Professional Master's Degree
Communication Theory

tech technological university

Professional Master's Degree
Communication Theory

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

Website: www.techtitute.com/us/information-technology/professional-master-degree/master-communication-theory

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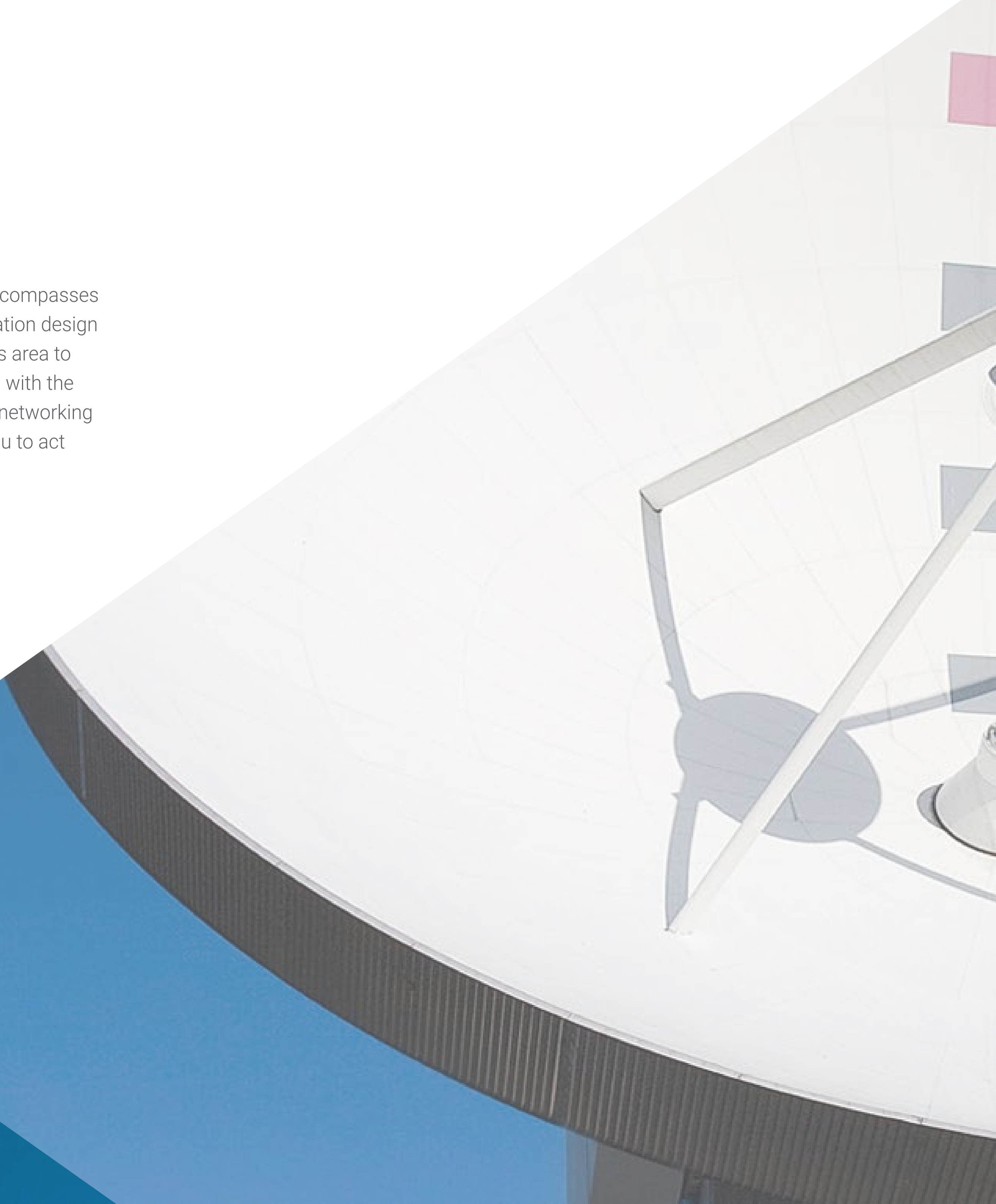
01 Introduction

The intervention of computer scientists in the Communication Theory encompasses signal detection, process prediction and filtering, and system communication design and analysis. A constantly evolving field that requires professionals in this area to permanently update their knowledge. In this program, we will provide you with the skills you need in these aspects, including protocols for communication, networking and statistical image processes. A high intensity course that will allow you to act effectively and successfully with the skills of a specialist.



All the development processes that Communication Theory develops in the field of Computer Science, compiled in a high quality program"

Advances in telecommunications are constantly occurring, implying, for the professionals involved in this field, the arrival of new developments and updates that modify or complement the way of working. It is therefore necessary to have IT experts who can adapt to these changes and who have first-hand knowledge of the new tools and techniques that are emerging in this field.

The Professional Master's Degree in Communication Theory covers all the topics that are involved in this field. Studying this program has a clear advantage over other masters that focus on specific blocks, which prevents the student from knowing the interrelation with other areas included in the multidisciplinary field of telecommunications. In addition, the teaching team in this program has carefully selected each of the topics to offer the student the most complete study opportunity possible, always in relation to current events.

This program is aimed at those interested in attaining a higher level of knowledge in Communication Theory. The main objective is to enable students to apply the knowledge acquired in this program in the real world, in a work environment that reproduces the conditions they may encounter in their future, in a rigorous and realistic manner.

Additionally, as it is a 100% online program, the student is not constrained by fixed timetables or the need to move to another physical location, but can access the contents at any time of the day, balancing their professional or personal life with their academic life.

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

- The development of case studies presented by experts in Communication Theory
- The graphic, schematic, and practical contents with which they are created, provide scientific and practical information on the disciplines that are essential for professional development
- Practical exercises where self assessment can be used to improve learning
- Special emphasis on innovative methodologies in Communication Theory
- 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

"With a study system oriented to contextual learning, this learning process will allow you to acquire the theoretical knowledge and practical skills you need"

With the most recognized learning support systems on the teaching scene, this program will allow you to learn at your own rhythm, without losing educational efficacy"

You will learn not only the fundamental theory of each area of study, but also its practical application through an immersive study supported by the best audiovisual technology.

With the comfort and assurance of the most complete and advanced online system in the educational market.

