Professional Master's Degree

Specific Telecommunication Technology

tech technological university

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Professional Master's Degree
Specific Telecommunication Technology

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

Website: www.techtitute.com/in/information-technology/professional-master-degree/master-specific-telecommunication-technology

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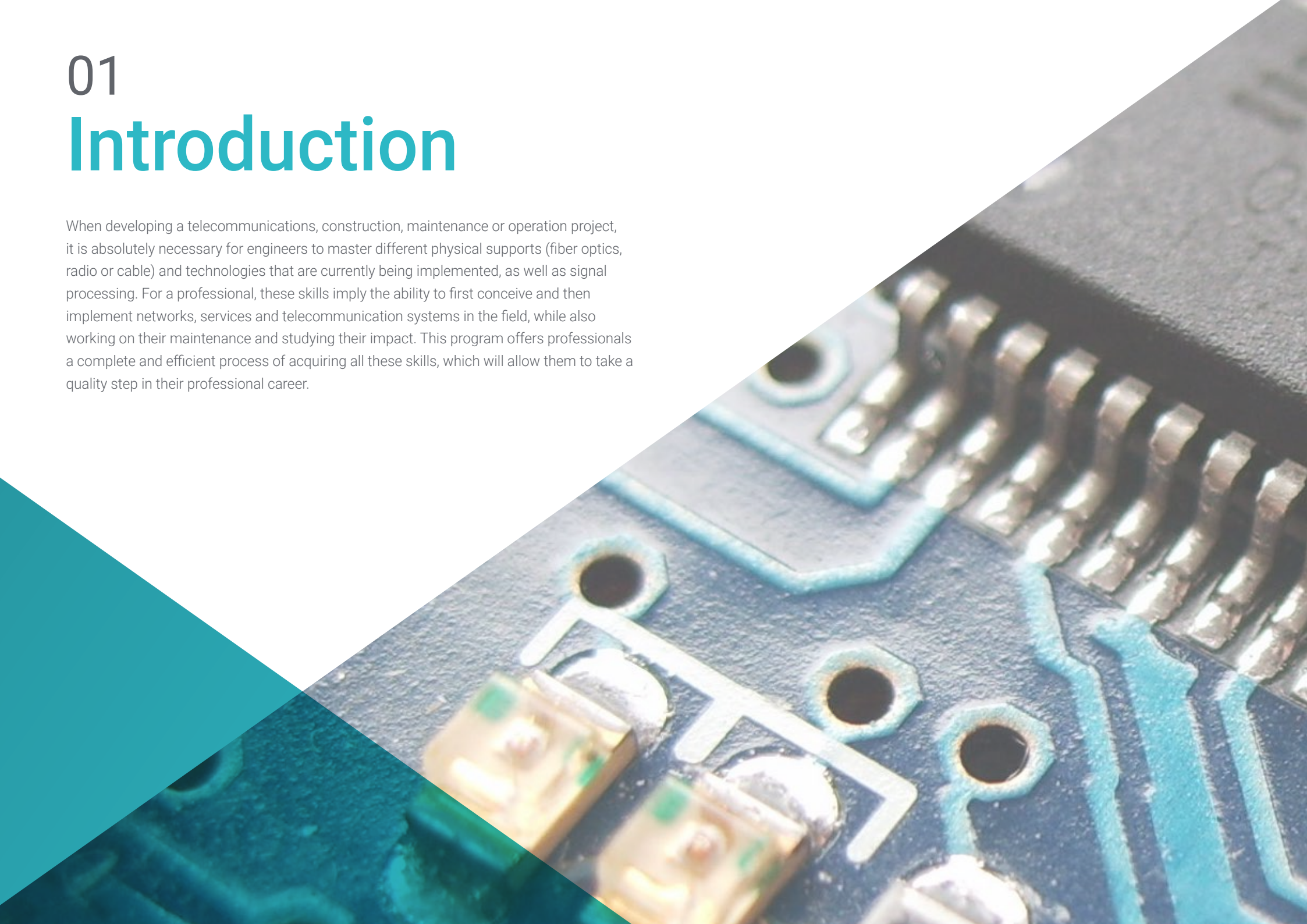
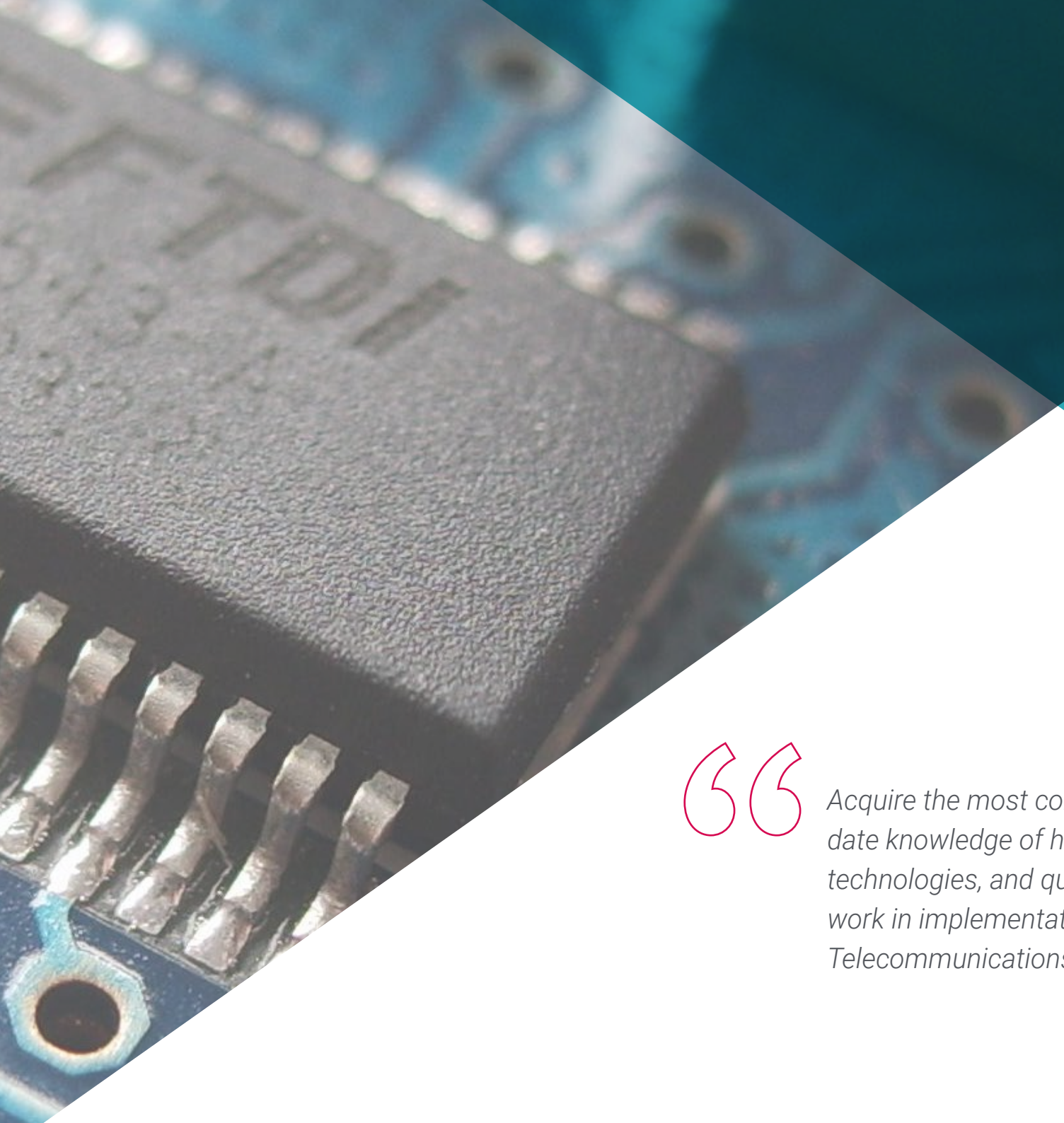
01

Introduction

When developing a telecommunications, construction, maintenance or operation project, it is absolutely necessary for engineers to master different physical supports (fiber optics, radio or cable) and technologies that are currently being implemented, as well as signal processing. For a professional, these skills imply the ability to first conceive and then implement networks, services and telecommunication systems in the field, while also working on their maintenance and studying their impact. This program offers professionals a complete and efficient process of acquiring all these skills, which will allow them to take a quality step in their professional career.





Acquire the most complete and up-to-date knowledge of hardware and new technologies, and qualify professionals to work in implementation and development in Telecommunications Systems Engineering"

Advances in telecommunications happen constantly, as this is one of the fastest evolving areas in the engineering sector. Therefore, it is necessary to have experts in Computer Science who can adapt to these changes and know first-hand the new tools and techniques that arise in this field.

The Professional Master's Degree in Specific Telecommunication Technology addresses a range of topics pertaining to this field. Their study presents a clear advantage over other Master's degrees that focus on specific blocks, which prevents the student from knowing the interrelation with other areas included in the multidisciplinary field of telecommunications, offering a broader vision that incorporates the complementary skills of other areas of interest. Besides, this educational program's teaching team has made a careful selection of each one of the topics to offer students the most complete study opportunity possible that is always linked to current events.

This program is aimed at those people interested in reaching a higher level of knowledge about Specific Telecommunication Technology. The main objective is to educate the student on how to apply the knowledge acquired in this Master's Degree in the real world, and in a work environment that rigorously and realistically reproduces the conditions that can be found in their future.

In addition, as it is a 100% online Master's Degree, the student is not conditioned by fixed schedules or the need to move to another location, but can access the contents at any time of the day, balancing their work or personal life with their academic duties.

