# Professional Master's Degree

## Electrotherapy in Physical Activity and Sport

tech global university

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# Professional Master's Degree

## Electrotherapy in Physical Activity and Sport

- Modality: **online**
- Duration: **12 months**
- Certificate: **TECH Global University**
- Credits: **60 ECTS**
- Schedule: **at your own pace**
- Exams: **online**

Website: www.techtitute.com/us/sports-science/professional-master-degree/master-electrotherapy-physical-activity-sport

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01

# Introduction to the Program

Electrotherapy in Physical Activity and Sport has gained increasing relevance due to its therapeutic and performance applications. According to research published by the *National Institutes of Health*, 65% of elite athletes use electrotherapy as part of their recovery routine. In fact, this phenomenon highlights the need to address its proper application and understanding. For this reason, the academic program at TECH Global University has been developed, offering a methodology based on 100% online teaching materials. Through this approach, professionals can acquire the necessary skills to effectively integrate electrotherapy into their sports practices, without the need for travel.

*You will acquire knowledge through a 100% online format, becoming an expert in Electrotherapy in Physical Activity and Sport"*

The use of electrical stimulation techniques in rehabilitation and physical performance has gained significant importance today. Electrotherapy is used to treat various muscular and joint conditions, alleviating pain, improving blood circulation, and accelerating the recovery of injuries. This tool is utilized as part of the physical preparation for athletes, as it helps optimize performance and prevent future injuries.

In this context, TECH Global University will delve into an exclusive academic curriculum, focusing on key areas such as high-frequency electrotherapy, ultrasound therapy in physiotherapy, and electromagnetic fields. These advancements are essential for the effective application of treatments in both the sports and therapeutic fields. With a technical and scientific approach, professionals will be able to integrate these methods into their daily practice, improving the quality and outcomes of treatments. Additionally, the program will explore the physiological mechanisms underlying each of these approaches.

This university program offers professionals a unique opportunity to refine their skills and acquire new knowledge that will allow them to stand out in their field. The acquisition of advanced competencies in Electrotherapy techniques will not only improve the effectiveness of treatments but also provide the possibility to implement more innovative and personalized protocols. As such, graduates will be better prepared to address the specific needs of each patient, optimizing their performance and recovery.

Finally, the methodology of TECH Global University, with its innovative Relearning approach, offers a completely flexible and accessible learning experience. With a 100% online environment available 24/7, accessible from any device with an internet connection, professionals can progress at their own pace, adapting to their schedules and needs.

This **Professional Master's Degree in Electrotherapy in Physical Activity and Sport** contains the most complete and up-to-date scientific program on the market. The most important features include:

- The development of practical cases presented by experts in Electrotherapy in Physical Activity and Sport
- The graphic, schematic, and practical contents with which they are created, provide scientific and practical information on the disciplines that are essential for professional practice
- Practical exercises where the self-assessment process can be carried out to improve learning
- With a special emphasis on innovative methodologies in electrical stimulation techniques
- 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

*Update your professional practice in the sports field with TECH Global University! Access the most innovative content in the use of Electrotherapy"*

*You will elevate your skills in using ultrasound therapy to treat various conditions in physiotherapy"*

*You will refine your skills in the use of electromagnetic fields for effective treatments in the sports field.*

*You will deepen your understanding of the therapeutic effects of high-frequency electrotherapy, enhancing its application in injury recovery.*

The faculty includes professionals from the field of Electrotherapy in Physical Activity and Sport, who bring their work experience to this program, along with renowned specialists from leading societies and prestigious universities.

The multimedia content, developed with the latest educational technology, will provide the professional with situated and contextual learning, i.e., a simulated environment that will provide an immersive learning experience designed to prepare for real-life situations.

This program is designed around Problem-Based Learning, whereby the student 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.

02

# Why Study at TECH?

TECH is the world's largest online university. With an impressive catalog of more than 14,000 university programs, available in 11 languages, it is positioned as a leader in employability, with a 99% job placement rate. In addition, it has a huge faculty of more than 6,000 professors of the highest international prestige.

*Study at the largest online university in the world and ensure your professional success. The future begins at TECH"*

### The world's best online university, according to FORBES

The prestigious Forbes magazine, specialized in business and finance, has highlighted TECH as "the best online university in the world" This is what they have recently stated in an article in their digital edition in which they echo the success story of this institution, "thanks to the academic offer it provides, the selection of its teaching staff, and an innovative learning method oriented to form the professionals of the future".

### The best top international faculty

TECH's faculty is made up of more than 6,000 professors of the highest international prestige. Professors, researchers and top executives of multinational companies, including Isaiah Covington, performance coach of the Boston Celtics; Magda Romanska, principal investigator at Harvard MetaLAB; Ignacio Wistuba, chairman of the department of translational molecular pathology at MD Anderson Cancer Center; and D.W. Pine, creative director of TIME magazine, among others.

### The world's largest online university

TECH is the world's largest online university. We are the largest educational institution, with the best and widest digital educational catalog, one hundred percent online and covering most areas of knowledge. We offer the largest selection of our own degrees and accredited online undergraduate and postgraduate degrees. In total, more than 14,000 university programs, in ten different languages, making us the largest educational institution in the world.


### The most complete syllabuses on the university scene

TECH offers the most complete syllabuses on the university scene, with programs that cover fundamental concepts and, at the same time, the main scientific advances in their specific scientific areas. In addition, these programs are continuously updated to guarantee students the academic vanguard and the most demanded professional skills. and the most in-demand professional competencies. In this way, the university's qualifications provide its graduates with a significant advantage to propel their careers to success.

### A unique learning method

TECH is the first university to use Relearning in all its programs. This is the best online learning methodology, accredited with international teaching quality certifications, provided by prestigious educational agencies. In addition, this innovative academic model is complemented by the "Case Method", thereby configuring a unique online teaching strategy. Innovative teaching resources are also implemented, including detailed videos, infographics and interactive summaries.

### The official online university of the NBA

TECH is the official online university of the NBA. Thanks to our agreement with the biggest league in basketball, we offer our students exclusive university programs, as well as a wide variety of educational resources focused on the business of the league and other areas of the sports industry. Each program is made up of a uniquely designed syllabus and features exceptional guest hosts: professionals with a distinguished sports background who will offer their expertise on the most relevant topics.

### Leaders in employability

TECH has become the leading university in employability. Ninety-nine percent of its students obtain jobs in the academic field they have studied within one year of completing any of the university's programs. A similar number achieve immediate career enhancement. All this thanks to a study methodology that bases its effectiveness on the acquisition of practical skills, which are absolutely necessary for professional development.


### Google Premier Partner

The American technology giant has awarded TECH the Google Premier Partner badge. This award, which is only available to 3% of the world's companies, highlights the efficient, flexible and tailored experience that this university provides to students. The recognition not only accredits the maximum rigor, performance and investment in TECH's digital infrastructures, but also places this university as one of the world's leading technology companies.

### The top-rated university by its students

Students have positioned TECH as the world's top-rated university on the main review websites, with a highest rating of 4.9 out of 5, obtained from more than 1,000 reviews. These results consolidate TECH as the benchmark university institution at an international level, reflecting the excellence and positive impact of its educational model.

03

# Syllabus

This innovative university program will address essential aspects of Electrotherapy in Physical Activity and Sport, focusing on its application for rehabilitation and performance enhancement. In addition, professionals will develop competencies in Electrotherapy techniques for pain relief and muscle stimulation, optimizing the recovery of sports injuries and pain alleviation. The program will also delve into electrostimulation for neurological patients, enhancing motor functionality and accelerating rehabilitation times. As a result, this specialized knowledge will provide students with key tools to implement effective treatments in their daily practice.

*Get up to date with this innovative curriculum on the uses of electrostimulation in neurology, improving the motor recovery of athletes"*

## **Module 1.** High-Frequency Electrotherapy

1.1. Physical Fundamentals of High Frequency
- 1.1.1. Introduction
- 1.1.2. Basic Principles

1.2. Physiological Effects of High Frequency
- 1.2.1. Athermal Effects
- 1.2.2. Thermal Effects

1.3. Therapeutic Effects of High Frequency
- 1.3.1. Athermal Effects
- 1.3.2. Thermal Effects

1.4. Shortwave Fundamentals
- 1.4.1. Short Wave: Capacitive Application Mode
- 1.4.2. Short Wave: Inductive Application Mode
- 1.4.3. Short Wave: Pulsed Emission Mode

1.5. Practical Applications of Shortwave
- 1.5.1. Practical Applications of Continuous Shortwave
- 1.5.2. Practical Applications of Pulsed Shortwave
- 1.5.3. Practical Applications of Shortwave: Pathology Phase and Protocols

1.6. Contraindications of Shortwave
- 1.6.1. Absolute Contraindications
- 1.6.2. Relative Contraindications
- 1.6.3. Precautions and Safety Measures

1.7. Practical Applications of the Microwave
- 1.7.1. Microwave Basics
- 1.7.2. Practical Microwave Considerations
- 1.7.3. Practical Applications of Continuous Microwave
- 1.7.4. Practical Applications of Pulsed Microwave
- 1.7.5. Microwave Treatment Protocols

1.8. Contraindications of the Microwave
- 1.8.1. Absolute Contraindications
- 1.8.2. Relative Contraindications

1.9. Fundamentals of Techartherapy
- 1.9.1. Physiological Effects of Techarterapy
- 1.9.2. Dosage of Tecartherapy Treatment

1.10. Practical Applications of Techartherapy
- 1.10.1. Arthrosis
- 1.10.2. Myalgia
- 1.10.3. Muscle Fibrillar Rupture
- 1.10.4. Post-Needling Pain of Myofascial Trigger Points
- 1.10.5. Tendinopathy
- 1.10.6. Tendon Rupture (Post-Surgical Period)
- 1.10.7. Wound Healing
- 1.10.8. Keloid Scars
- 1.10.9. Edema Drainage
- 1.10.10. Post-Exercise Recovery

1.11. Contraindications of Techartherapy
- 1.11.1. Absolute Contraindications
- 1.11.2. Relative Contraindications

## **Module 2.** Ultrasound Therapy in Physiotherapy

2.1. Physical Principles of Ultrasound Therapy
- 2.1.1. Definition of Ultrasound Therapy
- 2.1.2. Main Physical Principles of Ultrasound Therapy

2.2. Physiological Effects of Ultrasound Therapy
- 2.2.1. Mechanisms of Action of Therapeutic Ultrasound
- 2.2.2. Therapeutic Effects of Ultrasound Therapy

2.3. Main Parameters of Ultrasound Therapy
- 2.3.1. Introduction
- 2.3.2. Main parameters

2.4. Practical Applications
- 2.4.1. Ultrasound Treatment Methodology
- 2.4.2. Practical Applications and Indications of Ultrasound Therapy
- 2.4.3. Ultrasound Therapy Research Studies