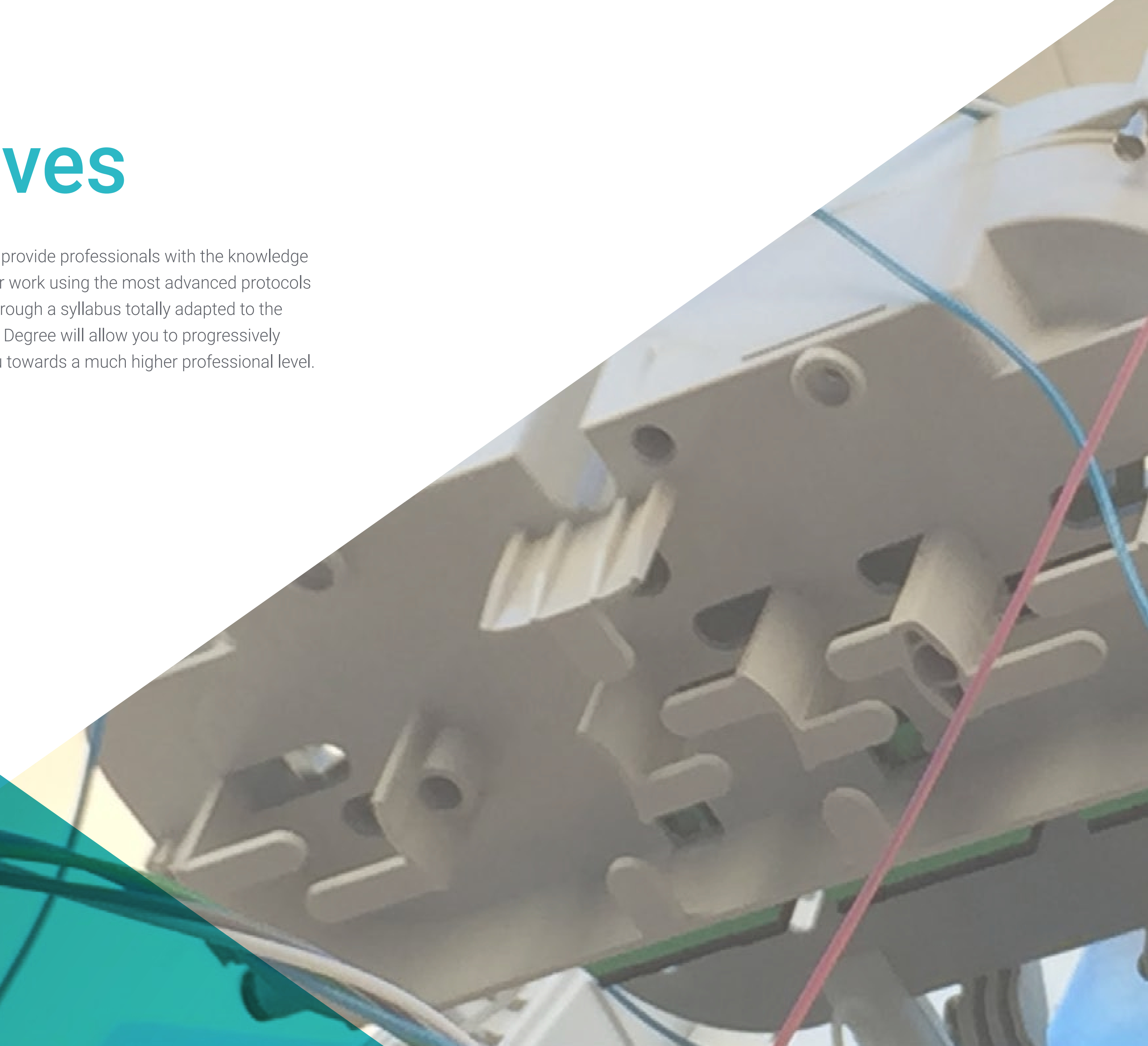
The teaching staff includes professionals from the IT sector, who contribute the experience of their work to this program, as well as renowned specialists from leading societies and prestigious universities.

Thanks to multimedia content developed with the latest educational technology, you will be immersed in situated and contextual learning. In other words, a simulated environment that will provide immersive learning, programmed to prepare for real situations.

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

02
Objectives

The objective of this program is to provide professionals with the knowledge and skills required to carry out their work using the most advanced protocols and techniques of the moment. Through a syllabus totally adapted to the student, this Professional Master's Degree will allow you to progressively acquire the skills that will carry you towards a much higher professional level.



Reach your professional goals steadily and progressively with the confidence of knowing that you are in the best place to achieve them"

General Objective

- Prepare the student to be capable of assessing the advantages and disadvantages of different technological alternatives that can be applies in the field of telecommunications

> *Achieve the level of knowledge you desire and master Communication Theory with this highly skilled program"*

Specific Objectives

Module 1. Electromagnetism, Semiconductors and Waves
- Apply mathematical principles in field physics
- Master the concepts and fundamental law of the fields: electrostatic, magnetostatic and electromagnetic
- Understand the basics of semiconductors
- Know the theory of transistors and know how to differentiate between the two main families
- Know the equations of electrical current equations
- Gain problem-solving skills specific to engineering, related to the laws of electromagnetism

Module 2. Random Signals and Lineal 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 Time Invariant Systems (LTI Systems) to model, analyze and predict processes

Module 3. Statistics and Probability

- Master the main concepts of probability and statistics
- Gain knowledge and understanding of the fundamentals of Probability Calculus, especially random and probabilistic terms
- Gain knowledge of the basic concepts underlying Statistical Inference techniques
- Solve problems and analyze data using the appropriate statistics technique
- Visualize and interpret the results obtained through statistical methods
- Use statistical methods in practical situations

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

Module 6. Transmission Systems Optical Communication

- Know the characteristics of transmission system elements
- Acquire the ability 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 ability 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) networks

Module 7. Communication Theory

- Definition of the basic concepts of communication theory
- Analyze the processes of file transmission of information over discrete channels
- Understand in depth the method of reliable transmission over noisy channels
- Master the techniques for the detection and correction of transmission errors
- Assimilate the basic characteristics of retransmission protocols
- Know the techniques of text, image, sound and video compression

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. Digital Signal Processing

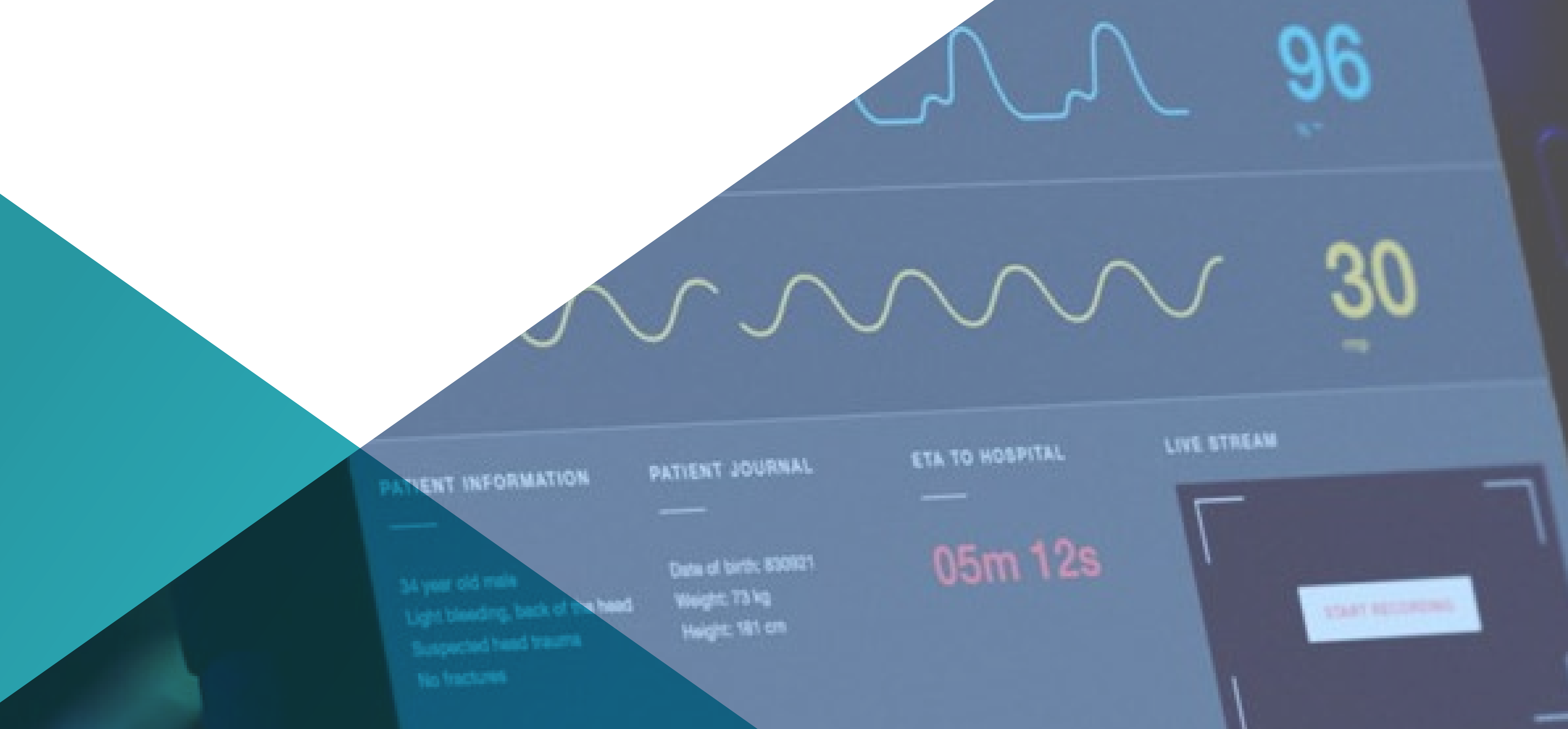
- Know the basic concepts of signals and discrete time systems
- Understand linear systems and related functions and transforms
- Master numerical signal processing and continuous signal sampling
- Understand and know how to implement rational discrete systems
- Be able to analyze transformed domains, especially spectral analysis
- Master analog-to-digital and digital-to-analog signal processing technologies

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 that are best suited to the connectivity provided by radio networks Understand the impact of radio networks on end-to-end quality of service and know the existing mechanisms to mitigate them
- Master WLAN, WPAN, WMAN wireless networks
- Analyze the different architectures of satellite networks and know the different services supported by a satellite network

03
Skills

After passing the evaluations of the Professional Master's Degree in Communication Theory, the professional will have acquired the skills required to intervene in all its aspects, by mastering the specific tools of this field, backed by the solvency of a complete and quality program.