This **Professional Master's Degree in Specific Telecommunication Technology** contains the most complete and up-to-date program on the market. The most important features include:

- The development of practical cases presented by experts in Specific Telecommunication Technology
- The graphic, schematic, and practical contents with which they are created, that 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
- Special emphasis on innovative methodologies in Specific Telecommunication Technology
- Theoretical lessons, questions for 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

Don't miss this opportunity to study this TECH Professional Master's Degree in Specific Telecommunication Technology" It's the perfect opportunity to advance your career"

With a system created to achieve a sufficiently broad body of knowledge and efficient practical experience, this program is a highly valuable tool for professional growth"

Its teaching staff includes professionals belonging to the field of Information Technology, who bring to this program the experience of their work, as well as recognized specialists from leading companies and prestigious universities.

Its 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 education programmed to learn in real situations.

This program is designed around Problem-Based Learning, whereby students must try to solve different professional practice situations that arise throughout the program. In order to achieve the above, the professional will receive the help of an innovative system of interactive videos, made by experienced and recognized experts in Specific Telecommunication Technology.

The study system has been created to offer a perfect reconciliation to the student, between dedication to study and other activities, without interfering in the effectiveness of learning.

Focused on real learning, this Professional Master's Degree offers the support of high-quality audiovisual systems that will allow students a practical and straightforward immersion.

02

Objectives

The Professional Master's Degree in Specific Telecommunication Technology aims to educate IT professionals in the specific aspects involved in the design, implementation and maintenance of specific telecommunication technologies. A high quality program that will optimize the effort of professionals, quickly converting it into results.

This program aims to educate competent professionals in the design, implementation and maintenance of specific telecommunication technologies"

General Objective

- Enable the student to assess the advantages and disadvantages of different technological alternatives that can be applied in the field of telecommunications

Achieve the desired level of knowledge and become proficient in the Professional Master's Degree in Specific Telecommunication Technology with this high-level program"

Specific Objectives

Module 1. Circuit Analysis

- Know the nature and behavior of electrical circuits
- Master basic concepts
- Identify circuit components
- Understand and apply different analysis methods
- Master the fundamental theorems of circuit theory
- Develop calculation skills

Module 2. Electromagnetism, Semiconductors and Waves

- Apply mathematical principles in field physics
- Master the concepts and fundamental law of fields: electrostatic, magnetostatic and electromagnetic
- Understand the basics of semiconductors
- Know the theory of transistors and how to differentiate between the two main families
- Know the equations of electrical current equations
- Gain problem-solving skills specific to engineering, and related to the laws of electromagnetism

Module 3. Random Signals and Linear Systems

- Understand the fundamentals of Probability Calculation
- Know the basic theory of variables and vectors
- Know in depth the random processes and their temporal and spectral characteristics
- Apply the concepts of deterministic and random signals to the characterization of disturbances and noise
- Know the fundamental properties of the systems
- Master linear systems and the related functions and transforms
- Apply concepts of Linear and Time-Invariant Systems (LTI Systems) to model, analyze and predict processes

Module 4. Fields and Waves

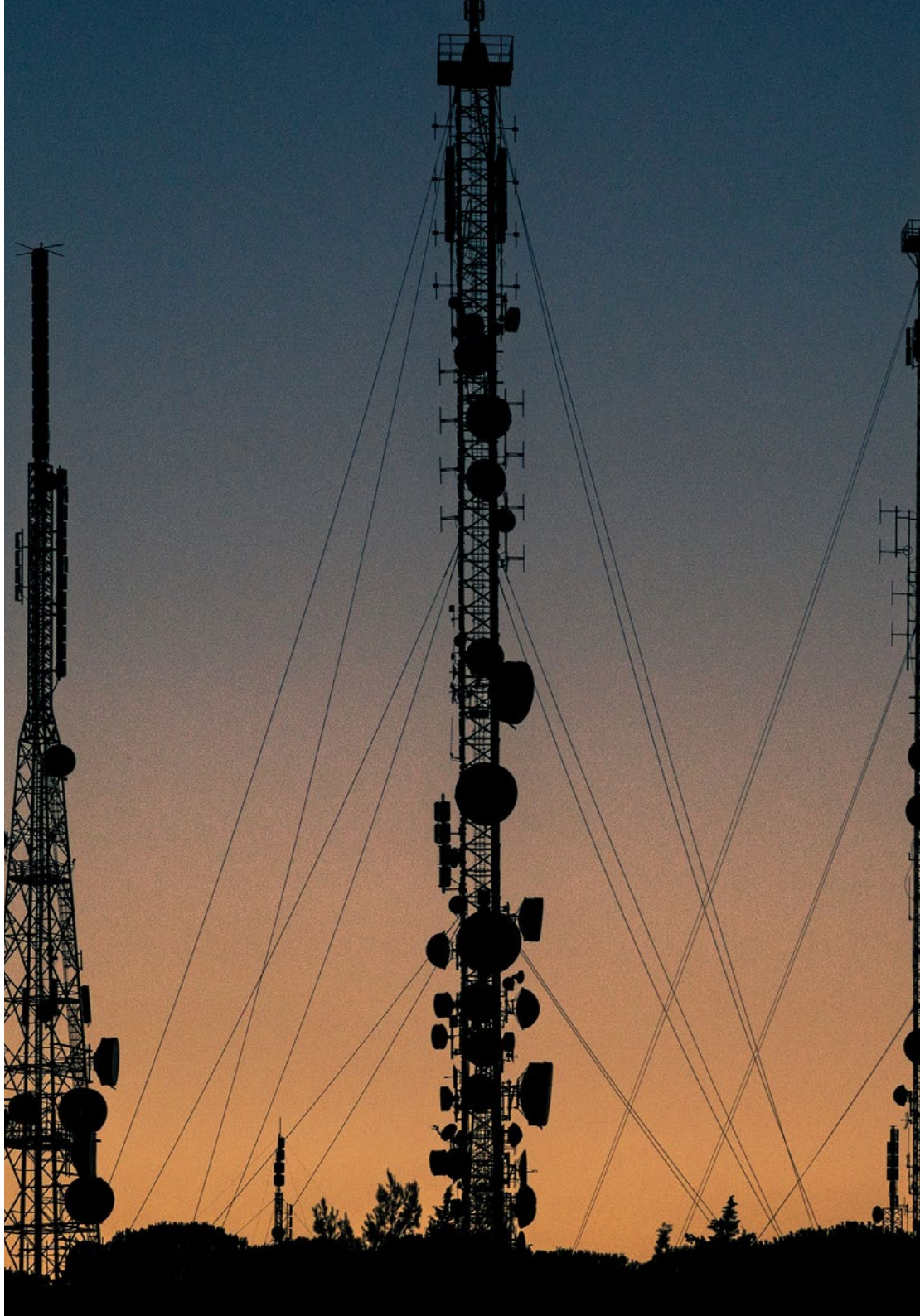
- Know how to qualitatively and quantitatively analyze the basic mechanisms of electromagnetic wave propagation phenomena and their interaction with obstacles, both in free space and in guidance systems
- Understand the fundamental parameters of the transmission media of a communications system
- Understand the concept of waveguide and the electromagnetic model of transmission lines, as well as the most important types of waveguides and lines
- Solve transmission line problems using the Smith chart
- Apply impedance matching techniques properly
- Know the basics of antenna operation

Module 5. Communication Theory

- Know the fundamental characteristics of different types of signals
- Analyze the different disturbances that can occur in signal transmission
- Master signal modulation and demodulation techniques
- Understand Analog Communication Theory and its modulations
- Understand Digital Communication Theory and its modulations
- Be able to apply this knowledge to specify, deploy and maintain communication systems and services

Module 6. Transmission Systems. Optical Communication

- Know the characteristics of transmission system elements
- Being able to analyze and specify the fundamental parameters of the transmission media of a communications system
- Recognize the main disturbances which affect signal transmission
- Understand the basic fundamentals of optical communication
- Develop the skill to analyze the optical components of light emission and reception
- Master the architecture and operation of WDM (Wavelength Division Multiplexing) and PON (Passive Optical Networks)



Module 7. Switching Networks and Telecommunication Infrastructures

- Differentiate between the concepts of access and transport networks, circuit-switched and packet-switched networks, fixed and mobile networks, as well as distributed network systems and applications, voice, data, audio and video services
- Know the methods of network interconnection and routing, as well as the basics of network planning and dimensioning based on traffic parameters
- Master the basic fundamentals of service quality
- Analyze the performance (delay, loss probability, blocking probability, etc.) of telecommunication networks
- Understand and apply the standards and regulations of protocols and networks of international standardization organizations
- Know the Common Telecommunication Infrastructure planning in residential contexts

Module 8. Fundamentals of Mobile and Cell Network Communications

- Know the basics of Mobile Communication
- Describe the main services that mobile communications provide
- Know the architecture and organization of new communication networks with mobile access
- Expose the different generations of mobile telephony
- Understand the different aspects that are presented in digital mobile communication systems
- Assimilate security protocols and techniques for the proper functioning of mobile communications
- Analyze the evolutionary aspects of mobile technologies and their integration into current networks

Module 9. Mobile Communications Networks

- Analyze the fundamental concepts of mobile communications networks
- Know the principles of mobile communications
- Master architecture and protocols of mobile communications networks
- Understand the basic technologies used in GSM, UMTS and LTE networks
- Understand the signaling systems and the different network protocols of GSM, UMTS and LTE networks
- Understand the functional entities of GSM, UMTS and LTE and their interconnection with other networks

