University of Oviedo
- Professor and Tutor at the Associated Center of the UNED in Jaén
- Research group "Signal Processing and Telecommunication Systems" (TIC188) of the University of Jaén
- ◆ Research Group "Quantum and High Performance Computing" of the University of Oviedo
- PhD in Telecommunication Engineering from the University of Jaén
- Telecommunication Engineer from the University of Málaga



Take the opportunity to learn about the latest advances in this field in order to apply it to your daily practice"





tech 18 | Structure and Content

Module 1. Advanced Acoustic Instrumentation

- 1.1. Noise
 - 1.1.1. Noise Descriptors by Energy Content Assessment: LAeq, SEL
 - 1.1.2. Noise Descriptors by Temporal Variation Assessment: LAnT
 - 1.1.3. Noise Categorization Curves: NC, PNC, RC and NR
- 1.2. Pressure Measurement
 - 1.2.1. Sound Level Meter. General Description, Structure and Operation by Blocks
 - 1.2.2. Frequency Weighting Analysis. Networks A,C, Z
 - 1.2.3. Temporal Weighting Analysis Slow, Fast, ImpulseNetworks
 - 1.2.4. Integrating Sound Level Meter and Dosimeter (Laeq and SEL). Classes and Types. Regulations
 - 1.2.5. Phases of Metrological Control Regulations
 - 1.2.6. Calipers and Pistophones
- 1.3. Intensity Measurement
 - 1.3.1. Intensimetry. Properties and Applications
 - 1.3.2. Intensimetric Probes
 - 1.3.2.1. Pressure/Pressure and pressure/Velocity Types
 - 1.3.3. Calibration Methods. Uncertainties
- 1.4. Sources of Acoustic Excitation
 - 1.4.1. Dodecahedral Omnidirectional Source. International Regulations
 - 1.4.2. Airborne Impulsive Sources. Gun and Acoustic Balloons
 - 1.4.3. Structural Impulsive Sources. Impact Machine
- 1.5. Vibration Measurement
 - 1.5.1. Piezoelectric Accelerometers
 - 1.5.2. Displacement, Velocity and Acceleration Curves
 - 1.5.3. Vibration Analyzers. Frequency Weightings
 - 1.5.4. Parameters and Calibration
- 1.6. Measuring Microphones
 - 1.6.1. Types of Measuring Microphones
 - 1.6.1.1. The Condenser and Pre-polarized Microphone. Basis of Operation
 - 1.6.2. Design and Construction of Microphones
 - 1.6.2.1. Diffuse Field, Random Field and Pressure Field
 - 1.6.3. Sensitivity, Response, Directivity, Range and Stability

- 1.6.4. Environmental and Operator Influences. Measurement with Microphones
- 1.7. Acoustic Impedance Measurement
 - 1.7.1. Impedance Tube Methods (Kundt): Standing Wave Range Method
 - Determination of Sound Absorption Coefficient at Normal Incidence. ISO 10534-2:2002 Transfer Function Method
 - 1.7.3. Surface Method: Impedance Gun
- 1.8. Acoustic Measuring Chambers
 - 1.8.1. Anechoic Chamber. Design and Materials
 - 1.8.2. Semi-Anechoic Chamber. Design and Materials
 - 1.8.3. Reverberation Chamber Design and Materials
- 1.9. Other Measurement Systems
 - 1.9.1. Automatic and Autonomous Measurement Systems for Environmental Acoustics
 - 1.9.2. Measurement Systems Using Data acquisition Cards and Software
 - 1.9.3. Systems Based on Simulation Software
- 1.10. Uncertainty in Acoustic Measurement
 - 1.10.1. Sources of Uncertainty
 - 1.10.2. Reproducible and Non-Reproducible Measurements
 - 1.10.3. Direct and Indirect Measurements

Module 2. Audio Signal Processing and Systems

- 2.1. Signals
 - 2.1.1. Continuous and Discrete Signals
 - 2.1.2. Periodic and Complex Signals
 - 2.1.3. Random and Stochastic Signals
- 2.2. Series and Fourier Transform
 - 2.2.1. Fourier Series and Fourier Transform. Analysis and Synthesis
 - 2.2.2. Time Domain Versus Frequency Domain
 - 2.2.3. Complex Variables and Transfer Function
- 2.3. Sampling and Reconstruction of Audio Signals
 - 2.3.1. A/D Conversion
 - 2.3.1.1. Sample Size, Coding and Sampling Rate
 - 2.3.2. Quantization Error. Synchronization Error (Jitter)
 - 2.3.3. D/A Conversion. Nyquist-Shannon Theorem
 - 2.3.4. Aliasing Effect (Masking)
- 2.4. Frequency Response Analysis of Systems