Take a quality step forward in your professional expertise by adding to your competences the mastery of the different fields of this specialty"

General Skill

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

Study at the one of the world's leading private online universities"

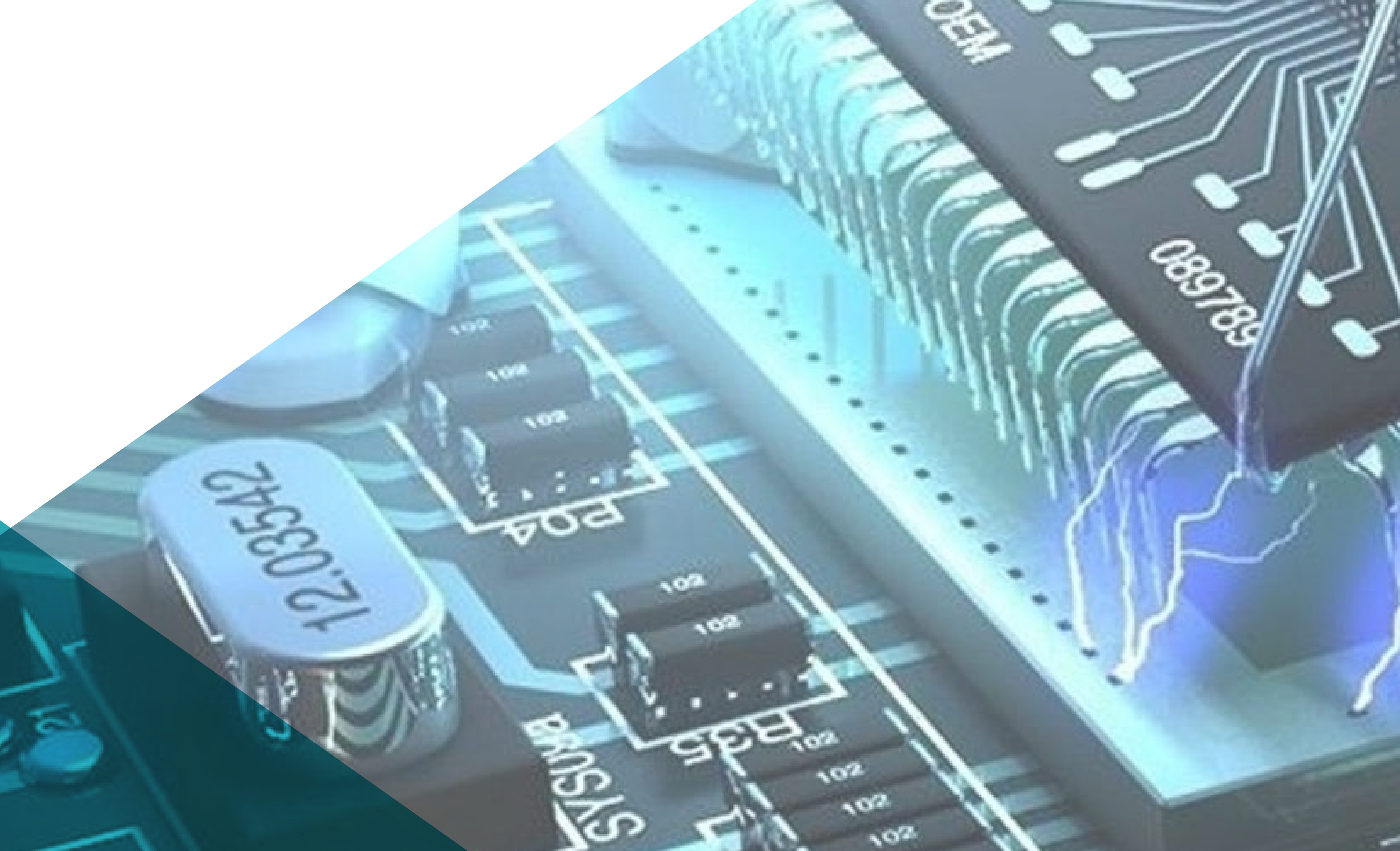
Specific Skills

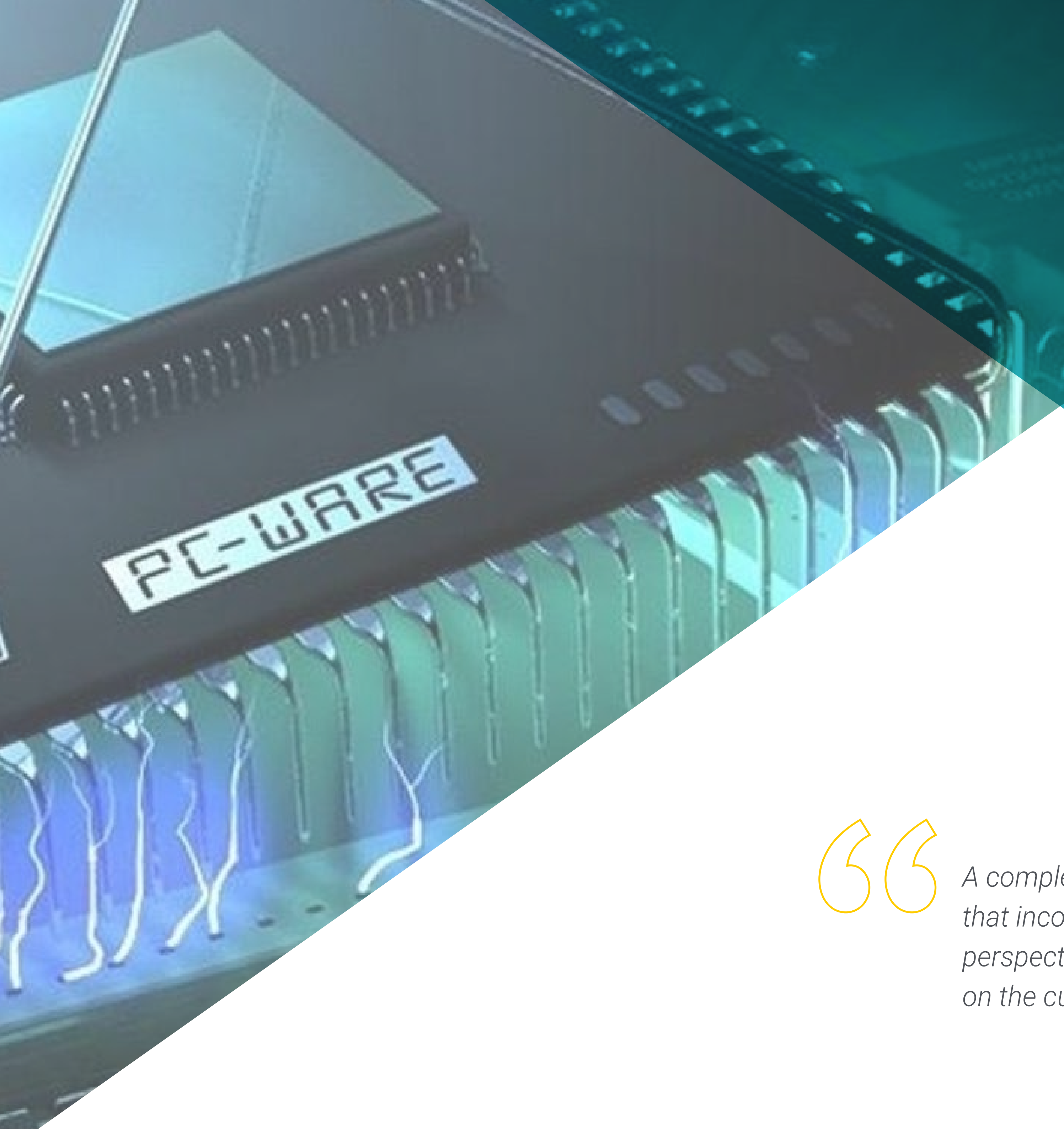
- Solve engineering problems related to electromagnetism, semiconductors and waves
- Know the random signals and lineal systems and master them in depth
- Master statistics and probability to apply them in telecommunications
- Analyze the mechanisms of wave propagation
- Know the different types of signals, as well as analog and digital communications
- Identify the main problems that affect signal transmission and solve them
- Know the information transmission process
- Know in depth the mobile communications and cellular networks
- Master analog to digital signal processing and vice versa
- Master radio services and wireless networks WLAN, WPAN, WMAN