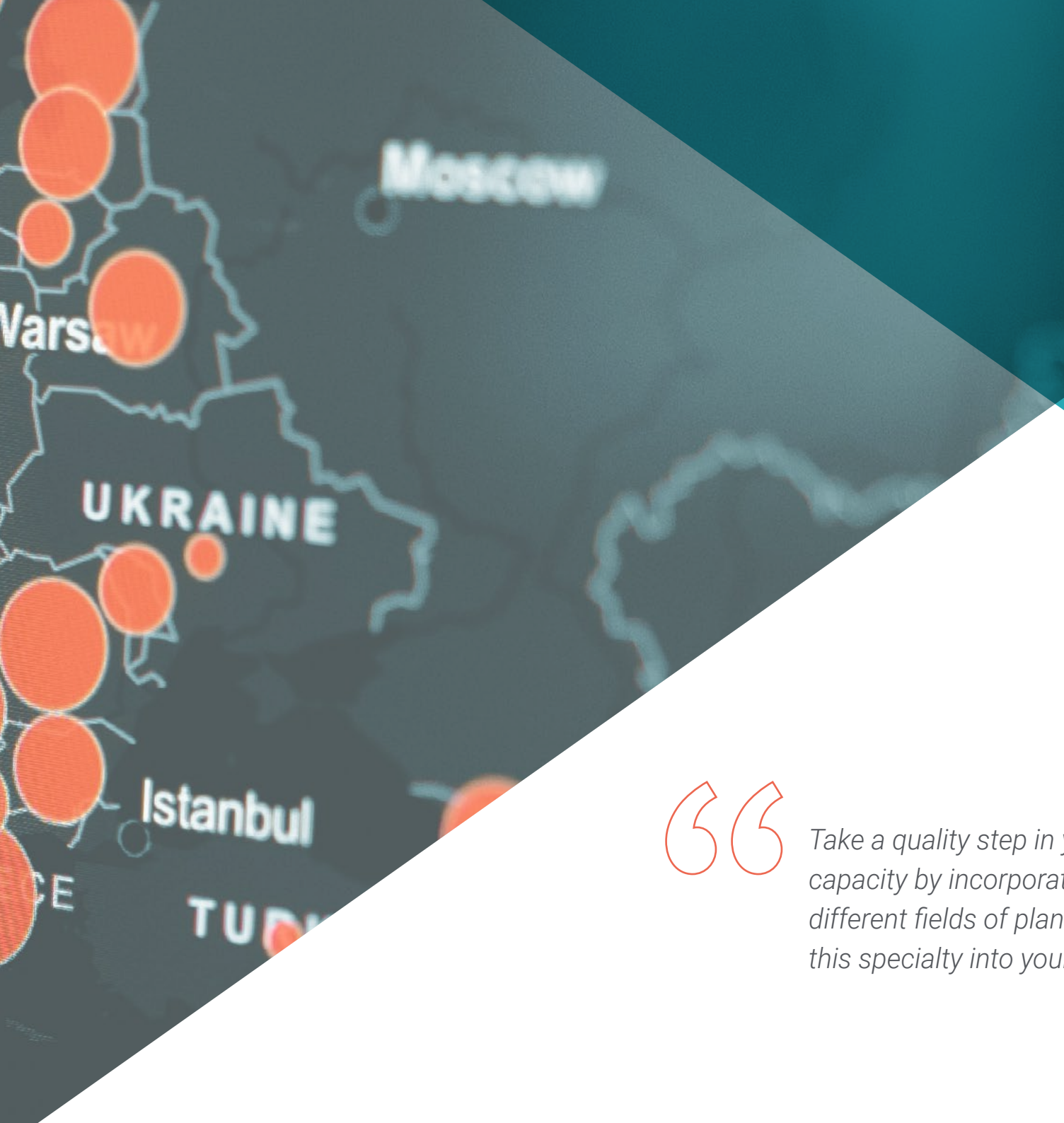
Module 10. Radio Networks and Services

- Know the access, link control and radio resource control mechanisms of an LTE system
- Understand the fundamental concepts of radio spectrum
- Know the specific services for radio networks
- Know the IP multicast techniques best suited to the connectivity provided by radio networks
- Understand the impact of radio networks on end-to-end quality of service and the existing mechanisms to mitigate them
- Master WLAN, WPAN, WMAN wireless networks
- Analyze different satellite networks architectures and know the different services supported by a satellite network

03

Skills

After completing the assesments of the Professional Master's Degree in Specific Telecommunications Technology, the professional will have acquired the necessary skills to intervene in all of its aspects, with mastery of this field's specific tools, backed by the solvency of a complete, quality program



Take a quality step in your professional capacity by incorporating the mastery of different fields of planning and intervention in this specialty into your skills"

General Skill

- Apply the most necessary technologies in each of the processes carried out in the field of telecommunications

Study in the world's leading private online university"

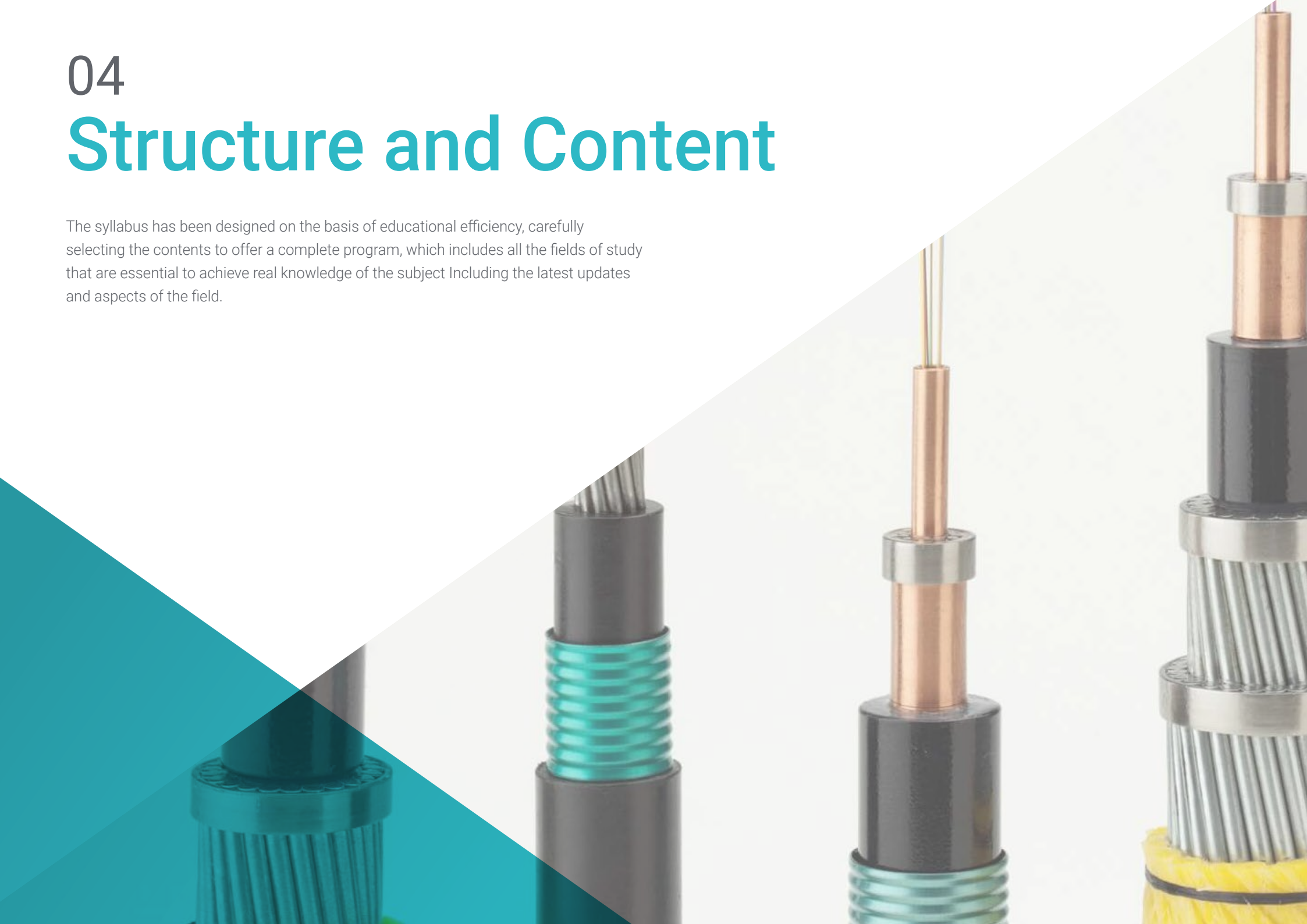
Specific Skills

- Know all the processes and mechanisms of electrical circuits and how to analyze them
- Solve engineering problems related to electromagnetism, semiconductors and waves
- Acquire in-depth knowledge of random signals and linear systems
- Know the propagation of waves and the operation of antennas
- Know the history and evolution of communication theory
- Detect the main problems that affect signal transmission
- Analyze telecommunication networks and detect possible problems
- Acquire in-depth knowledge of mobile communications and cellular networks
- Know all the mechanisms of radio services

04

Structure and Content

The syllabus has been designed on the basis of educational efficiency, carefully selecting the contents to offer a complete program, which includes all the fields of study that are essential to achieve real knowledge of the subject Including the latest updates and aspects of the field.