- 2.4.1. Discrete Fourier Transform, DFT
- 2.4.2. The Fast Fourier Transform FFT
- 2.4.3. Bode Diagram (Magnitude and Phase)
- 2.5. Analog IIR Signal Filters
 - 2.5.1. Filtering Types. HP, LP, PB
 - 2.5.2. Filter Order and Attenuation
 - 2.5.3. Q types. Butterworth, Bessel, Linkwitz-Riley, Chebysheb, EllipticTypes
 - 2.5.4. Advantages and Disadvantages of Different Filtering
- 2.6. Analysis and Design of Digital Signal Filters
 - 2.6.1. FIR (Infinite Impulse Response)
 - 2.6.2. IIR (Infinite Impulse Response)
 - 2.6.3. Design with Software Tools such as Matlab
- 2.7. Signal Equalization
 - 2.7.1. EQ types. HP, LP, PB
 - 2.7.2. EQ Slope (Attenuation)
 - 2.7.3. EQ Q (Quality Factor)
 - 2.7.4. EQ cut off (Cut Off Frequency)
 - 2.7.5. EQ boost (Reinforcement)
- 2.8. Calculation of Acoustic Parameters Using Signal Analysis and Processing Software
 - 2.8.1. Transfer Function and Signal Convolution
 - 2.8.2. IR Curve (Impulse Response)
 - 2.8.3. RTA (Real Time Analizer) Curve
 - 2.8.4. Step ResponseCurve
 - 2.8.5. RT 60. T30. T20 Curve
- 2.9. Statistical Presentation of Parameters in the Signal Processing Software
 - 2.9.1. Signal Smoothing (Smoothing)
 - 2.9.2. Waterfall
 - 2.9.3. TR Decay
 - 2.9.4. Spectrogram
- 2.10. Audio Signal Generation
 - 2.10.1. Analog Signal Generators. Tones and Random Noise
 - 2.10.2. Digital Pink and White Noise Generators
 - 2.10.3. Tonal or Sweep Generators (sweep)

Module 3. Recording Systems and Studio Recording Techniques

- 3.1. The Recording Studio
 - 3.1.1. The Recording Room
 - 3.1.2. Design of Recording Rooms
 - 3.1.3. The Control Room
 - 3.1.4. Control Room Design
- 3.2. Recording Process
 - 3.2.1. Pre-Production
 - 3.2.2. Recording in the Studio
 - 3.2.3. Postproduction
- 3.3. Technical Production in the Recording Studio
 - 3.3.1. Roles and Responsibilities in Production
 - 3.3.2. Creativity and Decision Making
 - 3.3.3. Resource Management
 - 3.3.4. Type of Recording
 - 3.3.5. Room Types
 - 3.3.6. Technical Equipment
- 3.4. Audio Formats
 - 3.4.1. Audio File Formats
 - 3.4.2. Audio Quality and Data Compression
 - 3.4.3. Format Conversion and Resolution
- 3.5. Cables and Connectors
 - 3.5.1. Electrical Wiring
 - 3.5.2. Charging Wiring
 - 3.5.3. Analog Signal Wiring
 - 3.5.4. Digital Signal Wiring
 - 3.5.5. Balanced, Unbalanced, Stereo and Monophonic Signal
- 3.6. Audio Interfaces
 - 3.6.1. Functions and Characteristics of Audio Interfaces
 - 3.6.2. Configuration and Use of Audio Interfaces
 - 3.6.3. Choosing the Right Interface for Each Project

tech 20 | Structure and Content

| 3.7. | Studio | Hood | phones |
|------|--------|------|--------|
| J./. | Studio | пеаи | DHOHES |

- 3.7.1. Structure
- 3.7.2. Types of Headphones
- 3.7.3. Specifications
- 3.7.4. Binaural Reproduction

3.8. The Audio Chain

- 3.8.1. Signal Routing
- 3.8.2. Recording Chain
- 3.8.3. Monitoring Chain
- 3.8.4. MIDI Recording

3.9. Mixer

- 3.9.1. Types of Inputs and Their Characteristics
- 3.9.2. Channel Functions
- 3.9.3. Mixers
- 3.9.4. DAW Controllers

3.10. Studio Microphone Techniques

- 3.10.1. Microphone Positioning
- 3.10.2. Microphone Selection and Configuration
- 3.10.3. Advanced Microphone Techniques







In just 6 weeks of 100% online academic experience you will acquire skills in areas related to the Integrated Environmental Management Plan with TECH Global University"





tech 24 | Methodology

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.

Methodology | 25 tech



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.

tech 26 | Methodology

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.



Methodology | 27 tech

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.





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.



25%

20%





tech 32 | Certificate

This program will allow you to obtain your **Postgraduate Diploma in Audio Engineering** 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 Diploma in Audio Engineering

Modality: online

Duration: 6 months

Accreditation: 18 ECTS



Mr./Ms. _____, with identification document _____ has successfully passed and obtained the title of:

Postgraduate Diploma in Audio Engineering

This is a program of 450 hours of duration equivalent to 18 ECTS, with a start date of dd/mm/yyyy and an end date of dd/mm/yyyy.

TECH Global University is a university officially recognized by the Government of Andorra on the 31st of January of 2024, which belongs to the European Higher Education Area (EHEA).

In Andorra la Vella, on the 28th of February of 2024



^{*}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.



» Duration: 6 months

» Credits: 18 ECTS

» Exams: online

» Certificate: TECH Global University

» Schedule: at your own pace