04

Structure and Content

The syllabus has been designed on the basis of educational effectiveness, carefully selecting the contents to offer a complete course, which includes all the fields of study essential to achieve true knowledge of the subject. With the most innovative aspects and developments in the field.





A complete and up to date syllabus that incorporates the most interesting perspectives and up to date information on the current landscape within this field”

Module 1. Electromagnetism, Semiconductors and Waves

1.1. Mathematics for Field Physics
- 1.1.1. Vectors and Orthogonal Coordinate Systems
- 1.1.2. Gradient of a Scalar Field
- 1.1.3. Divergence of a Vector Field and Divergence Theorem
- 1.1.4. Rotation of a Vector Field and Stokes' Theorem
- 1.1.5. Classification of Fields: Helmholtz Theorem

1.2. Electrostatic Field I
- 1.2.1. Fundamental Postulates
- 1.2.2. Coulomb's Law and Fields Generated by Charge Distributions
- 1.2.3. Gauss' Law
- 1.2.4. Electrostatic Potential

1.3. Electrostatic Field II
- 1.3.1. Material Media: Metals and Dielectrics
- 1.3.2. Boundary Conditions
- 1.3.3. Capacitors
- 1.3.4. Electrostatic Forces and Energy
- 1.3.5. Problem-Solving with Boundary Values

1.4. Stationary Electric Currents
- 1.4.1. Current Density and Ohm's Law
- 1.4.2. Load and Current Continuity
- 1.4.3. Current Equations
- 1.4.4. Resistance Calculations

1.5. Magnetostatic Field I
- 1.5.1. Fundamental Postulates
- 1.5.2. Vector Potential
- 1.5.3. BiotSavart's Law
- 1.5.4. The Magnetic Dipole

1.6. Magnetostatic Field II
- 1.6.1. Magnetic Field in Material Resources
- 1.6.2. Boundary Conditions
- 1.6.3. Induction
- 1.6.4. Forces and Energy

1.7. Electromagnetic Fields
- 1.7.1. Introduction
- 1.7.2. Electromagnetic Fields
- 1.7.3. Maxwell's Laws of Electromagnetism
- 1.7.4. Electromagnetic Waves

1.8. Semiconductor Materials
- 1.8.1. Introduction
- 1.8.2. Difference between Metals, Insulators and Semiconductors
- 1.8.3. Current Carriers
- 1.8.4. Calculation of Carrier Densities

1.9. Semiconductor Diode
- 1.9.1. The PN Junction
- 1.9.2. Derivation of the Diode Equation
- 1.9.3. The Diode in Large Signal: Circuits
- 1.9.4. The Diode in Small Signal: Circuits

1.10. Transistors
- 1.10.1. Definition
- 1.10.2. Characteristic Curves of the Transistor
- 1.10.3. Bipolar Junction Transistor
- 1.10.4. Field Effect Transistors

Module 2. Random Signals and Lineal Systems

- 2.1. Probability Theory
  - 2.1.1. Concept of Probability. Probability Space
  - 2.1.2. Conditional Probability and Independent Events
  - 2.1.3. Total Probability Theorem. Bayes' Theorem
  - 2.1.4. Compound Experiments. Bernoulli Tests
- 2.2. Random Variables
  - 2.2.1. Random Variable Definition
  - 2.2.2. Probability Distributions
  - 2.2.3. Main Distributions
  - 2.2.4. Functions of Random Variables
  - 2.2.5. Moments of Random Variable
  - 2.2.6. Generator Functions
- 2.3. Random Vectors
  - 2.3.1. Random Vector Definition
  - 2.3.2. Joint Distribution
  - 2.3.3. Marginal Distributions
  - 2.3.4. Conditional Distributions
  - 2.3.5. Linear Correlation Between Two Variables
  - 2.3.6. Normal Multivariant Distribution
- 2.4. Random Processes
  - 2.4.1. Definition and Description of Random Processes
  - 2.4.2. Random Processes in Discrete Time
  - 2.4.3. Random Processes in Continuous Time
  - 2.4.4. Stationary Processes
  - 2.4.5. Gaussian Processes
  - 2.4.6. Markovian Processes
- 2.5. Queuing Theory in Telecommunications
  - 2.5.1. Introduction
  - 2.5.2. Basic Concepts
  - 2.5.3. Model Description
  - 2.5.4. Example of the Application of Queuing Theory in Telecommunications
- 2.6. Random Processes. Temporal Characteristics
  - 2.6.1. Concept of Random Processes
  - 2.6.2. Processes Qualification
  - 2.6.3. Main Statistics
  - 2.6.4. Stationarity and Independence
  - 2.6.5. Temporary Averages
  - 2.6.6. Ergodicity
- 2.7. Random Processes. Spectral Characteristics
  - 2.7.1. Introduction
  - 2.7.2. Power Density Spectrum
  - 2.7.3. Properties of the Power Spectral Density
  - 2.7.4. Relationship between the Power Spectrum and Autocorrelation
- 2.8. Signals and Systems. Properties
  - 2.8.1. Introduction to Signals
  - 2.8.2. Introduction to Systems
  - 2.8.3. Basic Properties of Systems
    - 2.8.3.1. Linearity
    - 2.8.3.2. Time Invariance
    - 2.8.3.3. Causality
    - 2.8.3.4. Stability
    - 2.8.3.5. Memory
    - 2.8.3.6. Invertibility
- 2.9. Lineal Systems with Random Inputs
  - 2.9.1. Fundamentals of Lineal Systems
  - 2.9.2. Response to Lineal Systems and Random Signals
  - 2.9.3. Systems with Random Noise
  - 2.9.4. Spectral Characteristics of the System Response
  - 2.9.5. Equivalent Noise Bandwidth and Temperature
  - 2.9.6. Noise Source Model
- 2.10. LTI Systems
  - 2.10.1. Introduction
  - 2.10.2. Discrete-Time LTI Systems
  - 2.10.3. Continuous-Time LTI Systems
  - 2.10.4. Properties of LTI Systems
  - 2.10.5. Systems Described by Differential Equations

Module 3. Statistics and Probability

3.1. Introduction to Data Analysis
- 3.1.1. Introduction
- 3.1.2. Variables and Data: Types of Data
- 3.1.3. Describing Data with Tables
- 3.1.4. Describing Data with Graphs
- 3.1.5. Introduction to Exploratory Data Analysis