We have the most complete and up-to-date educational program in the market. We strive for excellence and for you to achieve it too"

Module 1. Circuit Analysis

1.1. Basic Concepts of Circuits
- 1.1.1. Basic Components of Circuits
- 1.1.2. Nodes, Branches and Meshes
- 1.1.3. Resistance
- 1.1.4. Capacitors
- 1.1.5. Coils

1.2. Circuit Analysis Methods
- 1.2.1. Kirchoff's Laws. Law of Currents: Nodal Analysis
- 1.2.2. Kirchoff's Laws. Law of Tensions: Mesh Analysis
- 1.2.3. Superposition Theorem
- 1.2.4. Other Theorems of Interest

1.3. Sinusoidal Functions and Phasors
- 1.3.1. Review of Sinusoidal Functions and their Characteristics
- 1.3.2. Sinusoidal Functions as Circuit Excitation
- 1.3.3. Phasor Definition
- 1.3.4. Basic Phasor Operations

1.4. Analysis of Sinusoidal Steady-State Circuits. Effects of Passive Components Excited by Sinusoidal Functions
- 1.4.1. Impedance and Admittance of Passive Components
- 1.4.2. Sinusoidal Current and Voltage in Resistors
- 1.4.3. Sinusoidal Current and Voltage in Capacitors
- 1.4.4. Sinusoidal Current and Voltage in Coils

1.5. Sinusoidal Steady-State Power
- 1.5.1. Definitions
- 1.5.2. Effective Values
- 1.5.3. Example 1 of Power Calculation
- 1.5.4. Example 2 of Power Calculation

1.6. Generators
- 1.6.1. Ideal Generators
- 1.6.2. Real Generators
- 1.6.3. Associations of Generators in Series Assembly
- 1.6.4. Associations of Generators in Mixed Assembly

1.7. Topological Circuit Analysis
- 1.7.1. Equivalent Circuits
- 1.7.2. Thévenin's Equivalent
- 1.7.3. Continuous Steady-State of Thévenin's Equivalent
- 1.7.4. Norton Equivalent

1.8. Fundamental Circuit Theorems
- 1.8.1. Superposition Theorem
- 1.8.2. Maximum Power Transfer Theorem
- 1.8.3. Substitution Theorem
- 1.8.4. Millman Theorem
- 1.8.5. Reciprocity Theorem

1.9. Transformers and Coupled Circuits
- 1.9.1. Introduction
- 1.9.2. Iron Core Transformers: The Ideal Model
- 1.9.3. Excessive Impedance
- 1.9.4. Power Transformer Specifications
- 1.9.5. Transformer Applications
- 1.9.6. Practical Iron-Core Transformers
- 1.9.7. Transformer Testing
- 1.9.8. Voltage and Frequency Effects
- 1.9.9. Weakly Coupled Circuits
- 1.9.10. Magnetically Coupled Circuits with Sinusoidal Excitation
- 1. 9.11. Coupled Impedance

1.10. Transient Phenomena Analysis in Circuits
- 1.10.1. Calculation of Instantaneous Current and Voltage in Passive Components
- 1.10.2. One Order Circuits in Transient Regime
- 1.10.3. Second Order Circuits in Transient Regime
- 1.10.4. Resonance and Frequency Effects: Filtering

Module 2. Electromagnetism, Semiconductors and Waves

2.1. Mathematics for Field Physics
- 2.1.1. Vectors and Orthogonal Coordinate Systems
- 2.1.2. Gradient of a Scalar Field
- 2.1.3. Divergence of a Vector Field and Divergence Theorem
- 2.1.4. Rotation of a Vector Field and Stokes' Theorem
- 2.1.5. Classification of Fields: Helmholtz Theorem

2.2. Electrostatic Field I
- 2.2.1. Fundamental Postulates
- 2.2.2. Coulomb's Law and Fields Generated by Charge Distributions
- 2.2.3. Gauss' Law
- 2.2.4. Electrostatic Potential

2.3. Electrostatic Field II
- 2.3.1. Material Media: Metals and Dielectrics
- 2.3.2. Boundary Conditions
- 2.3.3. Capacitors
- 2.3.4. Electrostatic Forces and Energy
- 2.3.5. Problem-Solving with Boundary Values

2.4. Stationary Electric Currents
- 2.4.1. Current Density and Ohm's Law
- 2.4.2. Load and Current Continuity
- 2.4.3. Current Equations
- 2.4.4. Resistance Calculations

2.5. Magnetostatic Field I
- 2.5.1. Fundamental Postulates
- 2.5.2. Vector Potential
- 2.5.3. Biot-Savart's Law
- 2.5.4. The Magnetic Dipole

2.6. Magnetostatic Field II
- 2.6.1. Magnetic Field in Material Resources
- 2.6.2. Boundary Conditions
- 2.6.3. Inductance
- 2.6.4. Forces and Energy
- 2.6.5. Electromagnetic Fields

2.7 Introduction
- 2.7.1. Electromagnetic Fields
- 2.7.2. Maxwell's Laws of Electromagnetism
- 2.7.3. Electromagnetic Waves

2.8. Semiconductor Materials
- 2.8.1. Introduction
- 2.8.2. Difference between Metals, Insulators and Semiconductors
- 2.8.3. Current Carriers
- 2.8.4. Carrier Density Calculation

2.9. Semiconductor Diode
- 2.9.1. The PN Junction
- 2.9.2. Derivation of the Diode Equation
- 2.9.3. The Diode in Large Signal: Circuits
- 2.9.4. The Diode in Small Signal: Circuits

2.10. Transistors
- 2.10.1. Definition
- 2.10.2. Characteristic Curves of the Transistor
- 2.10.3. Bipolar Junction Transistor
- 2.10.4. Field Effect Transistors

Module 3. Random Signals and Linear Systems

3.1. Probability Theory
- 3.1.1. Concept of Probability Probability Space
- 3.1.2. Conditional Probability and Independent Events
- 3.1.3. Total Probability Theorem. Bayes' Theorem
- 3.1.4. Composite Experiments. Bernoulli Tests

3.2. Random Variables
- 3.2.1. Random Variable Definition
- 3.2.2. Probability Distributions
- 3.2.3. Main Distributions
- 3.2.4. Functions of Random Variables
- 3.2.5. Moments of Random Variable
- 3.2.6. Generator Functions

3.3. Random Vectors
- 3.3.1. Random Vector Definition
- 3.3.2. Joint Distribution
- 3.3.3. Marginal Distributions
- 3.3.4. Conditional Distributions
- 3.3.5. Linear Correlation Between Two Variables
- 3.3.6. Normal Multivariant Distribution

3.4. Random Processes
- 3.4.1. Definition and Description of Random Processes
- 3.4.2. Random Processes in Discrete Time
- 3.4.3. Random Processes in Continuous Time
- 3.4.4. Stationary Processes
- 3.4.5. Gaussian Processes
- 3.4.6. Markovian Processes

3.5. Queuing Theory in Telecommunications
- 3.5.1. Introduction
- 3.5.2. Basic Concepts
- 3.5.3. Model Description
- 3.5.4. Example of the Application of Queuing Theory in Telecommunications

3.6. Random Processes. Temporal Characteristics
- 3.6.1. Concept of Random Process
- 3.6.2. Processes Qualification
- 3.6.3. Main Statistics
- 3.6.4. Stationarity and Independence
- 3.6.5. Temporary Averages
- 3.6.6. Ergodicity

3.7. Random Processes. Spectral Characteristic
- 3.7.1. Introduction
- 3.7.2. Power Density Spectrum
- 3.7.3. Power Density Spectral Properties
- 3.7.4. Relationship between the Power Spectrum and Autocorrelation

3.8. Signals and Systems. Properties
- 3.8.1. Introduction to Signals
- 3.8.2. Introduction to Systems
- 3.8.3. Basic Properties of Systems
  - 3.8.3.1. Linearity
  - 3.8.3.2. Time Invariance
  - 3.8.3.3. Causality
  - 3.8.3.4. Stability
  - 3.8.3.5. Memory
  - 3.8.3.6. Invertibility

3.9. Lineal Systems with Random Inputs
- 3.9.1. Fundamentals of Linear Systems
- 3.9.2. Response to Linear Systems and Random Signals
- 3.9.3. Systems with Random Noise
- 3.9.4. Spectral Characteristics of the System Response
- 3.9.5. Equivalent Noise Bandwidth and Temperature
- 3.9.6. Noise Source Modeling

3.10. LTI Systems
- 3.10.1. Introduction
- 3.10.2. Discrete-Time LTI Systems
- 3.10.3. Continuous-Time LTI Systems
- 3.10.4. Properties of LTI Systems
- 3.10.5. Systems Described by Differential Equations

Module 4. Fields and Waves

4.1. Mathematics for Field Physics
- 4.1.1. Vectors and Orthogonal Coordinate Systems
- 4.1.2. Gradient of a Scalar Field
- 4.1.3. Divergence of a Vector Field and Divergence Theorem
- 4.1.4. Rotation of a Vector Field and Stokes' Theorem
- 4.1.5. Classification of Fields: Helmholtz Theorem

4.2. Introduction to Waves
- 4.2.1. Wave Equation
- 4.2.2. General Solutions to Wave Equations: D'Alembert Solution
- 4.2.3. Harmonic Solutions to Wave Equations
- 4.2.4. Wave Equation in the Transformed Domain
- 4.2.5. Wave and Standing Wave Propagation

4.3. The electromagnetic field and Maxwell's equations
- 4.3.1. Maxwell's Equations
- 4.3.2. Continuity on the Electromagnetic Boundaries
- 4.3.3. Wave Equation
- 4.3.4. Monochromatic or Harmonic Dependence Fields

4.4. Propagation of Uniform Plane Waves
- 4.4.1. Wave Equation
- 4.4.2. Uniform Plane Waves
- 4.4.3. Lossless Media Propagation
- 4.4.4. Propagation in Lossy Media

4.5. Polarization and Incidence of Uniform Plane Waves
- 4.5.1. Electric Transversal Polarization
- 4.5.2. Magnetic Transversal Polarization
- 4.5.3. Lineal Polarization
- 4.5.4. Circular Polarization
- 4.5.5. Elliptical Polarization
- 4.5.6. Normal Incidence of Uniform Plane Waves
- 4.5.7. Oblique Incidence of Uniform Plane Waves

4.6. Basic Concepts of Transmission Line Theory
- 4.6.1. Introduction
- 4.6.2. Circuit Model of the Transmission Line
- 4.6.3. General Equations of the Transmission Line
- 4.6.4. Wave Equation Solution in both the Time Domain and the Frequency Domain
- 4.6.5. Low-Loss and No-Loss Lines
- 4.6.6. Power

4.7. Completed Transmission Line
- 4.7.1. Introduction
- 4.7.2. Reflection
- 4.7.3. Stationary Waves
- 4.7.4. Input Impedance
- 4.7.5. Load and Generator Mismatch
- 4.7.6. Transitory Response