2.5. Ultrasonophoresis
- 2.5.1. Definition of Ultrasonophoresis
- 2.5.2. Mechanisms of Ultrasonophoresis
- 2.5.3. Factors on Which the Effectiveness of Ultrasonophoresis Depends
- 2.5.4. Ultrasonophoresis Considerations to Take into Account
- 2.5.5. Research Studies on Ultrasonophoresis

2.6. Contraindications to Ultrasound Therapy
- 2.6.1. Absolute Contraindications
- 2.6.2. Relative Contraindications
- 2.6.3. Precautions
- 2.6.4. Recommendations
- 2.6.5. Contraindications to Ultrasonophoresis

2.7. High-Frequency Ultrasound Therapy. High-Frequency Pressure Waves (HFPW)
- 2.7.1. Definition of HFPW Therapy
- 2.7.2. Parameters of HFPW Therapy and HIFU (High-Intensity Focused Ultrasound) Therapy

2.8. Practical Applications of High-Frequency Ultrasound Therapy
- 2.8.1. Indications for HFPW and HIFU Therapy
- 2.8.2. HFPW and HIFU Therapy Research Studies

2.9. Contraindications to High Frequency Ultrasound Therapy
- 2.9.1. Introduction
- 2.9.2. Main Contraindications

## **Module 3.** Other Electromagnetic Fields

3.1. Laser. Physical Principles
- 3.1.1. Laser. Definition
- 3.1.2. Laser Parameters
- 3.1.3. Laser. Classification
- 3.1.4. Laser. Physical Principles

3.2. Laser. Physiological Effects
- 3.2.1. Interrelationship between Laser and Living Tissues
- 3.2.2. Biological Effects of Low and Medium Power Lasers
- 3.2.3. Direct Effects of Laser Application
  - 3.2.3.1. Photothermal Effect
  - 3.2.3.2. Photochemical Effect
  - 3.2.3.3. Photoelectric Stimulus
- 3.2.4. Indirect Effects of Laser Application
  - 3.2.4.1. Microcirculation Stimulation
  - 3.2.4.2. Trophism Stimulus and Repair

3.3. Laser. Therapeutic Effects
- 3.3.1. Analgesia
- 3.3.2. Inflammation and Edema
- 3.3.3. Reparation
- 3.3.4. Dosimetry
  - 3.3.4.1. Recommended Treatment Dose in Low Level Laser Therapy Application according to WALT Guidelines

3.4. Laser. Clinical Applications
- 3.4.1. Laser Therapy in Osteoarthritis
- 3.4.2. Laser Therapy in Chronic Low Back Pain
- 3.4.3. Laser Therapy in Epicondylitis
- 3.4.4. Laser Therapy in Rotator Cuff Tendinopathy
- 3.4.5. Laser Therapy in Cervicalgias
- 3.4.6. Laser Therapy in Musculoskeletal Disorders
- 3.4.7. Other Practical Laser Applications
- 3.4.8. Conclusions

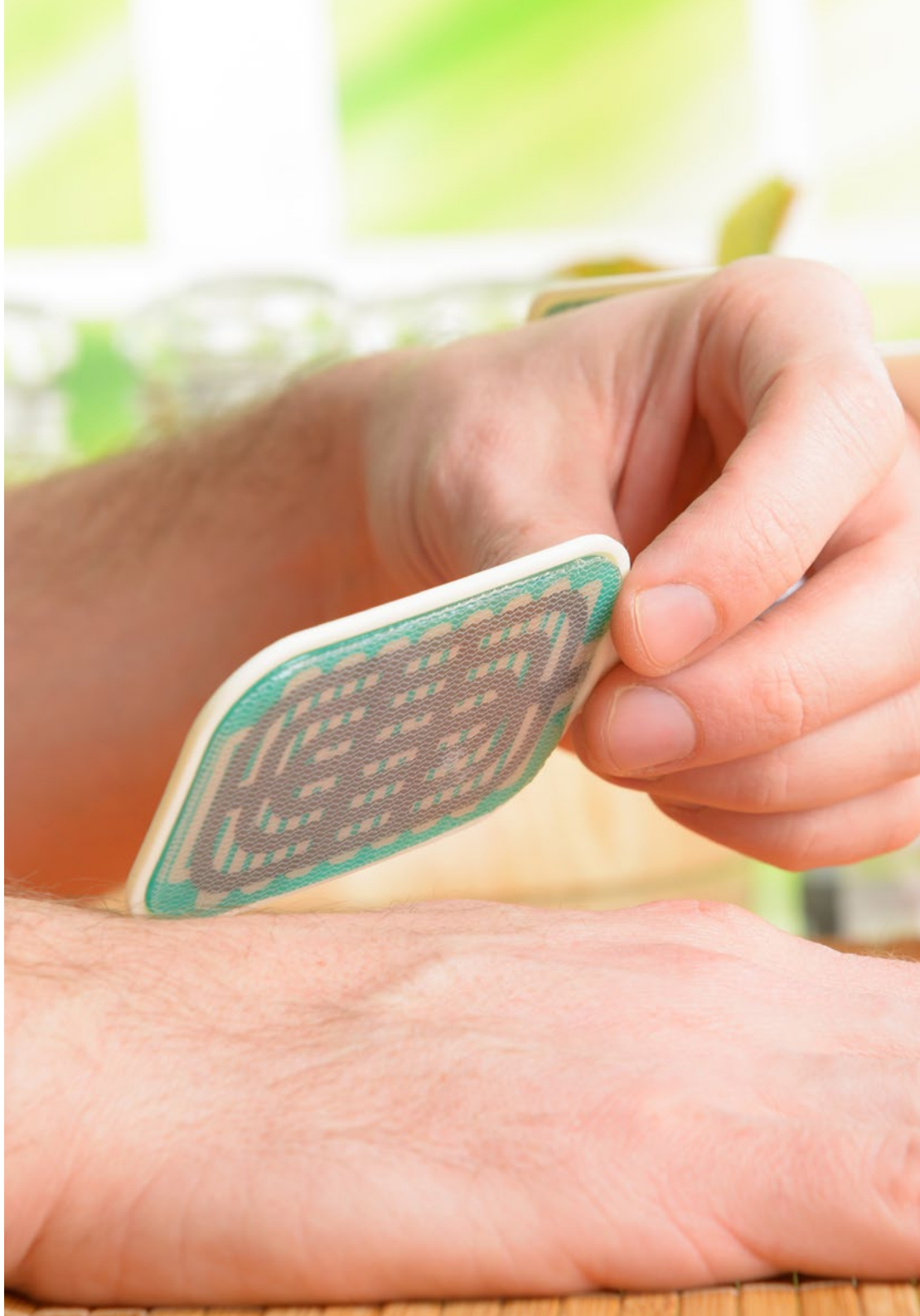
3.5. Laser. Contraindications
- 3.5.1. Precautions
- 3.5.2. Contraindications
  - 3.5.2.1. Conclusions

3.6. Infrared Radiation. Physical Principles
- 3.6.1. Introduction
  - 3.6.1.1. Definition
  - 3.6.1.2. Classification
- 3.6.2. Infrared Radiation Generation
  - 3.6.2.1. Luminous Emitters
  - 3.6.2.2. Non-Luminous Emitters
- 3.6.3. Physical Properties

3.7. Infrared Physiological Effects
- 3.7.1. Physiological Effects on the Skin
- 3.7.2. Infrared and Chromophores in Mitochondria
- 3.7.3. Radiation Absorption in Water Molecules
- 3.7.4. Infrared at the Cell Membrane
- 3.7.5. Conclusions

3.8. Therapeutic Effects of Infrared
- 3.8.1. Introduction
- 3.8.2. Local Effects of Infrared
  - 3.8.2.1. Erythematous
  - 3.8.2.2. Anti-inflammatory
  - 3.8.2.3. Scarring
  - 3.8.2.4. Sweating
  - 3.8.2.5. Relaxation
  - 3.8.2.6. Analgesia
- 3.8.3. Infrared Systemic Effects
  - 3.8.3.1. Cardiovascular System Benefits
  - 3.8.3.2. Systemic Muscle Relaxation
- 3.8.4. Dosimetry and Infrared Application
  - 3.8.4.1. Infrared Lamps
  - 3.8.4.2. Non-Luminous Lamps
  - 3.8.4.3. Luminous Lamps
  - 3.8.4.4. Monochromatic Infrared Energy (MIRE)
- 3.8.5. Conclusions

3.9. Practical Applications
- 3.9.1. Introduction
- 3.9.2. Clinical Applications
  - 3.9.2.1. Osteoarthritis and Infrared Radiation
  - 3.9.2.2. Lumbago and Infrared Radiation
  - 3.9.2.3. Fibromyalgia and Infrared
  - 3.9.2.4. Infrared Saunas in Cardiopathies
- 3.9.3. Conclusions



3.10. Infrared Contraindications
- 3.10.1. Precautions/Adverse Effects
  - 3.10.1.1. Introduction
  - 3.10.1.2. Consequences of Poor Infrared Dosing
  - 3.10.1.3. Precautions
  - 3.10.1.4. Formal Contraindications
- 3.10.2. Conclusions

## **Module 4.** General Principles of Electrotherapy

4.1. Physical Basis of Electric Current
- 4.1.1. Brief Historical Recollection
- 4.1.2. Definition and Physical Basis of Electrotherapy
  - 4.1.2.1. Potential Concepts

4.2. Main Parameters of the Electric Current
- 4.2.1. Pharmacology / Electrotherapy Parallelism
- 4.2.2. Main Parameters of the Waves: Waveform, Frequency, Intensity, and Pulse Width
- 4.2.3. Other Concepts: Voltage, Current and Resistance

4.3. Frequency-Dependent Classification of Currents
- 4.3.1. Classification according to Frequency: High, Medium and Low
- 4.3.2. Properties of Each Type of Frequency
- 4.3.3. Choice of the Most Suitable Current in Each Case

4.4. Waveform-Dependent Current Classification
- 4.4.1. General Classification: Direct and Alternating or Variable currents
- 4.4.2. Classification of the Variable Currents: Interrupted and Uninterrupted
- 4.4.3. Spectrum Concept

4.5. Current Transmission: Electrodes
- 4.5.1. General Information on Electrodes
- 4.5.2. Importance of Tissue Impedance
- 4.5.3. General Precautions

4.6. Types of Electrodes
- 4.6.1. Brief Recollection of the Historical Evolution of Electrodes
- 4.6.2. Considerations on Maintenance and Use of Electrodes
- 4.6.3. Main Types of Electrodes
- 4.6.4. Electrophoretic Application

4.7. Bipolar Application
- 4.7.1. Bipolar Application Overview
- 4.7.2. Electrode Size and Area to be Treated
- 4.7.3. Application of More Than Two Electrodes