3.2. Characteristic Measures in Frequency Distribution
- 3.2.1. Introduction
- 3.2.2. Position Measurements
- 3.2.3. Dispersion Measurements
- 3.2.4. Shape Measurements
- 3.2.5. Relation Measurements

3.3. Probability Calculation
- 3.3.1. Introduction
- 3.3.2. Interpreting Probability
- 3.3.3. Axiomatic Definition of Probability
- 3.3.4. Quantifying Probability
- 3.3.5. Conditional Probability
- 3.3.6. Theorem of Compound Probability
- 3.3.7. Event Independence
- 3.3.8. Theorem of Total Probability
- 3.3.9. Bayes' Theorem
- 3.3.10. Annex: Counting Methods to Determine Probability

3.4. Random Variables
- 3.4.1. Random Variable: Concept
- 3.4.2. Types of Random Variables
- 3.4.3. Probability Distributions of Random Variables
- 3.4.4. Characteristic Measures of Random Variables
- 3.4.5. Chebychev's Inequality

3.5. Discrete and Continuous Random Variables
- 3.5.1. Discrete Uniform Distribution on N Points
- 3.5.2. Bernoulli's Distribution
- 3.5.3. Binomial Distribution
- 3.5.4. Geometric Distribution
- 3.5.5. Negative Binomial Distribution
- 3.5.6. Poisson Distribution
- 3.5.7. Uniform Distribution
- 3.5.8. Normal or Gaussian Distribution
- 3.5.9. Gamma Distribution
- 3.5.10. Beta Distribution

3.6. Multidimensional Random Variables
- 3.6.1. Bidimensional Random Variables: Joint Distribution
- 3.6.2. Marginal Distributions
- 3.6.3. Conditional Distributions
- 3.6.4. Independence
- 3.6.5. Moments
- 3.6.6. Bayes' Theorem
- 3.6.7. Bivariant Normal Distribution

3.7. Introduction to Inference Statistics
- 3.7.1. Introduction
- 3.7.2. Sampling
- 3.7.3. Types of Sampling
- 3.7.4. Simple Random Sample
- 3.7.5. Sample Mean: Properties
- 3.7.6. Large Number Laws
- 3.7.7. Asymptotic Distribution of the Sample Mean
- 3.7.8. Distributions Associated with Normal Distribution

3.8. Estimate
- 3.8.1. Introduction
- 3.8.2. Statistics and Estimators
- 3.8.3. Properties of Estimators
- 3.8.4. Estimation Methods
- 3.8.5. Estimators in Normal Distribution: Fisher's Theorem
- 3.8.6. Confidence Intervals Pivot Variable Method
- 3.8.7. Confidence Intervals in Normal Populations
- 3.8.8. Asymptotic Confidence Intervals: Confidence Intervals for Proportions

3.9. Hypothesis Testing
- 3.9.1. Initial Motivation Example
- 3.9.2. Basic Concepts
- 3.9.3. Rejection Region
- 3.9.4. Hypothesis Testing for Normal Distribution Parameters
- 3.9.5. Proportion Testing
- 3.9.6. Relationship between Confidence Intervals and Hypothesis Testing Parameters
- 3.9.7. Non-Parametric Hypothesis Testing

3.10. Linear Regression Models
- 3.10.1. Introduction
- 3.10.2. Simple Linear Regression Models Hypothesis
- 3.10.3. Methodology
- 3.10.4. Parameter Estimation
- 3.10.5. Parameter Inferences
- 3.10.6. Regression Testing: ANOVA Table
- 3.10.7. Residual Hypothesis Testing
- 3.10.8. Determination Coefficient and Linear Correlation Coefficient
- 3.10.9. Predictions
- 3.10.10. Introduction to the Multiple Linear Regression Model

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. Rotational 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. General 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 Eq.
- 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 Lines
- 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 Lines
- 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 Matching
- 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. The Smith Chart
  - 4.9.2.1. Definition of the Smith Chart
  - 4.9.2.2. Simple Calculations
  - 4.9.2.3. Smith's Letter 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 vs. 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. Average 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 the Transmission Systems
- 5.3.1. Ideal Channel Transmission
- 5.3.2. Classification of Disturbances
- 5.3.3. Lineal Distortion
- 5.3.4. Non-Lineal 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 Pass 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. Types 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 Sideband Modulation (VSB)
  - 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
- 5.6.6. Noise in PM
- 5.6.7. Noise in FM
- 5.6.8. 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. Binary Receptor per Basic Sample
  - 5.8.2.1. Bipolar NRZ
  - 5.8.2.2. Bipolar RZ
  - 5.8.2.3. Error Rate
- 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 Receptor
  - 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 Receptors

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, IS, Diagram and Eyes

5.10.1. Comparison between Digital Modulations
- 5.10.1.1. Modulation Energy and Power
- 5.10.1.2. Enveloping
- 5.10.1.3. Protection Against Noise
- 5.10.1.4. Spectral Model
- 5.10.1.5. Channel Codification Techniques
- 5.10.1.6. Synchronization Signals
- 5.10.1.7. SER Symbol Error Rate

5.10.2. Limited Bandwidth Channels

5.10.3. Interference between Symbols (IS)
- 5.10.3.1. Characterization
- 5.10.3.2. Limitations

5.10.4. Optimal Receptor in PAM without IS

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 the Audio Signal
- 6.2.4. Representation of the Video Signal

6.3. Transmission Media and Disturbances
- 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. Fiber Optics
- 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. P-N Photodiodes
- 6.7.12. PIN Photodiode
- 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 Speed and Group Phase
  - 6.8.5.3. Intramodal 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. Communication Theory

7.1. Introduction: Telecommunication Systems and Transmission Systems
- 7.1.1. Introduction
- 7.1.2. Basic Concepts and History
- 7.1.3. Telecommunication Systems
- 7.1.4. Transmission Systems

7.2. Signal Characterization
- 7.2.1. Deterministic vs. Random Signals
- 7.2.2. Periodic and Non-Periodic Signals
- 7.2.3. Energy and Power Signals

7.2.4. Baseband and Bandpass Signals
7.2.5. Basic Parameters of a Signals
7.2.5.1. Average Value
7.2.5.2. Average Energy and Power
7.2.5.3. Maximum Value and Effective Value
7.2.5.4. Energy and Power Spectral Density
7.2.5.5. Power Calculation in Logarithmic Units
7.3. Disturbances in the Transmission Systems
7.3.1. Ideal Channel Transmission
7.3.2. Classification of Disturbances
7.3.3. Lineal Distortion
7.3.4. Non-Lineal Distortion
7.3.5. Crosstalk and Interference
7.3.6. Noise
7.3.6.1. Types of Noise
7.3.6.2. Characterization
7.3.7. Narrow Band Pass Signals
7.4. Analog Communications. Concepts
7.4.1. Introduction
7.4.2. General Concepts
7.4.3. Baseband Transmission
7.4.3.1. Modulation and Demodulation
7.4.3.2. Characterization
7.4.3.3. Multiplexing
7.4.4. Mixers
7.4.5. Characterization
7.4.6. Types of Mixers
7.5. Analog Communications. Lineal Modulations
7.5.1. Basic Concepts
7.5.2. Amplitude Modulation (AM)
7.5.2.1. Characterization
7.5.2.2. Parameters
7.5.2.3. Modulation/Demodulation
7.5.3. Double Side Band (DSB) Modulation
7.5.3.1. Characterization
7.5.3.2. Parameters
7.5.3.3. Modulation/Demodulation
7.5.4. Single Side Band (SSB) Modulation
7.5.4.1. Characterization
7.5.4.2. Parameters
7.5.4.3. Modulation/Demodulation
7.5.5. Vestigial Sideband Modulation (VSB)
7.5.5.1. Characterization
7.5.5.2. Parameters
7.5.5.3. Modulation/Demodulation
7.5.6. Quadrature Amplitude Modulation (QAM)
7.5.6.1. Characterization
7.5.6.2. Parameters
7.5.6.3. Modulation/Demodulation
7.5.7. Noise in Analog Modulations
7.5.7.1. Approach
7.5.7.2. Noise in DBL
7.5.7.3. Noise in BLU
7.5.7.4. Noise in AM
7.6. Analog Communications. Angular Modulations
7.6.1. Phase and Frequency Modulation
7.6.2. Narrow Band Angular Modulation
7.6.3. Spectrum Calculation
7.6.4. Generation and Demodulation
7.6.5. Angular Demodulation with Noise
7.6.6. Noise in PM
7.6.7. Noise in FM
7.6.8. Comparison between Analog Modulations