4.8. Wave Guide and Transmission Lin
- 4.8.1. Introduction
- 4.8.2. General Solutions for TEM, TE and TM Waves
- 4.8.3. Parallel Plane Guide
- 4.8.4. Rectangular Guide
- 4.8.5. Circular Wave Guide
- 4.8.6. Coaxial Cable
- 4.8.7. Plane Lines

4.9. Microwave Circuits, Smith Chart and Impedance Match
- 4.9.1. Introduction to Microwave Circuits
  - 4.9.1.1. Equivalent Voltages and Currents
  - 4.9.1.2. Impedance and Admittance Parameters
  - 4.9.1.3. Scattering Parameters
- 4.9.2. Smith's Chart
  - 4.9.2.1. Definition of Smith's Chart
  - 4.9.2.2. Simple Calculations
  - 4.9.2.3. Smith's Chart on Admissions
- 4.9.3. Adaptation of Impedances. Simple Stub
- 4.9.4. Adaptation of Impedances. Double Stub
- 4.9.5. Quarter-Wave Transformers

4.10. Introduction to Antennae
- 4.10.1. Introduction and Brief Historical Review
- 4.10.2. Electromagnetic Spectrum
- 4.10.3. Radiation Diagram
  - 4.10.3.1. System of Coordinates
  - 4.10.3.2. Three Dimensional Diagrams
  - 4.10.3.3. Two Dimensional Diagrams
  - 4.10.3.4. Level Curves
- 4.10.4. Fundamental Parameters of Antennae
  - 4.10.4.1. Radiated Power Density
  - 4.10.4.2. Directivity
  - 4.10.4.3. Gain
  - 4.10.4.4. Polarization
  - 4.10.4.5. Impedances
  - 4.10.4.6. Adaptation
  - 4.10.4.7. Area and Effective Longitude
  - 4.10.4.8. Transmission Equation

Module 5. Communication Theory

5.1. Introduction: Telecommunication Systems and Transmission Systems
- 5.1.1. Introduction
- 5.1.2. Basic Concepts and History
- 5.1.3. Telecommunication Systems
- 5.1.4. Transmission Systems

5.2. Signal Characterization
- 5.2.1. Deterministic and Random Signals
- 5.2.2. Periodic and Non-Periodic Signal
- 5.2.3. Energy and Power Signal
- 5.2.4. Baseband and Bandpass Signal

5.2.5. Basic Parameters of a Signal
5.2.5.1. Mean Value
5.2.5.2. Average Energy and Power
5.2.5.3. Maximum Value and Effective Value
5.2.5.4. Energy and Power Spectral Density
5.2.5.5. Power Calculation in Logarithmic Units
5.3. Disturbances in Transmission Systems
5.3.1. Ideal Channel Transmission
5.3.2. Classification of Disturbances
5.3.3. Linear Distortion
5.3.4. Non-Linear Distortion
5.3.5. Crosstalk and Interference
5.3.6. Noise
5.3.6.1. Types of Noise
5.3.6.2. Characterization
5.3.7. Narrow Band Passing Signals
5.4. Analog Communications. Concepts
5.4.1. Introduction
5.4.2. General Concepts
5.4.3. Baseband Transmission
5.4.3.1. Modulation and Demodulation
5.4.3.2. Characterization
5.4.3.3. Multiplexing
5.4.4. Mixers
5.4.5. Characterization
5.4.6. Type of Mixers
5.5. Analog Communications. Lineal Modulations
5.5.1. Basic Concepts
5.5.2. Amplitude Modulation (AM)
5.5.2.1. Characterization
5.5.2.2. Parameters
5.5.2.3. Modulation/Demodulation
5.5.3. Double Side Band (DSB) Modulation
5.5.3.1. Characterization
5.5.3.2. Parameters
5.5.3.3. Modulation/Demodulation
5.5.4. Single Side Band (SSB) Modulation
5.5.4.1. Characterization
5.5.4.2. Parameters
5.5.4.3. Modulation/Demodulation
5.5.5. Vestigial Side Band (VSB) Modulation
5.5.5.1. Characterization
5.5.5.2. Parameters
5.5.5.3. Modulation/Demodulation
5.5.6. Quadrature Amplitude Modulation (QAM)
5.5.6.1. Characterization
5.5.6.2. Parameters
5.5.6.3. Modulation/Demodulation
5.5.7. Noise in Analog Modulations
5.5.7.1. Approach
5.5.7.2. Noise in DBL
5.5.7.3. Noise in BLU
5.5.7.4. Noise in AM
5.6. Analog Communications. Angular Modulations
5.6.1. Phase and Frequency Modulation
5.6.2. Narrow Band Angular Modulation
5.6.3. Spectrum Calculation
5.6.4. Generation and Demodulation
5.6.5. Angular Demodulation with Noise
5.6.5.1. Noise in PM
5.6.6. Noise in FM
5.6.7. Comparison between Analog Modulations

5.7. Digital Communication Introduction. Transmission Models
- 5.7.1. Introduction
- 5.7.2. Fundamental Parameters
- 5.7.3. Advantages of Digital Systems
- 5.7.4. Limitations of Digital Systems
- 5.7.5. PCM Systems
- 5.7.6. Modulations in Digital Systems
- 5.7.7. Demodulations in Digital Systems

5.8. Digital Communication Digital Base Band Transmission
- 5.8.1. PAM Binary Systems
  - 5.8.1.1. Characterization
  - 5.8.1.2. Signal Parameters
  - 5.8.1.3. Spectral Model
- 5.8.2. Basic Binary Sampling Receiver
  - 5.8.2.1. Bipolar NRZ
  - 5.8.2.2. Bipolar RZ
  - 5.8.2.3. Error Probability
- 5.8.3. Optimal Binary Receptor
  - 5.8.3.1. Context
  - 5.8.3.2. Error Rate Calculation
  - 5.8.3.3. Optimal Receptor Filter Design
  - 5.8.3.4. SNR Calculation
  - 5.8.3.5. Loans
  - 5.8.3.6. Characterization
- 5.8.4. M-PAM Systems
  - 5.8.4.1. Parameters
  - 5.8.4.2. Constellations
  - 5.8.4.3. Optimal Receiver
  - 5.8.4.4. Bit Error Ratio (BER)
- 5.8.5. Signal Vectorial Space
- 5.8.6. Constellation of a Digital Modulation
- 5.8.7. M-Signal Receivers

5.9. Digital Communication Digital Bandpass Transmission. Digital Modulations
- 5.9.1. Introduction
- 5.9.2. ASK Modulation
  - 5.9.2.1. Characterization
  - 5.9.2.2. Parameters
  - 5.9.2.3. Modulation/Demodulation
- 5.9.3. QAM Modulation
  - 5.9.3.1. Characterization
  - 5.9.3.2. Parameters
  - 5.9.3.3. Modulation/Demodulation
- 5.9.4. PSK Modulation
  - 5.9.4.1. Characterization
  - 5.9.4.2. Parameters
  - 5.9.4.3. Modulation/Demodulation
- 5.9.5. FSK Modulation
  - 5.9.5.1. Characterization
  - 5.9.5.2. Parameters
  - 5.9.5.3. Modulation/Demodulation
- 5.9.6. Other Digital Modulations
- 5.9.7. Comparison between Digital Modulations

5.10. Digital Communication Comparison, IES, Diagram and Eyes
- 5.10.1. Comparison between Digital Modulations
  - 5.10.1.1. Energy and Power of the Modulations
  - 5.10.1.2. Envelope
  - 5.10.1.3. Noise Protection
  - 5.10.1.4. Spectral Model
  - 5.10.1.5. Channel Coding Techniques
  - 5.10.1.6. Synchronization Signals
  - 5.10.1.7. SER Symbol Error Rate

5.10.2. Bandwidth-Limited Channels
5.10.3. Inter Symbol Interference (IES)
5.10.3.1. Characterization
5.10.3.2. Limitations
5.10.4. Optimal Receiver in PAM Without IES
5.10.5. Eye Diagrams

Module 6. Transmission Systems. Optical Communication

6.1. Introduction to Transmission Systems
6.1.1. Basic Definitions and Transmission System Model
6.1.2. Description of Some Transmission Systems
6.1.3. Normalization within Transmission Systems
6.1.4. Units used in Transmission Systems, Logarithmic Representation
6.1.5. MDT Systems
6.2. Characterization of the Digital Signal
6.2.1. Characterization of Analog and Digital Sources
6.2.2. Digital Codification of Analog Signals
6.2.3. Digital Representation of Audio Signal
6.2.4. Representation of Video Signal
6.3. Transmission Media and Disturbance
6.3.1. Introduction and Characterization of Transmission Media
6.3.2. Metallic Transmission Lines
6.3.3. Fiber Optic Transmission Lines
6.3.4. Radio Transmission
6.3.5. Comparison of Transmission Media
6.3.6. Disturbances in Transmission
6.3.6.1. Attenuation
6.3.6.2. Distortion
6.3.6.3. Noise
6.3.6.4. Channel Capacity
6.4. Digital Transmission Systems
6.4.1. Digital Transmission Systems Model
6.4.2. Comparison between Analog and Digital Transmission
6.4.3. Fiber Optic Transmission System
6.4.4. Digital Radio Link
6.4.5. Other Systems
6.5. Optical Communication Systems. Basic Concepts and Optical Elements
6.5.1. Introduction to Optical Communication Systems
6.5.2. Fundamental Relationships about Light
6.5.3. Modulation Formats
6.5.4. Power and Time Balance
6.5.5. Multiplexing Techniques
6.5.6. Optical Networks
6.5.7. Non-Wavelength-Selective Passive Optical Elements
6.5.8. Wavelength-Selective Passive Optical Elements
6.6. Optical Fiber
6.6.1. Characteristic Parameters of Single-Mode and Multimode Fibers
6.6.2. Attenuation and Temporal Dispersion
6.6.3. Non-Lineal Effects
6.6.4. Regulations on Fiber Optics
6.7. Optical Transmitting and Receiving Devices
6.7.1. Basic Principles of Light Emission
6.7.2. Stimulated Emission
6.7.3. Fabry-Perot Resonator
6.7.4. Required Conditions for Achieving Laser Oscillation
6.7.5. Characteristics of Laser Radiation
6.7.6. Light Emission in Semiconductors
6.7.7. Semiconductor Lasers
6.7.8. Light-Emitting Diodes, LEDs
6.7.9. Comparison between LED and Semiconductor Laser
6.7.10. Light Detection Mechanisms in Semiconductor Junctions
6.7.11. PN photodiodes