4.8. Four-pole Application
- 4.8.1. Possibility of Combinations
- 4.8.2. Application in Electrostimulation
- 4.8.3. Tetrapolar Application in Interferential Currents
- 4.8.4. General Conclusions

4.9. Importance of Polarity Alternation
- 4.9.1. Brief Introduction to Galvanism
- 4.9.2. Risks Derived from Load Accumulation
- 4.9.3. Polar Behavior of Electromagnetic Radiation

## **Module 5.** Electrostimulation for Muscle Strengthening

5.1. Principles of Muscle Contraction
- 5.1.1. Introduction to Muscle Contraction
- 5.1.2. Types of Muscles
- 5.1.3. Muscle Characteristics
- 5.1.4. Muscle Functions
- 5.1.5. Neuromuscular Electrical Stimulation (NMES)

5.2. Sarcomere Structure
- 5.2.1. Introduction
- 5.2.2. Sarcomere Functions
- 5.2.3. Sarcomere Structure
- 5.2.4. Sliding Filament Theory

5.3. Motor Plate Structure
- 5.3.1. Motor Unit Concept
- 5.3.2. Concept of Neuromuscular Junction and Motor Plate
- 5.3.3. Structure of the Neuromuscular Junction
- 5.3.4. Neuromuscular Transmission and Muscle Contraction

5.4. Type of Muscle Contraction
- 5.4.1. Concept of Muscle Contraction
- 5.4.2. Types of Contraction
- 5.4.3. Isotonic Muscle Contraction
- 5.4.4. Isometric Muscle Contraction
- 5.4.5. Relationship between Strength and Endurance in Contractions
- 5.4.6. Auxotonic and Isokinetic Contractions

5.5. Types of Muscle Fibers
- 5.5.1. Types of Muscle Fibers
- 5.5.2. Slow-Twitch Fibers or Type I Fibers
- 5.5.3. Fast-Twitch Fibers or Type II Fibers

5.6. Main Neuromuscular Injuries
- 5.6.1. Concept of Neuromuscular Disease
- 5.6.2. Etiology of Neuromuscular Diseases
- 5.6.3. Neuromuscular Junction Injury and NMD
- 5.6.4. Major Neuromuscular Injuries or Diseases

5.7. Principles of Electromyography
- 5.7.1. Electromyography Concept
- 5.7.2. Development of Electromyography
- 5.7.3. Electromyographic Study Protocol
- 5.7.4. Electromyography Methods

5.8. Main Excitomotor Currents. Neo-Faradic Currents
- 5.8.1. Definition of Excitomotor Current and Main Types of Excitomotor Currents
- 5.8.2. Factors Influencing the Neuromuscular Response
- 5.8.3. Exitomotor Currents Most Commonly Used Neo-Faradic Currents

5.9. Excitomotor Interferential Currents. Kotz Currents
- 5.9.1. Kotz Currents or Russian Currents
- 5.9.2. Most Relevant Parameters in Kotz Currents
- 5.9.3. Strengthening Protocol Described with Russian Current
- 5.9.4. Differences between Low Frequency and Medium Frequency Electrostimulation

5.10. Applications of Electrical Stimulation in Urogynecology
- 5.10.1. Electrostimulation and Urogynecology
- 5.10.2. Types of Electrostimulation in Urogynecology
- 5.10.3. Placement of Electrodes
- 5.10.4. Mechanism of Action

5.11. Practical Applications
- 5.11.1. Recommendations for the Application of Excitomotor currents
- 5.11.2. Techniques of Application of Excitomorphic Currents
- 5.11.3. Examples of Work Protocols Described in Scientific Literature

5.12. Contraindications
- 5.12.1. Contraindications for the Use of Electrostimulation for Muscle Strengthening
- 5.12.2. Recommendations for Safe Electrostimulation Practice

## **Module 6.** Electrostimulation in the Neurological Patient

6.1. Assessment of Nerve Injury. Principles of Muscle Innervation
- 6.1.1. Assessment of Nerve Injury
- 6.1.2. Principles of Muscle Innervation

6.2. Intensity/Time (I/T) and Amplitude/Time (A/T) Curves
- 6.2.1. Intensity/Tme Curves
- 6.2.2. Amplitude /Time Curves

6.3. Main Trends in Neurological Rehabilitation
- 6.3.1. Introduction to Neurological Rehabilitation
- 6.3.2. Main Currents

6.4. Electrotherapy for Motor Rehabilitation in the Neurological Patient
- 6.4.1. Neurological Patient
- 6.4.2. Electrotherapy for Motor Rehabilitation in this Patient

6.5. Electrotherapy for Somatosensory Rehabilitation in the Neurologic Patient
- 6.5.1. Introduction to Somatosensory Rehabilitation
- 6.5.2. Electrotherapy for Somatosensory Rehabilitation in the Neurologic Patient

6.6. Practical Applications
- 6.6.1. Case Studies

6.7. Contraindications
- 6.7.1. Adverse Effects

## **Module 7.** Electrotherapy and Analgesia

7.1. Definition of Pain. Concept of Nociception
- 7.1.1. Definition of Pain
  - 7.1.1.1. Characteristics of Pain
  - 7.1.1.2. Other Concepts and Definitions Related to Pain
  - 7.1.1.3. Types of Pain
- 7.1.2. Concept of Nociception
  - 7.1.2.1. Peripheral Part Nociceptive System
  - 7.1.2.2. Central Part Nociceptive System

7.2. Main Nociceptive Receptors
- 7.2.1. Nociceptor Classification
  - 7.2.1.1. According to Driving Speed
  - 7.2.1.2. According to Location
  - 7.2.1.3. According to Stimulation Modality
- 7.2.2. Nociceptor Functioning

7.3. Main Nociceptive Pathways
- 7.3.1. Basic Structure of the Nervous System
- 7.3.2. Ascending Spinal Pathways
  - 7.3.2.1. Spinothalamic Tract (STT)
  - 7.3.2.2. Spinoreticular Tract (SRT)
  - 7.3.2.3. Spinomesencephalic Tract (SRT)
- 7.3.3. Trigeminal Ascending Pathways
  - 7.3.3.1. Trigeminothalamic Tract or Trigeminal Lemniscus
- 7.3.4. Sensitivity and Nerve Pathways
  - 7.3.4.1. Exteroceptive Sensitivity
  - 7.3.4.2. Proprioceptive Sensitivity
  - 7.3.4.3. Interoceptive Sensitivity
  - 7.3.4.4. Other Fascicles Related to Sensory Pathways

7.4. Transmitter Mechanisms of Nociceptive Regulation
- 7.4.1. Transmission at the Spinal Cord Level (PHSC)
- 7.4.2. APME Neuron Characteristics
- 7.4.3. Redex Lamination
- 7.4.4. Biochemistry of Transmission at the PHSC Level
  - 7.4.4.1. Presynaptic and Postsynaptic Channels and Receptors
  - 7.4.4.2. Transmission at the Level of Ascending Spinal Tract
  - 7.4.4.3. Spinothalamic Tract (STT)
  - 7.4.4.4. Transmission at the Level of the Thalamus
  - 7.4.4.5. Ventral Posterior Nucleus (VPN)
  - 7.4.4.6. Medial Dorsal Nucleus (MDN)
  - 7.4.4.7. Intralaminar Nuclei
  - 7.4.4.8. Posterior Region
  - 7.4.4.9. Transmission at the Level of the Cerebral Cortex
  - 7.4.4.10. Primary Somatosensory Area (S1)
  - 7.4.4.11. Secondary Somatosensory or Association Area (S2)
- 7.4.5. Gate Control
  - 7.4.5.1. Modulation Segmental Level
  - 7.4.5.2. Suprasegmental Modulation
  - 7.4.5.3. Considerations
  - 7.4.5.4. Gate Control Theory Review
- 7.4.6. Descending Routes
  - 7.4.6.1. Brainstem Modulatory Centers
  - 7.4.6.2. Diffuse Noxious Inhibitory Control (DNIC)

7.5. Modulatory Effects of Electrotherapy
- 7.5.1. Pain Modulation Levels
- 7.5.2. Neuronal Plasticity
- 7.5.3. Sensory Pathway Theory of Pain
- 7.5.4. Electrotherapy Models

7.6. High Frequency and Analgesia
- 7.6.1. Heat and Temperature
- 7.6.2. Effects
- 7.6.3. Application Techniques
- 7.6.4. Dosage

7.7. Low Frequency and Analgesia
- 7.7.1. Selective Stimulation
- 7.7.2. TENS and Gate Control
- 7.7.3. Post-Excitatory Depression of Orthosympathetic Nervous System
- 7.7.4. Theory of Endorphin Release
- 7.7.5. TENS Dosage

7.8. Other Parameters Related to Analgesia
- 7.8.1. Electrotherapy Effects
- 7.8.2. Dosage in Electrotherapy

## **Module 8.** Transcutaneous Electrical Nerve Stimulation (TENS)

8.1. Fundamentals of Current Type used in TENS
- 8.1.1. Introduction
  - 8.1.1.1. Theoretical Framework: Neurophysiology of Pain
    - 8.1.1.1.1. Introduction and Classification of Nociceptive Fibers
    - 8.1.1.1.2. Characteristics of Nociceptive Fibers
    - 8.1.1.1.3. Stages of the Nociceptive Process
- 8.1.2. Anti-Nociceptive System: Gate Control Theory
  - 8.1.2.1. Introduction to Current Type used in TENS
  - 8.1.2.2. Basic Characteristics of TENS Type of Current (Pulse Shape, Duration, Frequency and Intensity)

8.2. Classification of Current Type used in TENS
- 8.2.1. Introduction
  - 8.2.1.1. Types of Electrical Current Classification
  - 8.2.1.2. According to Frequency (Number of Pulses Emitted per Second)
- 8.2.2. Classification of Current Type used in TENS
  - 8.2.2.1. Conventional TENS
  - 8.2.2.2. TENS-Acupuncture
  - 8.2.2.3. Low-Rate Burst TENS
  - 8.2.2.4. Brief or Intense TENS
- 8.2.3. Mechanisms of Action of the TENS Current Type

8.3. Transcutaneous Electrical Nerve Stimulation (TENS)

8.4. Analgesic Effects of High-Frequency TENS
- 8.4.1. Introduction
  - 8.4.1.1. Main Reasons for the Wide Clinical Application of Conventional TENS
- 8.4.2. Hypoalgesia Derived from Conventional/High Frequency TENS
  - 8.4.2.1. Mechanism of Action
- 8.4.3. Neurophysiology of Conventional TENS
  - 8.4.3.1. Gate Control
  - 8.4.3.2. The Metaphor
- 8.4.4. Failure to Achieve Analgesic Effects
  - 8.4.4.1. Main Mistakes
  - 8.4.4.2. Main Problem of Hypoalgesia by Conventional TENS