7.7. Digital Communication. Introduction. Transmission Models
- 7.7.1. Introduction
- 7.7.2. Fundamental Parameters
- 7.7.3. Advantages of Digital Systems
- 7.7.4. Limitations of Digital Systems
- 7.7.5. PCM Systems
- 7.7.6. Modulations in Digital Systems
- 7.7.7. Demodulations in Digital Systems

7.8. Digital Communication. Digital Base Band Transmission
- 7.8.1. PAM Binary Systems
  - 7.8.1.1. Characterization
  - 7.8.1.2. Signal Parameters
  - 7.8.1.3. Spectral Model
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  - 7.8.2.3. Error Rate
- 7.8.3. Optimal Binary Receptor
  - 7.8.3.1. Context
  - 7.8.3.2. Error Rate Calculation
  - 7.8.3.3. Optimal Receptor Filter Design
  - 7.8.3.4. SNR Calculation
  - 7.8.3.5. Loans
  - 7.8.3.6. Characterization
- 7.8.4. M-PAM Systems
  - 7.8.4.1. Parameters
  - 7.8.4.2. Constellations
  - 7.8.4.3. Optimal Receptor
  - 7.8.4.4. Bit Error Ratio (BER)
- 7.8.5. Signal Vectorial Space
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- 7.8.7. M-Signal Receptors

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  - 7.9.2.1. Characterization
  - 7.9.2.2. Parameters
  - 7.9.2.3. Modulation/Demodulation
- 7.9.3. QAM Modulation
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  - 7.9.3.2. Parameters
  - 7.9.3.3. Modulation/Demodulation
- 7.9.4. PSK Modulation
  - 7.9.4.1. Characterization
  - 7.9.4.2. Parameters
  - 7.9.4.3. Modulation/Demodulation
- 7.9.5. FSK Modulation
  - 7.9.5.1. Characterization
  - 7.9.5.2. Parameters
  - 7.9.5.3. Modulation/Demodulation
- 7.9.6. Other Digital Modulations
- 7.9.7. Comparison between Digital Modulations

7.10. Digital Communication. Comparison, IS, Diagram and Eyes
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  - 7.10.1.1. Modulation Energy and Power
  - 7.10.1.2. Enveloping
  - 7.10.1.3. Protection Against Noise
  - 7.10.1.4. Spectral Model
  - 7.10.1.5. Channel Codification Techniques
  - 7.10.1.6. Synchronization Signals
  - 7.10.1.7. SER Symbol Error Rate
- 7.10.2. Limited Bandwidth Channels
- 7.10.3. Interference between Symbols (IS)
  - 7.10.3.1. Characterization
  - 7.10.3.2. Limitations
- 7.10.4. Optimal Receptor in PAM without IS
- 7.10.5. Eyes Diagram

Module 8. Fundamentals of Mobile and Cell Network Communications

8.1. Introduction to Mobile Communications
- 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 Communication Systems

8.2. Fundamentals of the Radio Interface, Radiating Elements and Basic Parameters
- 8.2.1. 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 Signalling System
- 8.4.1. Signalling Systems
- 8.4.2. 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/TDMA)
- 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 Communications
- 8.7.1. GSM Introduction. 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. GPRS Introduction. 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: Evolution of 3G, 4G and 5G
- 8.10.1. Introduction
- 8.10.2. Evolution towards 3G
- 8.10.3. Evolution towards 4G
- 8.10.4. Evolution towards 5G

Module 9. Digital Signal Processing

9.1. Introduction
- 9.1.1. Meaning of “Digital Signal Processing”
- 9.1.2. Comparison between DSP and ASP
- 9.1.3. History of DSP
- 9.1.4. Applications of DSP

9.2. Discrete Time Signals
- 9.2.1. Introduction
- 9.2.2. Sequence Classification
  - 9.2.2.1. Unidimensional and Multidimensional Sequences
  - 9.2.2.2. Odd and Even Sequences
  - 9.2.2.3. Periodic and Aperiodic Sequences
  - 9.2.2.4. Deterministic and Random Sequences
  - 9.2.2.5. Energy and Power Sequences
  - 9.2.2.6. Real and Complex Systems
- 9.2.3. Real Exponential Sequences
- 9.2.4. Sinusoidal Sequences
- 9.2.5. Impulse Sequence
- 9.2.6. Step Sequence
- 9.2.7. Random Sequence

9.3. Discrete Time Systems
- 9.3.1. Introduction
- 9.3.2. System Classification
  - 9.3.2.1. Linearity
  - 9.3.2.2. Invariance
  - 9.3.2.3. Stability
  - 9.3.2.4. Causality
- 9.3.3. Difference Equations
- 9.3.4. Discrete Convolution
  - 9.3.4.1. Introduction
  - 9.3.4.2. Deduction of the Discrete Convolution Formula
  - 9.3.4.3. Properties
  - 9.3.4.4. Graphical Method for Calculating Convolution
  - 9.3.4.5. Justification of Convolution

9.4. Sequences and Systems in the Frequency Domain
- 9.4.1. Introduction
- 9.4.2. Discrete-Time Fourier Transform (DTFT)
  - 9.4.2.1. Definition and Justification
  - 9.4.2.2. Observations
  - 9.4.2.3. Inverse Transform (IDTFT)
  - 9.4.2.4. Properties of DTFT
  - 9.4.2.5. Examples
  - 9.4.2.6. DTFT Calculation in a Computer
- 9.4.3. Frequency Response of a LI System in Discrete Time
  - 9.4.3.1. Introduction
  - 9.4.3.2. Frequency Response According to Impulse Response
  - 9.4.3.3. Frequency Response According to the Difference Equation
- 9.4.4. Bandwidth Relationship- Response Time
  - 9.4.4.1. Duration Relationship - Signal Bandwidth
  - 9.4.4.2. Implication in Filters
  - 9.4.4.3. Implications in Spectral Analysis

Module 10. Radio Networks and Services

10.4. Multicast and QoS End-to-End
- 10.4.1. Introduction
- 10.4.2. IP Multicast in Radio Networks
- 10.4.3. Delay/Disruption Tolerant Networking (DTN) 6
- 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 WLAN
  - 10.5.1.1. Principles of WLAN
    - 10.5.1.1.1. How They Work
    - 10.5.1.1.2. Frequency Band
    - 10.5.1.1.3. Security
  - 10.5.1.2. Applications
  - 10.5.1.3. Comparison between WLAN and Cabled LAN
  - 10.5.1.4. Effects of Radiation on Health
  - 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. The IEEE 802.11 Standard– WI- FI
  - 10.5.2.1. Architecture
  - 10.5.2.2. IEEE 802.11 Layers
    - 10.5.2.2.1. Physical Layer
    - 10.5.2.2.2. The Link Layer (MAC)
  - 10.5.2.3. Basic Operation of a WLAN
  - 10.5.2.4. Assigning the Radio Spectrum
  - 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. Wide Area Wireless Networks (WWAN). Introduction
- 10.6.4. Satellite and Mobile Telephony Network

10.7. Personal Wireless Networks WPAN
- 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 Communications System
  - 10.9.3.1. 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. According to its Orbit
- 10.9.5. Frequency Band