6.7.12. PIN photodiodes
6.7.13. Avalanche Photodiodes or APDs
6.7.14. Basic Configuration of the Receptor Circuit
6.8. Transmission Media in Optical Communication
6.8.1. Refraction and Reflection
6.8.2. Propagation in a Confined Two-Dimensional Medium
6.8.3. Different Types of Optical Fibers
6.8.4. Physical Properties of Optical Fibers
6.8.5. Dispersion in Optical Fibers
6.8.5.1. Intermodal Dispersion
6.8.5.2. Phase Velocity and Group Velocity
6.8.5.3. Intermodal Dispersion
6.9. Multiplexing and Switching in Optical Networks
6.9.1. Multiplexing in Optical Networks
6.9.2. Photonic Switching
6.9.3. WDM Networks Basic Principles
6.9.4. Characteristic Components of a WDM System
6.9.5. Architecture and Functioning of WDM Networks
6.10. Passive Optical Networks (PON)
6.10.1. Coherent Optical Communication
6.10.2. Optical Time Division Multiplexing (OTDM)
6.10.3. Characteristic Elements of Passive Optical Networks
6.10.4. Architecture of PON Networks
6.10.5. Optical Multiplexing in PON Networks

Module 7. Switching Networks and Telecommunication Infrastructures

7.1. Introduction to Switch Networks
7.1.1. Switching Techniques
7.1.2. Local LAN Networks
7.1.3. Topology and Transmission Media Review
7.1.4. Basic Transfer Concepts
7.1.5. Methods of Accessing the Media
7.1.6. Network Interconnection Equipment
7.2. Switching Techniques and Switch Structure. ISDN and FR Networks
7.2.1. Switch Networks
7.2.2. Circuit-Switch Networks
7.2.3. ISDN
7.2.4. Packet-Switched Networks
7.2.5. FR
7.3. Traffic Parameters and Network Dimensioning
7.3.1. Fundamental Traffic Concepts
7.3.2. Loss Systems
7.3.3. Standby Systems
7.3.4. Traffic Modeling System Examples
7.4. Quality of Service and Traffic Management Algorithms
7.4.1. Quality of Service
7.4.2. Congestion Effects
7.4.3. Congestion Control
7.4.4. Traffic Control
7.4.5. Traffic Management Algorithms
7.5. Access Networks: WAN Access Technologies
7.5.1. Wide Area Networks
7.5.2. WAN Network Access Technologies
7.5.3. xDSL Access
7.5.4. FTTH
7.6. ATM: Asynchronous Transfer Mode
7.6.1. ATM Service
7.6.2. Protocol Architecture
7.6.3. Logical ATM Connections
7.6.4. ATM Cells
7.6.5. ATM Cell Transmission
7.6.6. Types of ATM Services

7.7. MPLS: Multi-protocol Label Switching
- 7.7.1. Introduction MPLS
- 7.7.2. MPLS Operations
- 7.7.3. Labels
- 7.7.4. VPN

7.8. Project for the Implementation of a Telematic Network
- 7.8.1. Obtaining Information
- 7.8.2. Planning
  - 7.8.2.1. System Dimensioning
  - 7.8.2.2. Installation Site Drawings and Schematics
- 7.8.3. Technical Design Specifications
- 7.8.4. Network Implementation and Deployment

7.9. Structured Cabling. Case Study
- 7.9.1. Introduction
- 7.9.2. Structured Cabling Organizations and Standards
- 7.9.3. Transmission of medium
- 7.9.4. Structured Cabling
- 7.9.5. Physical Interface
- 7.9.6. Parts of a Structured Cabling (Horizontal and Vertical)
- 7.9.7. Identification System
- 7.9.8. Case Study

7.10. Common Telecommunication Infrastructure Planning
- 7.10.1. Introduction ICT
  - 7.10.1.1. ICT Standards
- 7.10.2. Enclosures and Piping
  - 7.10.2.1. Exterior Area
  - 7.10.2.2. Common Area
  - 7.10.2.3. Private Zone
- 7.10.3. ICT Distribution Networks
- 7.10.4. Technical Projects

Module 8. Fundamentals of Mobile and Cell Network Communications

8.1. Introduction to Mobile Communication
- 8.1.1. General Considerations
- 8.1.2. Composition and Classification
- 8.1.3. Frequency Bands
- 8.1.4. Channel and Modulation Classes
- 8.1.5. Radio Coverage, Quality and Capacity
- 8.1.6. Evolution of Mobile Communications Systems

8.2. Fundamentals of the Radio Interface, Radiating Elements and Basic Parameters
- 8.2.1. The Physical Layer
- 8.2.2. Radio Interface Fundamentals
- 8.2.3. Noise in Mobile Systems
- 8.2.4. Multiple Access Techniques
- 8.2.5. Modulations Used in Mobile Communications
- 8.2.6. Wave Propagation Modes
  - 8.2.6.1. Surface Wave
  - 8.2.6.2. Ionosphere Wave
  - 8.2.6.3. Spatial Wave
  - 8.2.6.4. Ionospheric and Tropospheric Effects

8.3. Wave Propagation through Mobile Channels
- 8.3.1. Basic Characteristics of Propagation through Mobile Channels
- 8.3.2. Evolution of Basic Propagation Loss Prediction Models
- 8.3.3. Methods Based on Ray Theory
- 8.3.4. Empirical Methods of Propagation Prediction
- 8.3.5. Propagation Models for Microcells
- 8.3.6. Multipath Channels
- 8.3.7. Characteristics of Multipath Channels

8.4. SS7 Signaling System
- 8.4.1. Signalling Systems
- 8.4.2. SS7. SS7. Characteristics and Architecture
- 8.4.3. Message Transfer Part (MTP)
- 8.4.4. Signaling Control Part (SCCP)
- 8.4.5. User Parts (TUP, ISUP)
- 8.4.6. Application Parts (MAP, TCAP, INAP, etc.)

8.5. PMR and PAMR Systems. TETRA Systems
- 8.5.1. Basic Concepts of a PMR Network
- 8.5.2. Structure of a PMR Network
- 8.5.3. Backbone Systems. PAMR
- 8.5.4. TETRA Systems

8.6. Classic Cellular Systems (FDMA/TDM)
- 8.6.1. Fundamentals of Cellular Systems
- 8.6.2. Classic Cellular Concept
- 8.6.3. Cellular Planning
- 8.6.4. Geometry of Cellular Networks
- 8.6.5. Cellular Division
- 8.6.6. Dimensioning of a Cellular System
- 8.6.7. Calculation of Interference in Cellular Systems
- 8.6.8. Coverage and Interference in Real Cellular Systems
- 8.6.9. Frequency Assignment in Cellular Systems
- 8.6.10. Architecture of Cellular Networks

8.7. GSM System; *Global System for Mobile Communication*
- 8.7.1. Introduction to GSM. Origin and Evolution
- 8.7.2. GSM Telecommunication Services
- 8.7.3. Architecture of GSM Networks
- 8.7.4. GSM Radio Interface: Channels, TDMA Structure and Bursts
- 8.7.5. Modulation, Codification and Intertwined
- 8.7.6. Transmission Properties
- 8.7.7. Protocols

8.8. GPRS Service: General Packet Radio Service
- 8.8.1. Introduction to GPRS. Origin and Evolution
- 8.8.2. General Features of the GPRS
- 8.8.3. Architecture of GPRS Networks
- 8.8.4. GPRS Radio Interface: Channels, TDMA Structure and Bursts
- 8.8.5. Transmission Properties
- 8.8.6. Protocols

8.9. UMTS (W-CDMA) System
- 8.9.1. UMTS Origin. Characteristics of the 3rd Generation
- 8.9.2. Architecture of UMTS Networks
- 8.9.3. UMTS Radio Interface: Channels, Codes and Characteristics
- 8.9.4. Modulation, Codification and Intertwined
- 8.9.5. Transmission Properties
- 8.9.6. Protocols and Services
- 8.9.7. Capacity in UMTS
- 8.9.8. Planning and Radio Link Balance

8.10. Cellular Systems: 3G, 4G and 5G Evolution
- 8.10.1. Introduction
- 8.10.2. Evolution towards 3G
- 8.10.3. Evolution towards 4G
- 8.10.4. Evolution towards 5G

Module 9. Mobile Communications Networks

9.1. Introduction Mobile Communication Networks
- 9.1.1. Communication Networks
- 9.1.2. Communication Network Classification
- 9.1.3. Radioelectric Spectrum
- 9.1.4. Radio Telephone Systems
- 9.1.5. Cellular Technology
- 9.1.6. Evolution of Mobile Telephone Systems

9.2. Protocols and Architecture
- 9.2.1. Protocol Concept Review
- 9.2.2. Communication Architecture Concept Review
- 9.2.3. OSI Model Review
- 9.2.4. TCP/IP Protocol Architecture Review
- 9.2.5. Structure of a Mobile Telephony Network

9.3. Mobile Communication Principles
- 9.3.1. Radiation and Antenna Types
- 9.3.2. Frequency Reuse
- 9.3.3. Signal Propagation
- 9.3.4. Itinerancy and Transfer
- 9.3.5. Multiple Access Techniques
- 9.3.6. Analog and Digital Systems
- 9.3.7. Portability