8.5. Analgesic Effects of Low-Frequency TENS
- 8.5.1. Introduction
- 8.5.2. Mechanisms of Action of TENS-mediated Hypoalgesia Acupuncture: Endogenous Opioid System
- 8.5.3. Mechanism of Action
- 8.5.4. High-Intensity and Low-Frequency
  - 8.5.4.1. Parameters
  - 8.5.4.2. Fundamental Differences from Conventional TENS Current

8.6. Analgesic Effects of "Burst-Type TENS"
- 8.6.1. Introduction
- 8.6.2. Description
  - 8.6.2.1. Burst-Type TENS Current Details
  - 8.6.2.2. Physical Parameters
  - 8.6.2.3. Sjölund and Eriksson
- 8.6.3. Summary of the Physiological Mechanisms of Analgesia, Both Central and Peripheral, Up to This Point

8.7. Importance of Pulse Width
  8.7.1. Introduction
    8.7.1.1. Physical Characteristics of Waves
      8.7.1.1.1. Definition of a Wave
      8.7.1.1.2. Other General Characteristics and Properties of a Wave
  8.7.2. Impulse Shape
8.8. Electrodes. Types and Application
  8.8.1. Introduction
    8.8.1.1. The TENS Current Device
  8.8.2. Electrodes
    8.8.2.1. General Characteristics
    8.8.2.2. Skin Care
    8.8.2.3. Other Types of Electrodes
8.9. Practical Applications
  8.9.1. TENS Applications
  8.9.2. Impulse Duration
  8.9.3. Impulse Shape
  8.9.4. Intensity
  8.9.5. Frequency
  8.9.6. Electrode Type and Placement
8.10. Contraindications
  8.10.1. Contraindications to the use of TENS Therapy
  8.10.2. Recommendations for Safe TENS Practice

## **Module 9.** Interferential Currrents

9.1. Fundamentals of Interferential Currents
  9.1.1. Interferential Current Concept
  9.1.2. Main Properties of Interferential Currents
  9.1.3. Characteristics and Effects of Interferential Currents
9.2. Main Parameters of Interferential Currents
  9.2.1. Introduction to the Different Parameters
  9.2.2. Types of Frequencies and Effects Produced
  9.2.3. Relevance of Application Time
  9.2.4. Types of Applications and Parameters
9.3. Effects of High Frequency
  9.3.1. Concept of High Frequency in Interferential Streams
  9.3.2. Main Effects of High Frequency
  9.3.3. Application of High Frequency
9.4. Concept of Accommodation. Importance and Adjustment of the Frequency Spectrum
  9.4.1. Low-Frequency Concept in Interferential Currents
  9.4.2. Main Effects of Low Frequency
  9.4.3. Low-Frequency Application
9.5. Electrodes. Types and Application
  9.5.1. Main Types of Electrodes in Interferential Currents
  9.5.2. Relevance of Electrode Types in Interferential Currents
  9.5.3. Application of Different Types of Electrodes
9.6. Practical Applications
  9.6.1. Recommendations for the Application of Interferential Currents
  9.6.2. Techniques for the Application of Interferential Currents
9.7. Contraindications
  9.7.1. Contraindications to the Use of Interferential Currents
  9.7.2. Recommendations for Safe Practice Using Interferential Currents

## **Module 10.** Invasive Treatment in Electrotherapy

10.1. Invasive Treatment in Physical Therapy for Analgesic Purposes
  10.1.1. General Aspects
  10.1.2. Types of Invasive Treatment
  10.1.3. Infiltration Versus Puncture
10.2. Fundamentals of Dry Needling
  10.2.1. Myofascial Pain Syndrome
  10.2.2. Myofascial Trigger Points
  10.2.3. Neurophysiology of Myofascial Pain Syndrome and Trigger Points
10.3. Post-puncture Treatments
  10.3.1. Adverse Effects of Dry Needling
  10.3.2. Post-puncture Treatments
  10.3.3. Combination of Dry Needling and TENS

10.4. Electrotherapy as an Adjunct to Dry Needling
- 10.4.1. Non-Invasive Approach
- 10.4.2. Invasive Approach
- 10.4.3. Types of Electropuncture

10.5. Percutaneous Electrical Nerve Stimulation: PENS
- 10.5.1. Neurophysiological Fundamentals of PENS Application
- 10.5.2. Scientific Evidence for the Application of PENS
- 10.5.3. General Considerations for PENS Implementation

10.6. Advantages of PENS Over TENS
- 10.6.1. Current Status of PENS Implementation
- 10.6.2. Application of PENS in Lower Back Pain
- 10.6.3. Application of PENS in Other Regions and Pathologies

10.7. Use of Electrodes
- 10.7.1. General Information on the Application of Electrodes
- 10.7.2. Variants in the Application of Electrodes
- 10.7.3. Multipole Application

10.8. Practical Applications
- 10.8.1. Justification for the Implementation of the PENS
- 10.8.2. Applications in Lower Back Pain
- 10.8.3. Upper Quadrant and Lower Limb Applications

10.9. Contraindications
- 10.9.1. Contraindications Derived from TENS
- 10.9.2. Contraindications Derived from Dry Needling
- 10.9.3. General Considerations

10.10. Invasive Treatments for Regenerative Purposes
- 10.10.1. Introduction
  - 10.10.1.1. Electrolysis Concept
- 10.10.2. Intratissue Percutaneous Electrolysis
  - 10.10.2.1. Concept
  - 10.10.2.2. Effects
  - 10.10.2.3. Review of the *State-of-the-Art*
  - 10.10.2.4. Combination with Eccentric Exercises

10.11. Physical Principles of Galvanism
- 10.11.1. Introduction
  - 10.11.1.1. Physical Characteristics of Direct Current
- 10.11.2. Galvanic Current
  - 10.11.2.1. Physical Characteristics of Galvanic Current
  - 10.11.2.2. Chemical Phenomena of Galvanic Current
  - 10.11.2.3. Structure
- 10.11.3. Iontophoresis
  - 10.11.3.1. Leduc's Experiment
  - 10.11.3.2. Physical Properties of Iontophoresis

10.12. Physiological Effects of Galvanic Current
- 10.12.1. Physiological Effects of Galvanic Current
- 10.12.2. Electrochemical Effects
  - 10.12.2.1. Chemical Behavior
- 10.12.3. Electrothermal Effects
- 10.12.4. Electrophysical Effects

10.13. Therapeutic Effects of Galvanic Current
- 10.13.1. Clinical Application of Galvanic Current
  - 10.13.1.1. Vasomotor Action
    - 10.13.1.1.1. Effect on the Nervous System
- 10.13.2. Therapeutic Effects of Iontophoresis
  - 10.13.2.1. Penetration and Elimination of Cations and Anions
  - 10.13.2.2. Drugs and Indications
- 10.13.3. Therapeutic Effects of Intratissue Percutaneous Electrolysis

10.14. Types of Percutaneous Application of Galvanic Currents
- 10.14.1. Introduction to Application Techniques
  - 10.14.1.1. Classification According to Electrode Placement
    - 10.14.1.1.1. Direct Galvanizing
- 10.14.2. Indirect Galvanizing
- 10.14.3. Classification According to the Technique Applied
  - 10.14.3.1. Intratissue Percutaneous Electrolysis
  - 10.14.3.2. Iontophoresis
  - 10.14.3.3. Galvanic Bath

10.15. Application Protocols
- 10.15.1. Galvanic Current Application Protocols
- 10.15.2. Intratissue Percutaneous Electrolysis Application Protocols
  - 10.15.2.1. Procedure
- 10.15.3. Iontophoresis Application Protocols
  - 10.15.3.1. Procedure

10.16. Contraindications
- 10.16.1. Contraindications of Galvanic Current
- 10.16.2. Contraindications, Complications and Precautions of Galvanic Current

## **Module 11.** Magnetotherapy in Physiotherapy

11.1. Physical Principles of Magnetotherapy
- 11.1.1. Introduction
- 11.1.2. History of Magnetotherapy
- 11.1.3. Definition
- 11.1.4. Principles of Magnetotherapy
  - 11.1.4.1. Magnetic Fields on Earth
  - 11.1.4.2. Physical Principles
- 11.1.5. Biophysical Interactions with Magnetic Fields

11.2. Physiological Effects of Magnetotherapy
- 11.2.1. Effects of Magnetotherapy on Biological Systems
  - 11.2.1.1. Biochemical Effects
  - 11.2.1.2. Cellular Effect
    - 11.2.1.2.1. Effects on Lymphocytes and Macrophages
    - 11.2.1.2.2. Effects on the Cell Membrane
    - 11.2.1.2.3. Effects on the Cytoskeleton
    - 11.2.1.2.4. Effects on Cytoplasm
  - 11.2.1.3. Conclusion on the Effect on the Cell
  - 11.2.1.4. Effect on Bone Tissue

11.3. Therapeutic Effects of Magnetotherapy
- 11.3.1. Introduction
- 11.3.2. Inflammation
- 11.3.3. Vasodilatation
- 11.3.4. Analgesia
- 11.3.5. Increased Calcium and Collagen Metabolism
- 11.3.6. Reparation
- 11.3.7. Muscle Relaxation

11.4. Main Magnetic Field Parameters
- 11.4.1. Introduction
- 11.4.2. Magnetic Field Parameters
  - 11.4.2.1. Intensity
  - 11.4.2.2. Frequency
- 11.4.3. Dosimetry of Magnetic Fields
  - 11.4.3.1. Frequency of Application
  - 11.4.3.2. Application Time

11.5. Types of Electrodes and their Application
- 11.5.1. Introduction
- 11.5.2. Electromagnetic Fields
  - 11.5.2.1. Total Body or Global Application
  - 11.5.2.2. Regional Application
- 11.5.3. Local Magnetic Fields Induced with Magnets
  - 11.5.3.1. Conclusions

11.6. Magnetotherapy. Clinical Applications
- 11.6.1. Introduction
- 11.6.2. Arthrosis
  - 11.6.2.1. Electromagnetic Fields and Chondrocyte Apoptosis
  - 11.6.2.2. Early-Stage Knee Osteoarthritis
  - 11.6.2.3. Advanced Stage Osteoarthritis
  - 11.6.2.4. Conclusion on Osteoarthritis and Pulsed Electromagnetic Fields
- 11.6.3. Bone Consolidation
  - 11.6.3.1. Review of Literature on Bone Consolidation
  - 11.6.3.2. Bone Consolidation in Long Bone Fractures
  - 11.6.3.3. Bone Consolidation in Short Bone Fractures