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. Interferences
- 10.10.5. Administrative Provisions
- 10.10.6. Provisions Related to Services and Stations

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

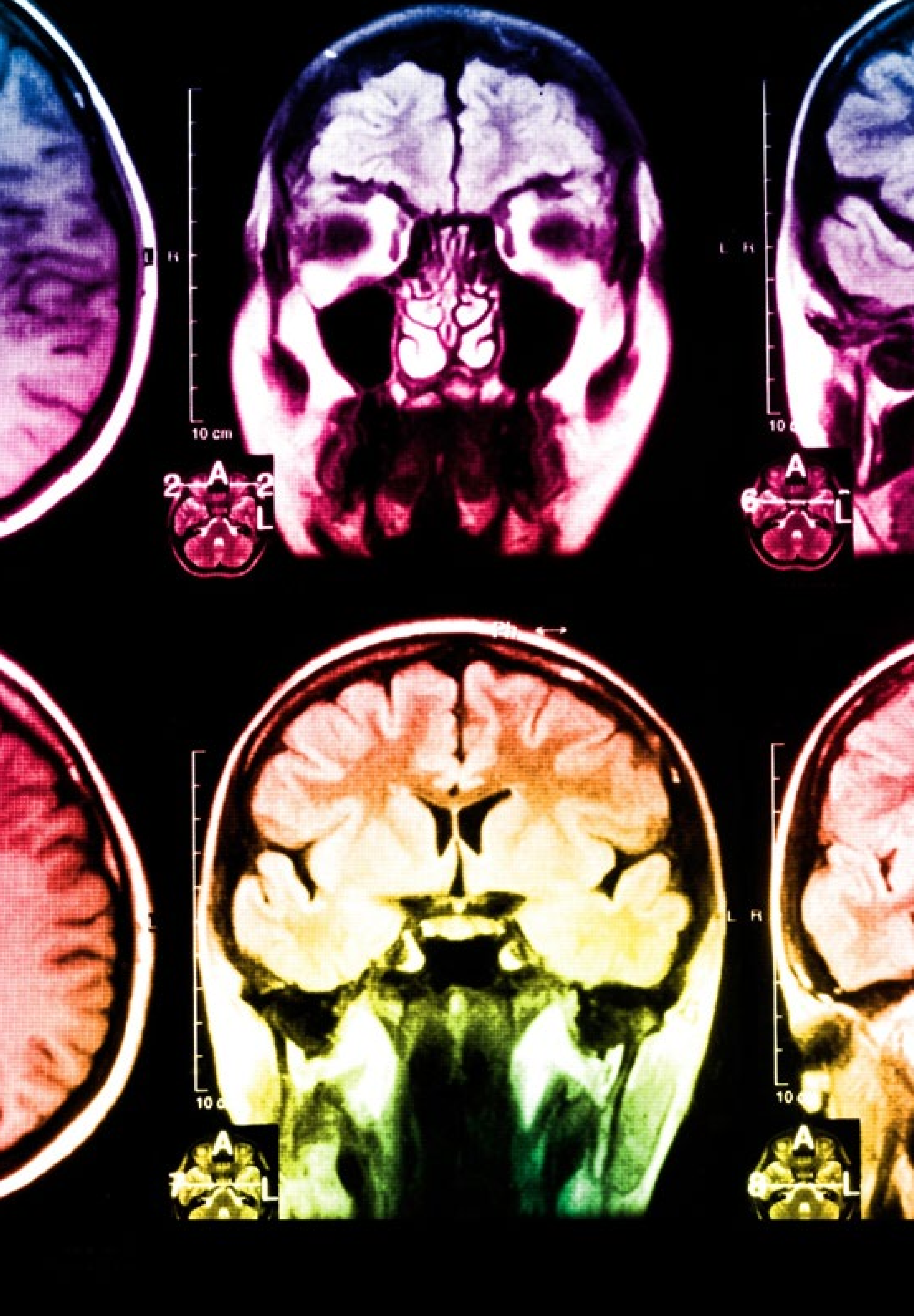
TECH effectively combines the Case Study methodology with a 100% online learning system based on repetition, which combines different teaching elements in each lesson.

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.

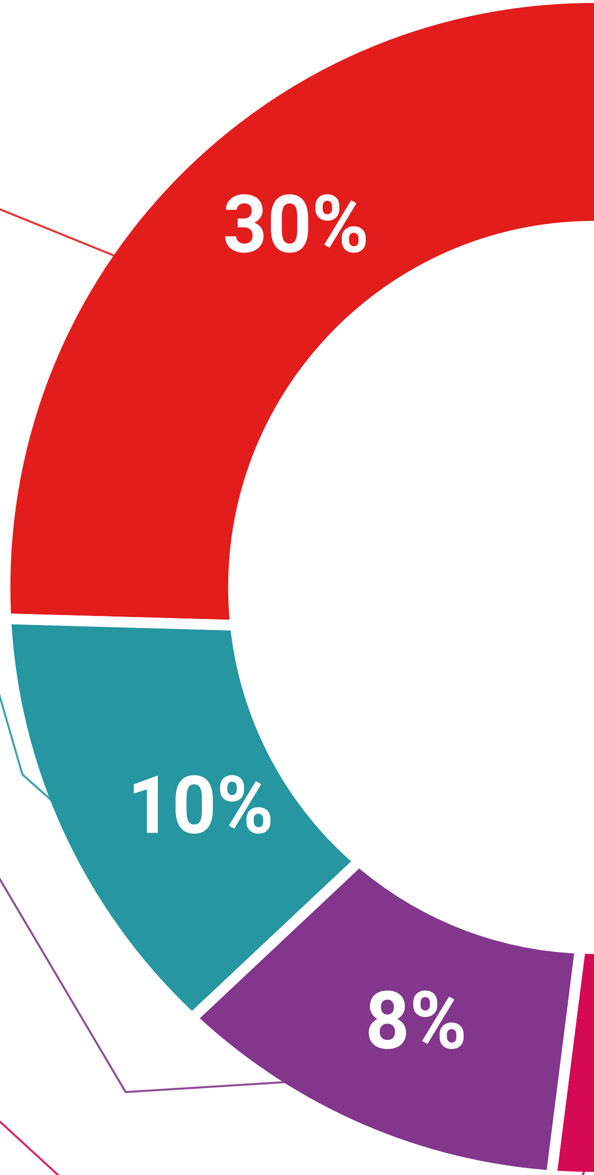
Learning from an Expert strengthens knowledge and memory, and generates confidence in future difficult decisions.

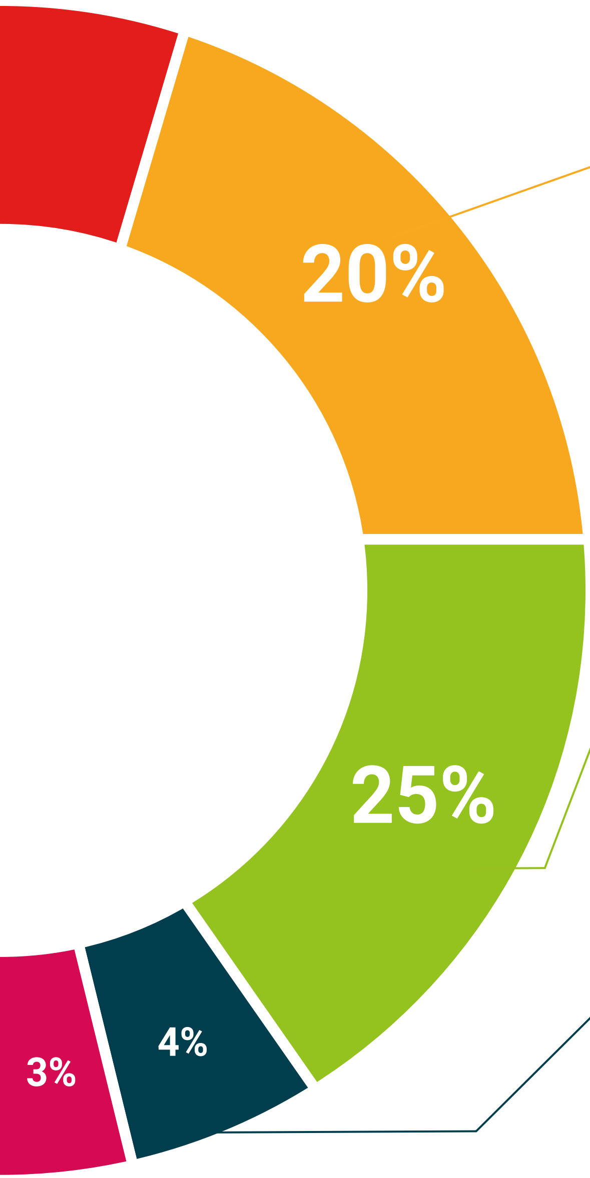
Practising Skills and Abilities

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".