9.4. GSM Network Review: Technical Characteristics, Architecture and Interfaces
- 9.4.1. GSM Systems
- 9.4.2. GSM Technical Characteristics
- 9.4.3. GSM Network Architecture
- 9.4.4. GSM Channel Structure
- 9.4.5. GSM Interfaces

9.5. GSM and GPRS Protocol Review
- 9.5.1. Introduction
- 9.5.2. GSM Protocols
- 9.5.3. GSM Evolution
- 9.5.4. GPRS

9.6. UMTS System. Technical Characteristics, Architecture and HSPA
- 9.6.1. Introduction
- 9.6.2. UMTS Systems
- 9.6.3. UMTS Technical Characteristics
- 9.6.4. UMTS Network Architecture
- 9.6.5. HSPA

9.7. UMTS System. Protocols, Interfaces and VoIP
- 9.7.1. Introduction
- 9.7.2. UMTS Channel Structure
- 9.7.3. UMTS Protocols
- 9.7.4. UMTS Interfaces
- 9.7.5. VoIP and IMS

9.8. VoIP: Traffic Models for IP Telephony
- 9.8.1. VoIP Introduction
- 9.8.2. Protocols
- 9.8.3. VoIP Elements
- 9.8.4. Real-Time VoIP Transport
- 9.8.5. Packaged Voice Traffic Models

9.9. LTE System. Technical Characteristics and Architecture. CS Fallback
- 9.9.1. LTE Systems
- 9.9.2. LTE Technical Characteristics
- 9.9.3. LTE Network Architecture
- 9.9.4. LTE Channel Structure
- 9.9.5. LTE Calls: VoLGA, CS FB and VoLTE

9.10. LTE Systems: Interfaces, Protocols and Services
- 9.10.1. Introduction
- 9.10.2. LTE Interfaces
- 9.10.3. LTE Protocols
- 9.10.4. LTE Services

Module 10. Radio Networks and Services

10.1. Basic Techniques in Radio Networks
- 10.1.1. Introduction to Radio Networks
- 10.1.2. Basic Fundamentals
- 10.1.3. Multiple Access Techniques (MAC): Random Access (RA). MF-TDMA, CDMA and OFDMA
- 10.1.4. Optimization of the Radio Link: Fundamentals of Link Control Techniques (LCT) HARQ. MIMO

10.2. Radioelectric Spectrum
- 10.2.1. Definition
- 10.2.2. Nomenclature of Frequency Bands According to ITU-R
- 10.2.3. Other Frequency Band Nomenclature
- 10.2.4. Radio Spectrum Division
- 10.2.5. Types of Electromagnetic Radiation

10.3. Radio Communication Systems and Services
- 10.3.1. Conversion and Treatment of Signals: Analog and Digital Modulations
- 10.3.2. Digital Signal Transmission
- 10.3.3. Digital Radio System DAB, IBOC, DRM and DRM+
- 10.3.4. Radio-frequency Communication Networks
- 10.3.5. Configuration of Fixed Installations and Mobile Units
- 10.3.6. Structure of a Fixed and Mobile Radio-frequency Transmitting Center
- 10.3.7. Installation of Radio and Television Signal Transmission Systems
- 10.3.8. Verification of the Operation of Broadcasting and Transmission Systems
- 10.3.9. Maintenance of Transmission Systems

10.4. *Multicast* and QoS. End to end
- 10.4.1. Introduction
- 10.4.2. *Multicast* IP in Radio Networks
- 10.4.3. Delay/Disruption Tolerant Networking (DTN)
- 10.4.4. E-to-E Service Quality:
  - 10.4.4.1. Impact of Radio Networks on E-to-E QoS
  - 10.4.4.2. TCP in Radio Networks

10.5. Local WLAN Wireless Networks
- 10.5.1. Introduction to WLANs
  - .10.5.1.1. Principles of WLANs
    - 10.5.1.1.1. How Do They Work?
    - 10.5.1.1.2. Frequency Bands
    - 10.5.1.1.3. Security/Safety

10.5.1.2. Applications
10.5.1.3. Comparison between WLAN and Cabled LAN
10.5.1.4. Health Effects of Radiation
10.5.1.5. Standardization and Normalization of WLAN Technology
10.5.1.6. Topology and Configurations
10.5.1.6.1. Peer-to-Peer (Ad-Hoc) Configuration
10.5.1.6.2. Configuration in Access Point Mode
10.5.1.6.3. Other Configurations: Network Interconnections
10.5.2. IEEE 802.11 Standard - Wi-Fi
10.5.2.1. Architecture
10.5.2.2. IEEE 802.11 Layers
10.5.2.2.2. Layers The Physical Layer
10.5.2.2.2. The Link (MAC) Layer
10.5.2.3. Basic WLAN Operation
10.5.2.4. Radio Spectrum Allocation
10.5.2.5. IEEE 802.11 Variants
10.5.3. The HiperLAN standard
10.5.3.1. Reference Model
10.5.3.2. HiperLAN/1
10.5.3.3. HiperLAN/2
10.5.3.4. Comparison of HiperLAN with 802.11a
10.6. Wireless Metropolitan Area Networks (WMAN) and Wireless Wide Area Networks (WWAN)
10.6.1. Introduction to WMAN. Features
10.6.2. WiMAX. Characteristics and Diagram
10.6.3. Wireless Wide Area Networks (WWAN). Introduction
10.6.4. Satellite and Mobile Telephony Network
10.7. Personal WPAN Wireless Networks
10.7.1. Technology and Evolution
10.7.2. Bluetooth
10.7.3. Personal and Sensor Networks
10.7.4. Profiles and Applications
10.8. Terrestrial Radio Access Networks
10.8.1. Evolution of Terrestrial Radio Access: WiMAX, 3GPP
10.8.2. 4th Generation Accesses Introduction
10.8.3. Radio Resources and Capacity
10.8.4. LTE Radio Carriers. MAC, RLC and RRC
10.9. Satellite Communications
10.9.1. Introduction
10.9.2. History of Satellite Communications
10.9.3. Structure of a Satellite Communication System
10.9.3.1. The Special Segment
10.9.3.2. The Control Center
10.9.3.3. The Ground Segment
10.9.4. Types of Satellite
10.9.4.1. By Purpose
10.9.4.2. By Orbit
10.9.5. Frequency Bands
10.10. Planning and Regulations of Radio Systems and Services
10.10.1. Terminology and Technical Characteristics
10.10.2. Frequencies
10.10.3. Coordination, Notification and Registration of Frequency Assignments and Plan Modifications
10.10.4. Interference
10.10.5. Administrative Provisions
10.10.6. Provisions Relating to Services and Stations

A complete journey that will allow you to grow in your intervention capacity, with the confidence of a study in which theoretical growth is combined with the contextual experience of what you have learned"

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 has been the most widely used learning system among the world's leading Information Technology schools for as long as they have existed. 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 course, students 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

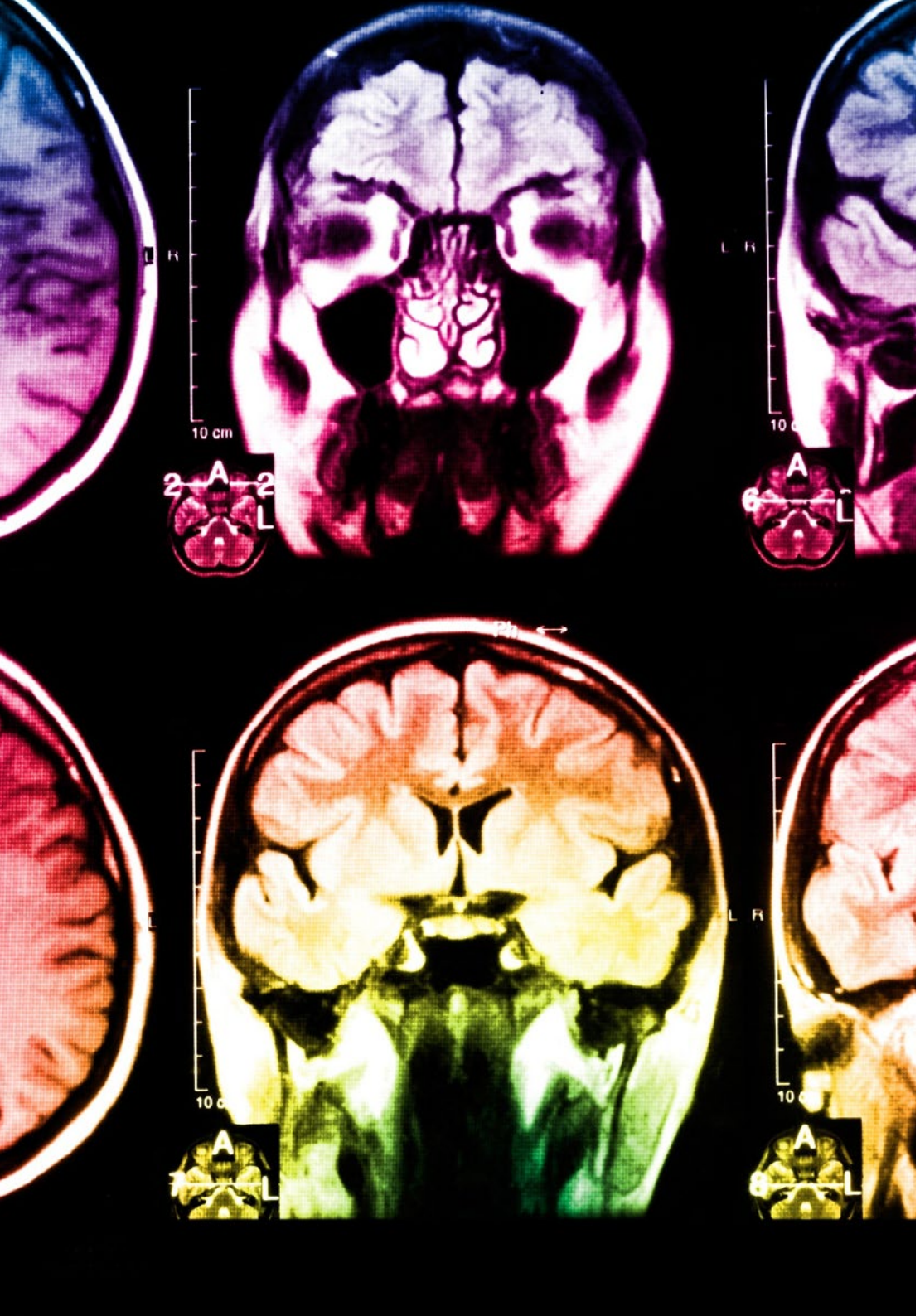
TECH effectively combines the Case Study methodology with a 100% online learning system based on repetition, which combines different teaching elements in each lesson.