11.6.4. Shoulder Pathology
11.6.4.1. Shoulder Impingement
11.6.4.2. Rotator Cuff Tendinopathy
11.6.4.2.1. Rheumatoid Arthritis
11.6.4.2.2. Conclusions
11.7. Magnetotherapy. Contraindications
11.7.1. Introduction
11.7.2. Possible Adverse Effects Studied
11.7.3. Precautions
11.7.4. Formal Contraindications
11.7.5. Conclusions

## **Module 12.** Non-Invasive Brain Stimulation

12.1. Non-Invasive Brain Stimulation: Introduction
12.1.1. Introduction to Non-Invasive Brain Stimulation
12.1.2. Transcranial Magnetic Stimulation
12.1.2.1. Introduction to Transcranial Magnetic Stimulation
12.1.2.2. Mechanisms of Action
12.1.2.3. Stimulation Protocols
12.1.2.3.1. Transcranial Magnetic Stimulation with Single and Paired Pulses
12.1.2.3.2. Location of the Stimulation Site "Hot Spot"
12.1.2.3.3. Repetitive Transcranial Magnetic Stimulation
12.1.2.3.4. Simple Repetitive Pattern Stimulation
12.1.2.3.5. Theta-Burst Stimulation (TBS)
12.1.2.3.6. Quadripulse Stimulation (QPS)
12.1.2.3.7. Paired Associative Stimulation (PAS)
12.1.2.4. Security
12.1.2.5. Therapeutic Applications
12.1.3. Conclusions
12.1.4. Bibliography

12.2. Transcranial Direct Current
- 12.2.1. Transcranial Direct Current
  - 12.2.1.1. Introduction to Transcranial Direct Current
  - 12.2.1.2. Mechanism of Action
  - 12.2.1.3. Security
  - 12.2.1.4. Procedures
  - 12.2.1.5. Applications of SOFCs
  - 12.2.1.6. Other Forms of Transcranial Electrical Stimulation
- 12.2.2. Transcranial Neuromodulation Combined with other Therapeutic Interventions
- 12.2.3. Conclusions
- 12.2.4. Bibliography

*This university program provides you with the key tools to effectively apply electrotherapy for analgesia in the rehabilitation process"*

04

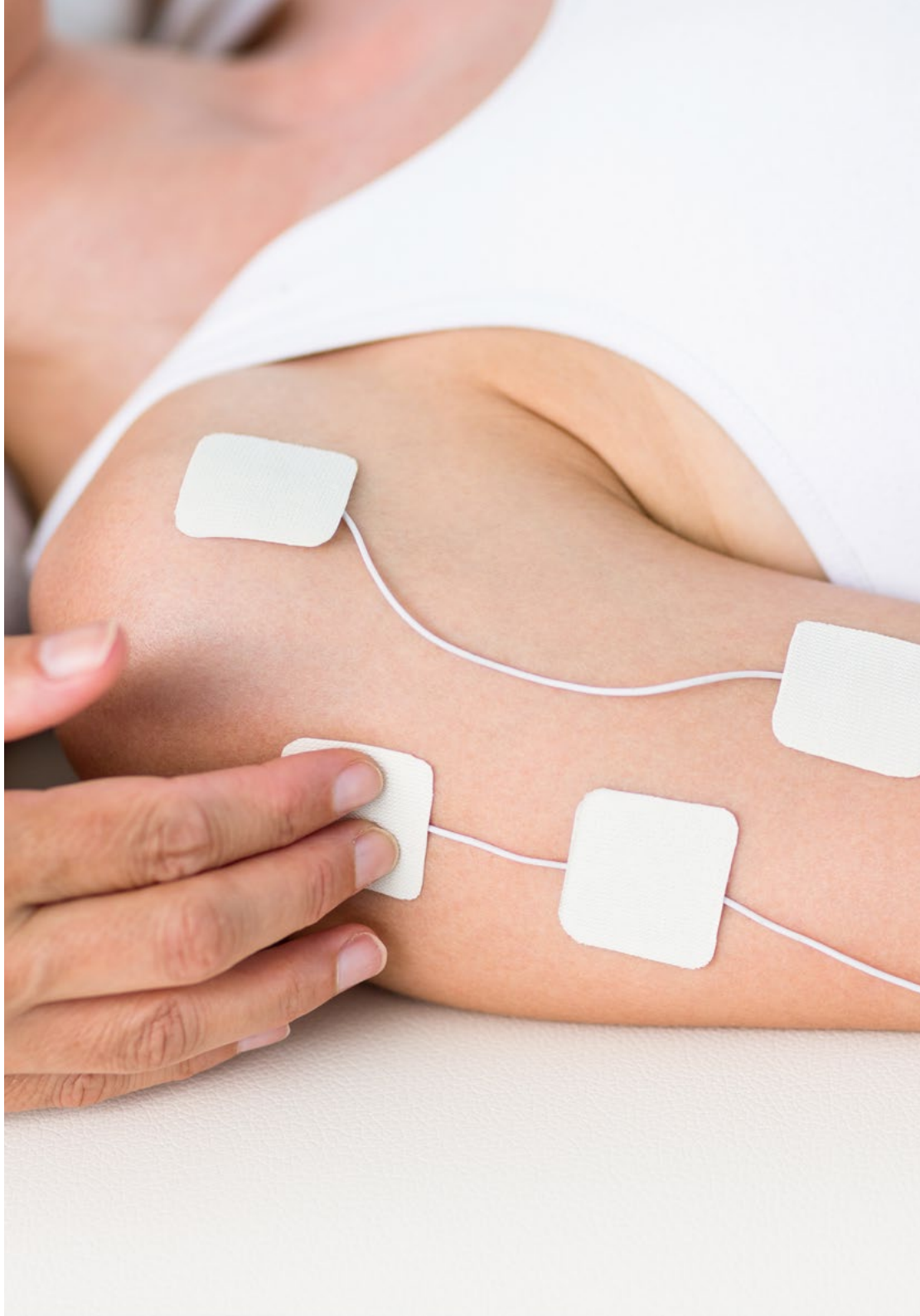
# Teaching Objectives

The primary focus of this university program is to equip professionals with the necessary competencies to implement advanced Electrotherapy techniques in the sports field. Through the development of specific skills, the program aims to optimize rehabilitation processes, enhancing the efficiency of injury recovery and pain relief. Additionally, the application of innovative and scientifically validated methods will enable professionals to address complex challenges in physical recovery. Furthermore, tools will be provided to customize treatments, ensuring effective solutions tailored to the unique needs of each patient in their recovery process.

*You will assess the impact of electrical stimulation on pain relief, improving the well-being of athletes"*

## General Objectives

- Apply high-frequency electrotherapy to enhance rehabilitation for various physical conditions
- Integrate ultrasound therapy in physiotherapy to optimize musculoskeletal injury treatments
- Use electromagnetic fields in therapies to improve recovery and physical performance
- Implement general principles of Electrotherapy for effective patient treatment approaches
- Apply electrostimulation techniques to strengthen muscles and improve functionality
- Use electrostimulation in neurological patients to support motor and functional recovery
- Employ Electrotherapy and analgesia to relieve pain in various therapeutic contexts
- Incorporate transcutaneous electrical stimulation (TENS) and interferential currents to improve well-being and recovery



## Specific Objectives

### Module 1. High-Frequency Electrotherapy

- Apply the physical principles of high frequency to understand its physiological and therapeutic effects on various pathological conditions
- Develop practical skills in the use of shortwave, microwave, and capacitive-resistive therapy to optimize treatments for different injuries and pathologies
- Identify and manage contraindications and precautions associated with high-frequency application, ensuring patient safety
- Implement specific treatment protocols using capacitive-resistive therapy for conditions such as osteoarthritis, tendinopathies, and post-exercise recovery

### Module 2. Ultrasound Therapy in Physiotherapy

- Apply the physical principles of ultrasound therapy to understand its mechanisms of action and therapeutic effects on various pathologies
- Develop skills in selecting and adjusting appropriate parameters to optimize treatments with ultrasound therapy
- Implement sonophoresis as a complementary technique, evaluating its efficacy and applicability in treating various clinical conditions
- Identify and manage the contraindications and precautions of ultrasound therapy, ensuring its safe and effective use in physiotherapy

### Module 3. Other Electromagnetic Fields

- Apply the principles of laser therapy in treating musculoskeletal disorders
- Determine the appropriate dosimetry in the use of low-intensity laser
- Identify the clinical applications of infrared therapy in pathologies such as osteoarthritis
- Recognize the contraindications and precautions in the use of electromagnetic fields

### Module 4. General Principles of Electrotherapy

- Identify the main parameters of electric waves in Electrotherapy
- Classify currents according to frequency and waveform
- Apply currents based on frequency and properties of each type
- Recognize the importance of polarity alternation in electrotherapeutic applications

### Module 5. Electrostimulation for Muscle Strengthening

- Understand the basic principles of muscle contraction and its relationship with neuromuscular electrostimulation
- Identify key structures of the sarcomere and motor plate in the context of electrostimulation
- Differentiate between different types of muscle contraction and implement appropriate electrostimulation protocols
- Understand the types of muscle fibers and their influence on the response to electrostimulation
- Recognize the main neuromuscular injuries and their treatment using electrostimulation
- Apply electromyography techniques to assess the effectiveness of electrostimulation protocols

### Module 6. Electrostimulation in the Neurological Patient

- Assess nerve injuries to design effective electrostimulation treatments
- Apply electrotherapy currents to promote motor rehabilitation in neurological patients
- Use somatosensory electrotherapy to improve sensory perception in patients with neurological damage
- Identify contraindications and minimize adverse effects during electrostimulation application

### Module 7. Electrotherapy and Analgesia

- Define pain and understand its relationship with nociception for better application of Electrotherapy
- Classify nociceptors based on conduction speed, location, and type of stimulation
- Analyze nociceptive pathways to identify how they affect pain perception and treatment using Electrotherapy
- Apply the Gate Control theory to modulate pain at the segmental and suprasegmental levels
- Assess the effects of electrotherapy on pain modulation, including neuronal plasticity and therapeutic models
- Use high and low-frequency electrotherapy techniques to manage pain, adjusting dosage and parameters based on the type of treatment

### Module 8. Transcutaneous Electrical Nerve Stimulation (TENS)

- Describe the fundamentals of TENS current and its application in pain control according to the neurophysiology of the nociceptive process
- Classify the types of TENS current and understand their characteristics, such as frequency, impulse shape, and intensity
- Analyze the analgesic effects of high-frequency TENS, especially in hypoalgesia mechanisms and Gate control
- Examine low-frequency TENS, its mechanism of action through endogenous opioids, and its differences from conventional TENS
- Evaluate the importance of pulse width in the effectiveness of electrical stimulation, as well as the characteristics of the waves used
- Correctly apply electrodes in TENS, ensuring skin care and proper electrode types for therapy