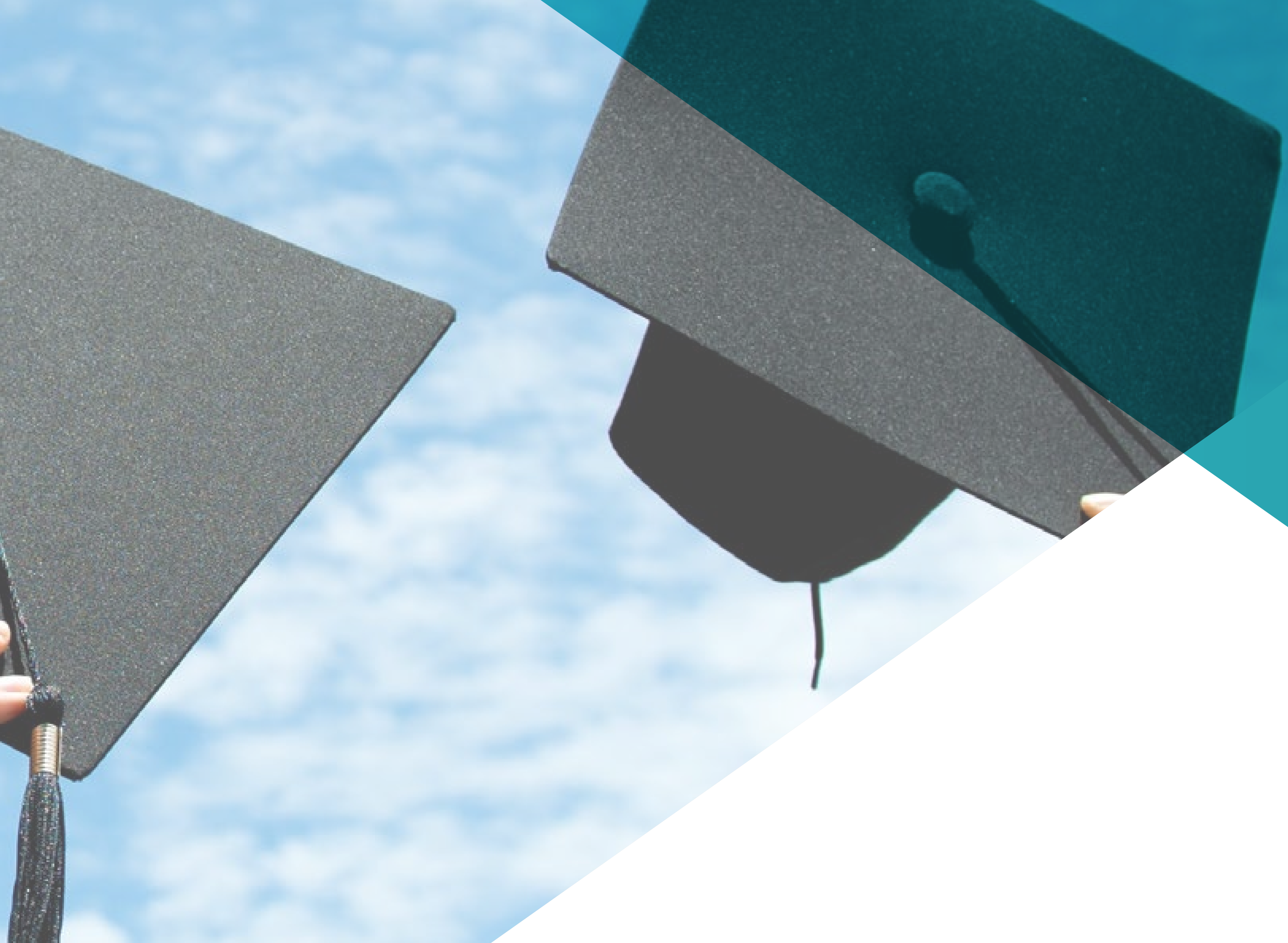
Testing & Retesting

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

Title: **Professional Master's Degree in Communication Theory**

Official Nº of hours: **1,500 h.**


tech technological university

Awards the following

DIPLOMA

to

Mr./Ms. ________________, with identification number ____________.

For having successfully passed and accredited the following program

PROFESSIONAL MASTER'S DEGREE

in

Communication Theory

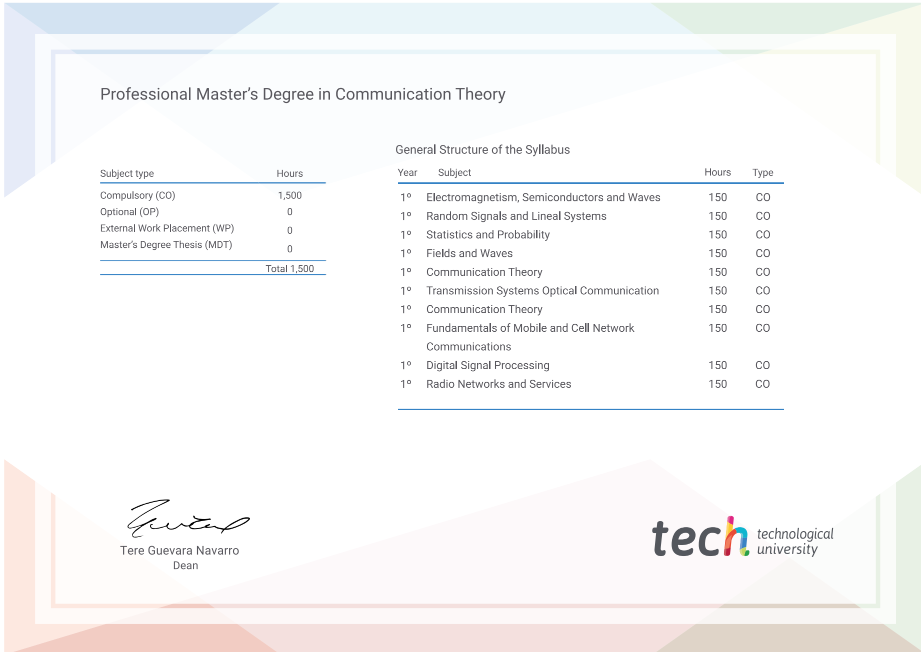
This is a qualification awarded by this University, equivalent to 1,500 hours, with a start date of dd/mm/yyyy and an end date of dd/mm/yyyy.

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 techtitute.com/certificates


Professional Master's Degree in Communication Theory

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	Electromagnetism, Semiconductors and Waves	150	CO
1º	Random Signals and Lineal Systems	150	CO
1º	Statistics and Probability	150	CO
1º	Fields and Waves	150	CO
1º	Communication Theory	150	CO
1º	Transmission Systems Optical Communication	150	CO
1º	Communication Theory	150	CO
1º	Fundamentals of Mobile and Cell Network Communications	150	CO
1º	Digital Signal Processing	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 diploma 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
Communication Theory

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

Professional Master's Degree
Communication Theory

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