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.

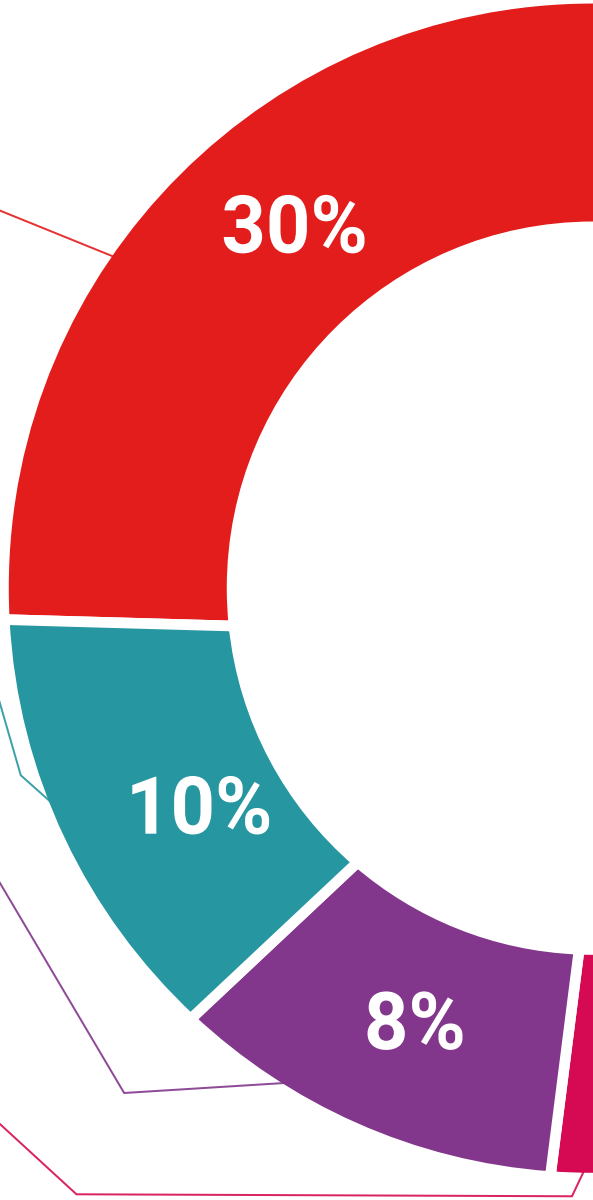
Learning from an Expert strengthens knowledge and memory, and generates confidence in future difficult decisions.

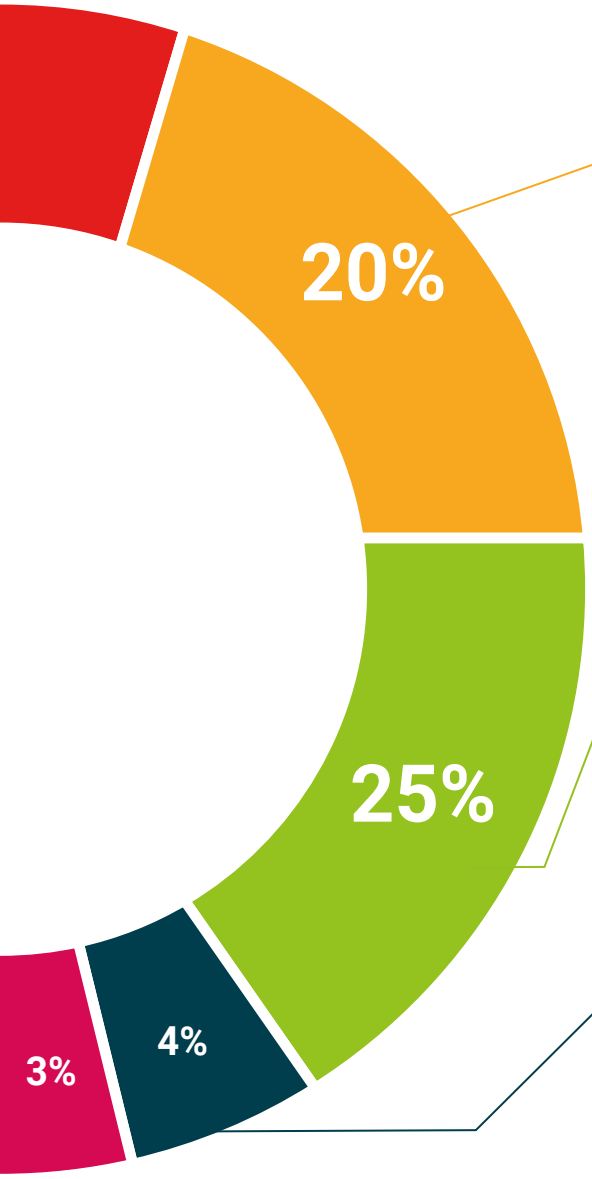
Practising Skills and Abilities

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 Professional Master's Degree in Specific Telecommunications Technology guarantees students, in addition to the most rigorous and up-to-date education, access to a Professional Master's Degree 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 **Professional Master's Degree in Specific Telecommunication Technology** contains the most complete and up-to-date program on the market.

After the student has passed the assessments, they will receive their corresponding **Professional Master's Degree** issued by **TECH Technological University** via tracked delivery*.

The certificate issued by **TECH Technological University** will reflect the qualification obtained in the Professional Master's Degree, aand meets the requirements commonly demanded by labor exchanges, competitive examinations, and professional career evaluation committees.

Title: **Professional Master's Degree in Specific Telecommunication Technology**

Official Nº of hours: **1,500 h.**

tech technological university

Awards the following

CERTIFICATE

to

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

For having successfully passed and accredited the following program

PROFESSIONAL MASTER'S DEGREE

in

Specific Telecommunication Technology

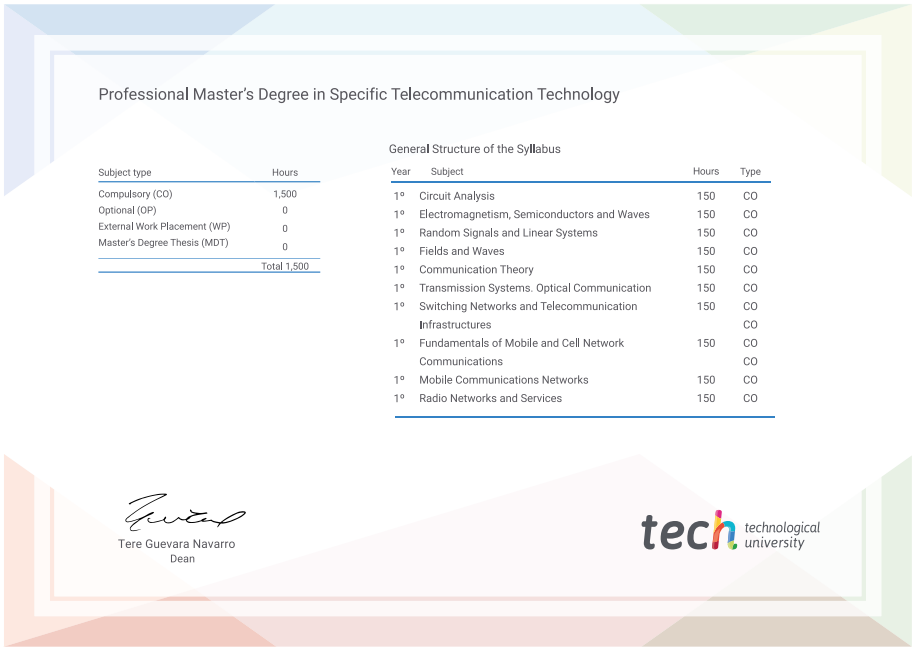
This is a qualification awarded by this University, equivalent to 1,500 hours, with a start date of dd/mm/yyyy and an end date of dd/mm/yyyy.

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

Unique TECH Code: AFWORD23S techhitute.com/certificates


Professional Master's Degree in Specific Telecommunication Technology

Subject type	Hours
Compulsory (CO)	1,500
Optional (OP)	0
External Work Placement (WP)	0
Master's Degree Thesis (MDT)	0
	Total 1,500

General Structure of the Syllabus

Year	Subject	Hours	Type
1º	Circuit Analysis	150	CO
1º	Electromagnetism, Semiconductors and Waves	150	CO
1º	Random Signals and Linear Systems	150	CO
1º	Fields and Waves	150	CO
1º	Communication Theory	150	CO
1º	Transmission Systems. Optical Communication	150	CO
1º	Switching Networks and Telecommunication Infrastructures	150	CO
1º	Fundamentals of Mobile and Cell Network Communications	150	CO
1º	Mobile Communications Networks	150	CO
1º	Radio Networks and Services	150	CO

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*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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Professional Master's Degree
Specific Telecommunication Technology

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

Professional Master's Degree

Specific Telecommunication Technology

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