### Module 9. Interferential Currrents

- Describe the fundamentals of interferential currents and their properties, as well as the effects they produce in therapeutic treatment
- Analyze the main parameters of interferential currents, focusing on frequency types, application time, and their relevance in therapies
- Explain the effects of high frequency in interferential currents and how they are applied to achieve therapeutic benefits
- Identify the main electrode types in interferential currents and their correct application according to the treatment type

### Module 10. Invasive Treatment in Electrotherapy

- Explain the fundamentals of invasive treatment in physiotherapy for analgesic purposes, highlighting the differences between infiltration and needling
- Describe dry needling and its relationship with myofascial pain syndrome, including the neurophysiology of trigger points
- Analyze the adverse effects of dry needling and the recommendations for post-needling treatment, as well as the combination with TENS
- Define types of electropuncture and their application in both invasive and non-invasive electrotherapy treatments
- Explore the benefits of PENS (Percutaneous Electrical Nerve Stimulation) compared to TENS, and its application in low back pain and other pathologies
- Explain the physical principles of galvanism and its applications, including galvanic current, iontophoresis, and percutaneous intratissue electrolysis

### Module 11. Magnetotherapy in Physiotherapy

- Evaluate the biochemical and cellular effects of magnetotherapy, focusing on the response of lymphocytes, macrophages, and bone tissue
- Determine the therapeutic effects of magnetotherapy on inflammation, vasodilation, and tissue repair
- Examine the clinical applications of magnetotherapy in treating pathologies such as osteoarthritis, bone consolidation, and shoulder injuries
- Explore the physical principles of magnetotherapy and its interaction with magnetic fields in the natural environment

### Module 12. Non-Invasive Brain Stimulation

- Understand the principles and mechanisms of non-invasive brain stimulation, highlighting its therapeutic applications
- Analyze different protocols for transcranial magnetic stimulation, evaluating their effects and safety
- Explore applications of transcranial direct current stimulation in clinical neuroscience and other therapeutic interventions
- Assess the efficacy of transcranial neuromodulation techniques combined with other therapies in treating various pathologies

*You will address conditions related to invasive treatment in electrotherapy, acquiring key skills for its proper application"*

05

# Career Opportunities

This Professional Master's Degree will provide comprehensive professional development, enabling specialists to stand out in a wide range of sectors. The trained professionals will be able to work in specialized care centers, sports associations, and institutions dedicated to wellness and rehabilitation. Moreover, the competencies acquired will allow them to lead projects, participate in multidisciplinary teams, and manage the care of patients with diverse conditions. As a result, graduates will be well-prepared to contribute in various work environments, significantly improving the health and well-being of athletes.

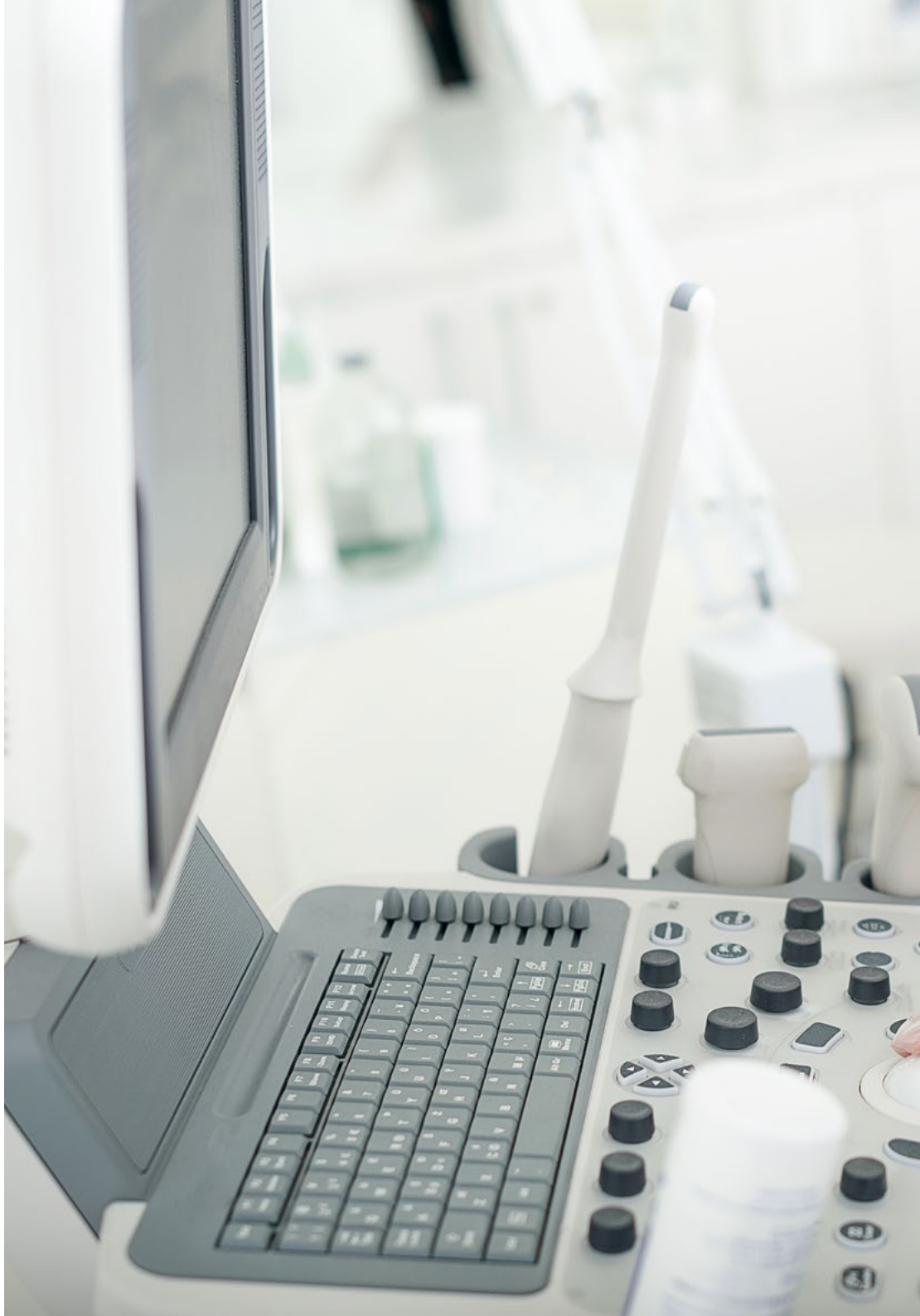
*You will assume specialized roles in rehabilitation, applying advanced techniques in institutions dedicated to wellness"*

### Graduate Profile

The graduate of this Professional Master's Degree will be a professional with a comprehensive vision of rehabilitation, capable of combining technical knowledge with an ethical and humanistic approach. They will also be prepared to identify and apply innovative treatments, optimizing therapeutic outcomes. Additionally, the graduate will possess strong adaptability to various contexts, being able to collaborate effectively with different professionals. Finally, their ability to evaluate and continually improve treatment processes will position them as a reference in their field, contributing to continuous improvement in healthcare.

*With this effective academic program, you will expand your comprehensive view of rehabilitation, addressing the key aspects involved in the recovery process.*

- **Effective Communication:** Convey ideas clearly and understandably, facilitating interaction and teamwork.
- **Critical Thinking:** Analyze complex situations, evaluate different perspectives, and make informed and strategic decisions.
- **Time Management:** Organize and prioritize tasks efficiently, ensuring deadlines and goals are met.
- **Adaptability:** Apply changes and new challenges, demonstrating flexibility and resilience in the face of unexpected situations.





After completing the university program, you will be able to apply your knowledge and skills in the following positions:

1. **Rehabilitation Director:** Leader of rehabilitation programs, overseeing their execution and ensuring compliance with therapeutic and administrative standards.
2. **Physical Therapist:** Responsible for designing and implementing treatment plans to improve mobility and alleviate pain in patients with musculoskeletal injuries.
3. **Neurological Rehabilitation Specialist:** Dedicated to providing care for patients with neurological disorders, such as strokes or spinal cord injuries, to improve their functionality.
4. **Respiratory Rehabilitation Specialist:** In charge of working with patients suffering from chronic or post-surgical respiratory diseases, helping them improve their lung capacity.
5. **Wellness Program Coordinator:** Manager in the implementation of wellness and health strategies, focusing on the prevention and maintenance of physical and mental health for individuals.
6. **Sports Physiotherapist:** Dedicated to the rehabilitation and prevention of sports injuries, helping athletes regain their physical form.
7. **Occupational Health Director:** Leader in the implementation of occupational health programs, promoting the prevention of work-related diseases and the rehabilitation of employees.
8. **Physical Therapy Technician:** Responsible for assisting physiotherapists in the application of therapeutic techniques, using specialized equipment to facilitate physical rehabilitation.
9. **Corporate Health and Wellness Manager:** Dedicated to developing strategies to improve the physical and mental well-being of employees within companies, implementing occupational health programs.

05

# Study Methodology

TECH is the world's first university to combine the **case study** methodology with **Relearning**, a 100% online learning system based on guided repetition.

This disruptive pedagogical strategy has been conceived to offer professionals the opportunity to update their knowledge and develop their skills in an intensive and rigorous way. A learning model that places students at the center of the educational process giving them the leading role, adapting to their needs and leaving aside more conventional methodologies.

*TECH will prepare you to face new challenges in uncertain environments and achieve success in your career"*

## The student: the priority of all TECH programs

In TECH's study methodology, the student is the main protagonist.
The teaching tools of each program have been selected taking into account the demands of time, availability and academic rigor that, today, not only students demand but also the most competitive positions in the market.

With TECH's asynchronous educational model, it is students who choose the time they dedicate to study, how they decide to establish their routines, and all this from the comfort of the electronic device of their choice. The student will not have to participate in live classes, which in many cases they will not be able to attend. The learning activities will be done when it is convenient for them. They can always decide when and from where they want to study.

*"At TECH you will NOT have live classes (which you might not be able to attend)"*

## The most comprehensive study plans at the international level

TECH is distinguished by offering the most complete academic itineraries on the university scene. This comprehensiveness is achieved through the creation of syllabi that not only cover the essential knowledge, but also the most recent innovations in each area.

By being constantly up to date, these programs allow students to keep up with market changes and acquire the skills most valued by employers. In this way, those who complete their studies at TECH receive a comprehensive education that provides them with a notable competitive advantage to further their careers.

And what's more, they will be able to do so from any device, pc, tablet or smartphone.

> *TECH's model is asynchronous, so it allows you to study with your pc, tablet or your smartphone wherever you want, whenever you want and for as long as you want"*

## Case Studies and Case Method

The case method has been the learning system most used by the world's best business schools. Developed in 1912 so that law students would not only learn the law based on theoretical content, its function was also to present them with real complex situations. In this way, they could make informed decisions and value judgments about how to resolve them. In 1924, Harvard adopted it as a standard teaching method.

With this teaching model, it is students themselves who build their professional competence through strategies such as Learning by Doing or Design Thinking, used by other renowned institutions such as Yale or Stanford.

This action-oriented method will be applied throughout the entire academic itinerary that the student undertakes with TECH. Students will be confronted with multiple real-life situations and will have to integrate knowledge, research, discuss and defend their ideas and decisions. All this with the premise of answering the question of how they would act when facing specific events of complexity in their daily work.

## Relearning Methodology

At TECH, case studies are enhanced with the best 100% online teaching method: Relearning.

This method breaks with traditional teaching techniques to put the student at the center of the equation, providing the best content in different formats. In this way, it manages to review and reiterate the key concepts of each subject and learn to apply them in a real context.

In the same line, and according to multiple scientific researches, reiteration is the best way to learn. For this reason, TECH offers between 8 and 16 repetitions of each key concept within the same lesson, presented in a different way, with the objective of ensuring that the knowledge is completely consolidated during the study process.

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

## A 100% online Virtual Campus with the best teaching resources

In order to apply its methodology effectively, TECH focuses on providing graduates with teaching materials in different formats: texts, interactive videos, illustrations and knowledge maps, among others. All of them are designed by qualified teachers who focus their work on combining real cases with the resolution of complex situations through simulation, the study of contexts applied to each professional career and learning based on repetition, through audios, presentations, animations, images, etc.

The latest scientific evidence in the field of Neuroscience points to the importance of taking into account the place and context where the content is accessed before starting a new learning process. Being able to adjust these variables in a personalized way helps people to remember and store knowledge in the hippocampus to retain it in the long term. This is a model called Neurocognitive context-dependent e-learning that is consciously applied in this university qualification.

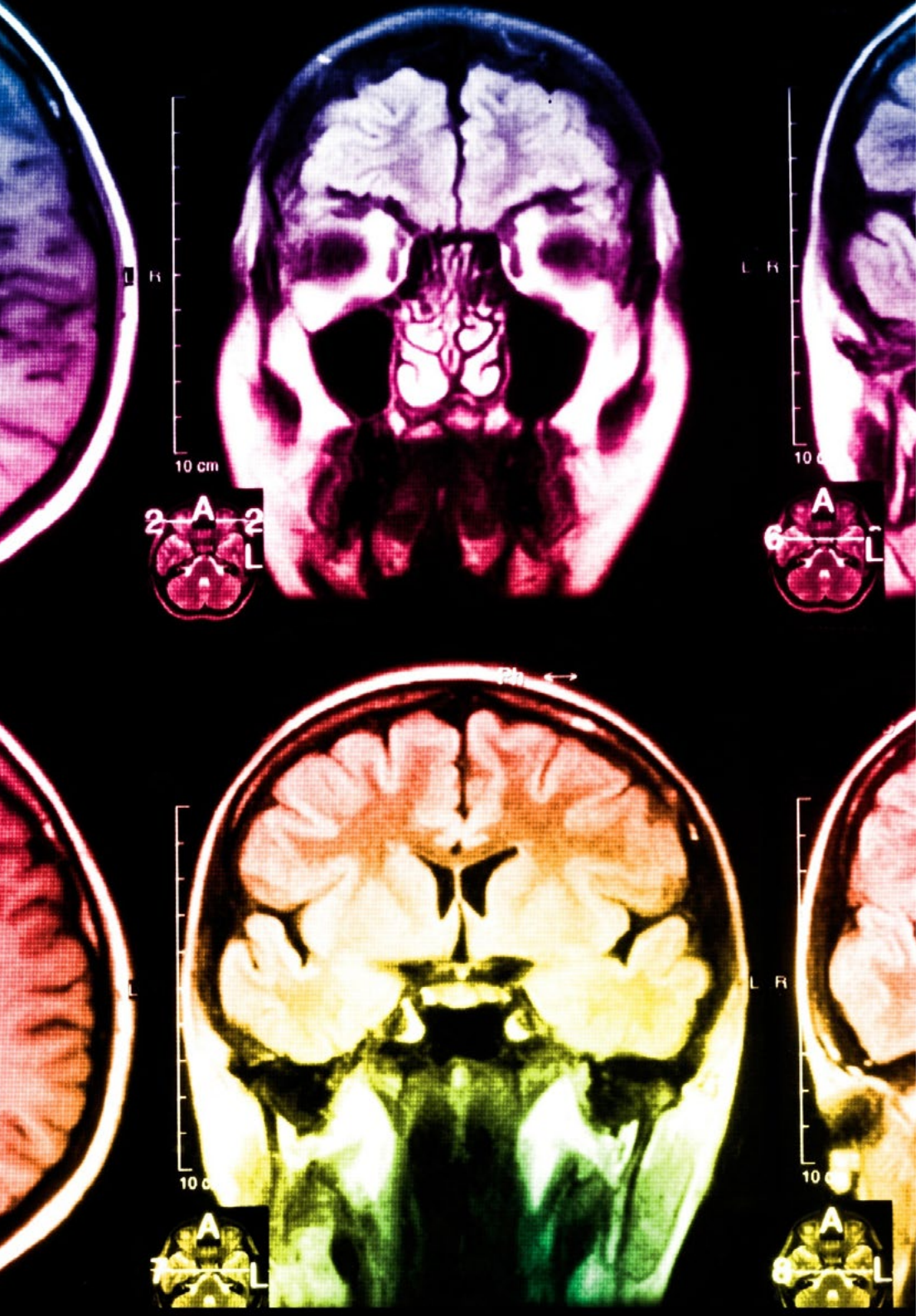
In order to facilitate tutor-student contact as much as possible, you will have a wide range of communication possibilities, both in real time and delayed (internal messaging, telephone answering service, email contact with the technical secretary, chat and videoconferences).

Likewise, this very complete Virtual Campus will allow TECH students to organize their study schedules according to their personal availability or work obligations. In this way, they will have global control of the academic content and teaching tools, based on their fast-paced professional update.

*The online study mode of this program will allow you to organize your time and learning pace, adapting it to your schedule"*

**The effectiveness of the method is justified by four fundamental achievements:**

1. Students who follow this method not only achieve the assimilation of concepts, but also a development of their mental capacity, through exercises that assess real situations and the application of knowledge.
2. Learning is solidly translated into practical skills that allow the student to better integrate into the real world.
3. Ideas and concepts are understood more efficiently, given that the example situations are based on real-life.
4. Students like to feel that the effort they put into their studies is worthwhile. This then translates into a greater interest in learning and more time dedicated to working on the course.



## The university methodology top-rated by its students

The results of this innovative teaching model can be seen in the overall satisfaction levels of TECH graduates.

The students' assessment of the teaching quality, the quality of the materials, the structure of the program and its objectives is excellent. Not surprisingly, the institution became the top-rated university by its students according to the global score index, obtaining a 4.9 out of 5.

*Access the study contents from any device with an Internet connection (computer, tablet, smartphone) thanks to the fact that TECH is at the forefront of technology and teaching.*

*You will be able to learn with the advantages that come with having access to simulated learning environments and the learning by observation approach, that is, Learning from an expert.*

As such, the best educational materials, thoroughly prepared, will be available in this program:

### 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.

This content is then adapted in an audiovisual format that will create our way of working online, with the latest techniques that allow us to offer you high quality in all of the material that we provide you with.

### Practicing Skills and Abilities

You will carry out activities to develop specific competencies and skills in each thematic field. Exercises and activities to acquire and develop the skills and abilities that a specialist needs to develop within the framework of the globalization we live in.

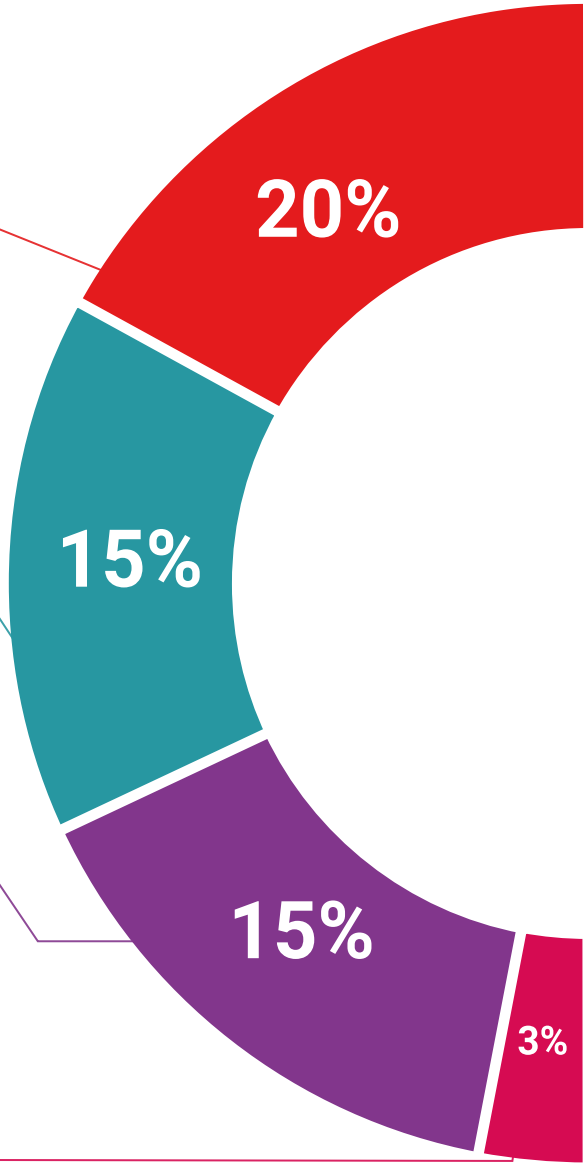
### Interactive Summaries

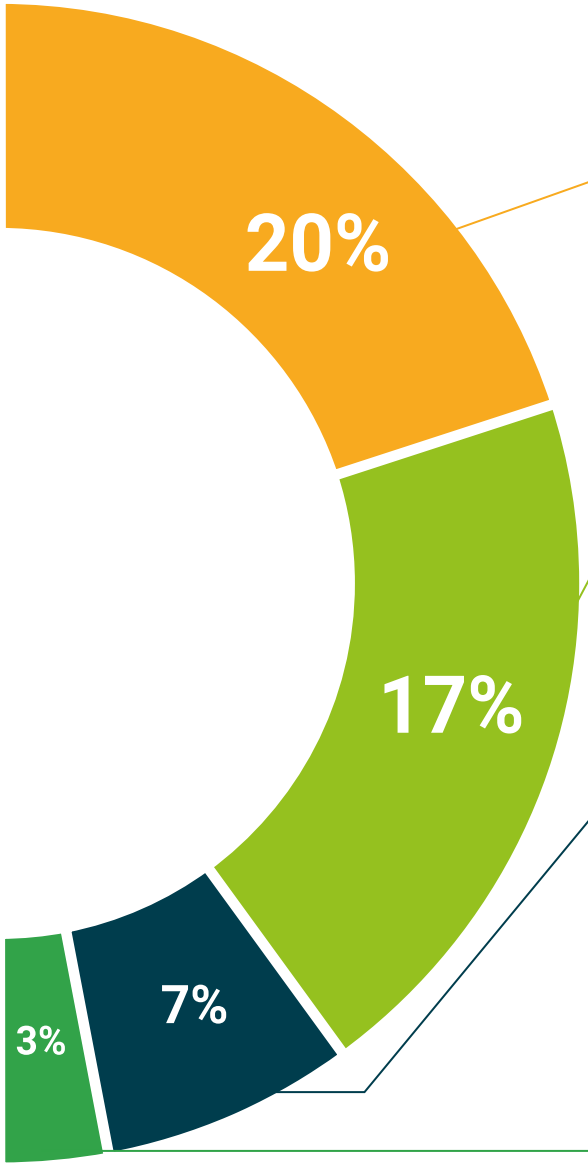
We present the contents attractively and dynamically in multimedia lessons that include audio, videos, images, diagrams, and concept maps in order to reinforce knowledge.

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

### Additional Reading

Recent articles, consensus documents, international guides... In our virtual library you will have access to everything you need to complete your education.






### Case Studies

Students will complete a selection of the best case studies in the field. Cases that are presented, analyzed, and supervised by the best specialists in the world.

### Testing & Retesting

We periodically assess and re-assess your knowledge throughout the program. We do this on 3 of the 4 levels of Miller's Pyramid.

### 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 for future difficult decisions.

### Quick Action Guides

TECH offers the most relevant contents of the course in the form of worksheets or quick action guides. A synthetic, practical and effective way to help students progress in their learning.

06

# Teaching Staff

The teaching team, composed of renowned experts in electrotherapy, offers students a unique academic experience. With years of practical and teaching experience, these professionals have designed this Professional Master's Degree with the goal of providing updated knowledge and cutting-edge tools. Their approach is focused on maximizing the development of specialized skills, providing high-level training that enables graduates to successfully face the challenges of the sector. Furthermore, each instructor contributes their vision and professional experience, ensuring that professionals receive quality training that will boost their careers.

*Only TECH Global University offers a university program designed by experts, allowing you to stand out in the field of Electrotherapy in Physical Activity and Sport"*

## Guest Directors

### Ms. Sanz Sánchez, Marta

- Physiotherapy Supervisor at the Hospital Universitario 12 de Octubre
- Graduate in Physiotherapy from the School of Nursing and Physiotherapy of the University of Comillas
- Degree in Physiotherapy from the School of Nursing and Physiotherapy of the University of Alcalá de Henares
- Associate Professor at the Complutense University of Madrid

### Mr. Hernández, Leonardo

- Supervisor of the Rehabilitation Service Unit of the 12 de Octubre University Hospital, versitaria Gimbernat
- Physiotherapist at the University Hospital of Guadalajara
- Diploma in Physiotherapy from the European University of Madrid
- Degree in Physiotherapy from Comillas Pontifical University
- Master's Degree in Osteopathy by Gimbernat University School

## Management

### Dr. León Hernández, José Vicente

- Physiotherapist expert in the Study and Treatment of Pain and Manual Therapy
- Doctorate in Physiotherapy from the Rey Juan Carlos University
- Master's Degree in the Study and Treatment of Pain from the Rey Juan Carlos University
- Degree in Chemical Sciences from the Complutense University of Madrid, specializing in Biochemistry
- Diploma in Physiotherapy from the Alfonso X el Sabio University
- Member and training coordinator at the Institute of Neuroscience and Movement Sciences

## Teachers

### Mr. Losana Ferrer, Alejandro

- Clinical Physiotherapist and Trainer in New Technologies for Rehabilitation at Rebiotex
- Physiotherapist at CEMTRO Clinic
- Master's Degree in Advanced Physiotherapy in Musculoskeletal Pain Management
- Expert in Neuroorthopedic Manual Therapy
- University Advanced Training in Therapeutic Exercise and Invasive Physiotherapy for Musculoskeletal Pain
- Graduate in Physiotherapy in La Salle

### Ms. Merayo Fernández, Lucía

- Physiotherapist Expert in Pain Management
- Physiotherapist in the Navarra Health Service
- Physiotherapist. Doctor San Martin Ambulatory
- Degree in Physiotherapy
- Master's Degree in Advanced Physiotherapy in Musculoskeletal Pain Management

### Dr. Cuenca - Martínez, Ferrán

- Physiotherapist Expert in Pain Management
- Physiotherapist at FisioCranioClinic
- Physiotherapist at the Institute of Functional Rehabilitation La Salle
- Researcher at the Center for Higher University Studies (CSEU La Salle)
- Researcher at EXINH Research Group
- Researcher in the Motion in Brans Research Group of the Institute of Neuroscience and Movement Sciences (INCIMOV)
- Chief editor of The Journal of Move and Therapeutic Science
- Editor and publisher of NeuroRehab News magazine
- Author of several scientific articles in national and international journals
- Doctor of Medicine and Surgery from the Autonomous University of Madrid
- Graduate in Physiotherapy from the University of Valencia
- Master's Degree in Advanced Physiotherapy in Pain Treatment by the UAM

### Mr. Suso Martí, Luis

- Physiotherapist
- Researcher at the Institute for Neurosciences and Movement Sciences
- Contributor to the popular science magazine NeuroRhab News
- Degree in Physiotherapy. University of Valencia
- Doctorate, Autonomous University of Madrid
- Degree in Psychology. Open University of Catalonia
- Master's Degree in "Advanced Physiotherapy in Pain Management".

### Dr. Gurdiel Álvarez, Francisco

- Physiotherapist at Powerexplosive
- Physiotherapist at Fisad Clinic
- Physiotherapist for Ponferradina Sports Society
- D. in Health Sciences from the Rey Juan Carlos University
- Bachelor's Degree in Physiotherapy from the University of León
- Degree in Psychology from the National University of Distance Education (UNED)
- Master's Degree in Advanced Physiotherapy in the Treatment of Musculoskeletal Pain by the Autonomous University of Madrid
- Expert in Orthopedic Manual Therapy and Myofascial Pain Syndrome by the European University

### Mr. Izquierdo García, Juan

- Physiotherapist at the Cardiac Rehabilitation Unit of the 12 de Octubre University Hospital
- Diploma in Physiotherapy from the Rey Juan Carlos University
- University Specialist in Heart Failure by the University of Murcia.
- Master's Degree in Health Care Management from the University of the Mid-Atlantic
- Expert in Manual Therapy in Muscular and Neuromeningeal Tissue by the Rey Juan Carlos University
- Member of: Multidisciplinary Cardiac Rehabilitation Unit of the 12 de Octubre University Hospital

**Mr. Román Moraleda, Carlos**

- Physiotherapist and Osteopath
- Physiotherapist at La Paz University Hospital
- Physiotherapist in Paris Public Hospitals
- Physiotherapist in Primary Care for the Madrid Health Service.
- Expert in Lymphatic Drainage and Complex Decompressive Physiotherapy

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

07

# Certificate

The Professional Master's Degree in Electrotherapy in Physical Activity and Sport guarantees students, in addition to the most rigorous and up-to-date education, access to a Postgraduate Certificate issued by TECH Global University..

*Successfully complete this program and receive your university qualification without having to travel or fill out laborious paperwork"*

This private qualification will allow you to obtain a **Professional Master's Degree in Electrotherapy in Physical Activity and Sport** endorsed by **TECH Global University**, the world's largest online university.

**TECH Global University** is an official European University publicly recognized by the Government of Andorra (***official bulletin***). Andorra is part of the European Higher Education Area (EHEA) since 2003. The EHEA is an initiative promoted by the European Union that aims to organize the international training framework and harmonize the higher education systems of the member countries of this space. The project promotes common values, the implementation of collaborative tools and strengthening its quality assurance mechanisms to enhance collaboration and mobility among students, researchers and academics.

This **TECH Global University** private qualification is a European program of continuing education and professional updating that guarantees the acquisition of competencies in its area of knowledge, providing a high curricular value to the student who completes the program.

Title: **Professional Master's Degree in Electrotherapy in Physical Activity and Sport**

Modality: **online**

Duration: **12 months**

Accreditation: **60 ECTS**


tech global university

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

**Professional Master's Degree in Electrotherapy in Physical Activity and Sport**

This is a private qualification of 1,800 hours of duration equivalent to 60 ECTS, with a start date of dd/mm/yyyy and an end date of dd/mm/yyyy.

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

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

Dr. Pedro Navarro Illana
Dean

This qualification must always be accompanied by the university degree issued by the competent authority to practice professionally in each country. Unique TECH Code: AFWORD23S techtitute.com/certificates


Professional Master's Degree in Electrotherapy in Physical Activity and Sport

General Structure of the Syllabus

| Subject type | ECTS |
|---|---|
| Compulsory (CO) | 60 |
| Optional (OP) | 0 |
| External Work Placement (WP) | 0 |
| Master's Degree Thesis (MDT) | 0 |
| | Total 60 |

General Structure of the Syllabus

| Year | Subject | ECTS | Type |
|---|---|---|---|
| 1º | High-Frequency Electrotherapy | 5 | CO |
| 1º | Ultrasound Therapy in Physiotherapy | 5 | CO |
| 1º | Other Electromagnetic Fields | 5 | CO |
| 1º | General Principles of Electrotherapy | 5 | CO |
| 1º | Electrostimulation for Muscle Strengthening | 5 | CO |
| 1º | Electrostimulation in the Neurological Patient | 5 | CO |
| 1º | Electrotherapy and Analgesia | 5 | CO |
| 1º | Transcutaneous Electrical Nerve Stimulation (TENS) | 5 | CO |
| 1º | Interferential Currrents | 5 | CO |
| 1º | Invasive Treatment in Electrotherapy | 5 | CO |
| 1º | Magnetotherapy in Physiotherapy | 5 | CO |
| 1º | Non-Invasive Brain Stimulation | 5 | CO |

Dr. Pedro Navarro Illana
Dean

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*Apostille Convention. In the event that the student wishes to have their paper diploma issued with an apostille, TECH Global University will make the necessary arrangements to obtain it, at an additional cost.

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# Professional Master's Degree

## Electrotherapy in Physical Activity and Sport

- Modality: **online**
- Duration: **12 months**
- Certificate: **TECH Global University**
- Credits: **60 ECTS**
- Schedule: **at your own pace**
- Exams: **online**

# Professional Master's Degree

## Electrotherapy in Physical Activity and Sport

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