Advanced Master's Degree

Strength Training and High Performance in Sports

Endorsed by the NBA

tech technological university

tech technological university

Advanced Master's Degree
Strength Training and High Performance in Sports

- Modality: **online**
- Duration: **2 years**
- Certificate: **TECH Technological University**
- Dedication: **16h/week**
- Schedule: **at your own pace**
- Exams: **online**

Website: www.techtitute.com/in/sports-science/advanced-master-degree/advanced-masters-degree-strength-training-high-performance-sports

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01

Introduction

Professional athletes are obliged to maintain a high level of performance and physical fitness that allows them to exercise under extreme training conditions. In the case of these professionals, strength and high performance exercises are part of their daily work, so they must have sports advisors to help them exercise their body at the highest level in complete safety and without risk of injury. It is for this reason that the professional will develop within this field a series of skills that will serve to deepen the current models of sports training.

Develop yourself in the world of high level personal training and help your clients to push their physical conditions to the limit and achieve the maximum performance of their body"

Elite and high-level sports require a greater physical effort on the part of the professionals who practice them than other athletes. Their physical conditions and performance are highly demanding, so personal trainers must have a high knowledge of the characteristics of each sport, in order to, through training, achieve the best possible performance and avoid injuries caused by overexertion.

For this this reason, TECH have designed this very complete Advanced Master's Degree in Strength Training and High Performance Sports, which has the participation of a team of specialized teachers with years of experience that will allow you to develop in this field with total guarantees of success. Specifically, this program is divided into two main blocks: on one hand, sports performance and, on the other hand, strength training and programming for sports performance. In this way, it is an innovative qualification that addresses in an up to date and in depth way the competences of sports performance.

This Advanced Master's Degree is a compendium of knowledge that seeks, in the most organic way possible, to provide the professional with information on the most effective techniques and procedures in strength training and high performance sports. Therefore, it is a program with the latest technology of the moment, which will allow students to update their information in a comfortable and distance way. In this way, it will be possible to easily combine study time with the rest of the daily obligations.

This **Advanced Master's Degree in Strength Training and High Performance in Sports** contains the most complete and up-to-date scientific program on the market. The most important features include:

- The latest technology in e-learning software
- Intensely visual teaching system, supported by graphic and schematic contents that are easy to assimilate and understand
- Practical cases presented by experts in active service
- State-of-the-art interactive video systems
- Teaching supported by remote education
- Continuous updating and retraining systems
- Autonomous learning: full compatibility with other occupations
- Practical exercises for self-evaluation and learning verification
- Support groups and educational synergies: questions to the expert, debate and knowledge forums
- Communication with the teacher and individual reflection work
- Content that is accessible from any, fixed or portable device with an Internet connection
- Complementary resource banks that are permanently available

We offer you high-level training so that you will be able to design the most appropriate routines for your users according to the type of sport they practice"

A high educational level qualification, supported by advanced technological development and the teaching experience of the best professionals"

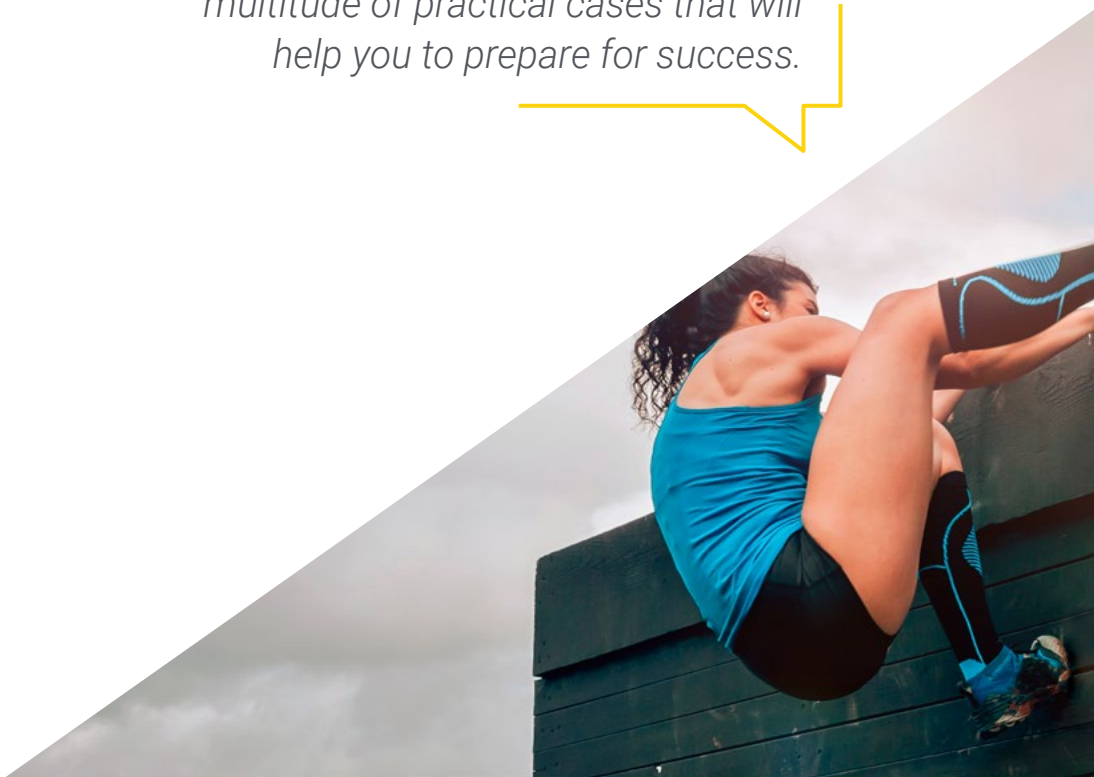
A program created for professionals who aspire to excellence, and that will enable you to easily and effectively acquire new skills and strategies.

Our teaching staff is made up of working professionals. In this way, we ensure that we provide you with the training update we are aiming for. A multidisciplinary team of doctors prepared and experienced in different environments, who will develop the theoretical knowledge in an efficient way, but above all, they will bring their practical knowledge from their own experience to the course.

This command of the subject is complemented by the effectiveness of the methodological design of this Advanced Master's Degree. Developed by a multidisciplinary team of e-learning experts, it integrates the latest advances in educational technology. In this way, you will be able to study with a range of easy-to-use and versatile multimedia tools that will give you the necessary skills you need for your specialization.

The design of this program is based on Problem-Based Learning, an approach that conceives learning as a highly practical process. To achieve this remotely, we will use telepractice learning. With the help of an innovative interactive video system, and *learning from an expert*, you will be able to acquire the knowledge as if you were actually dealing with the scenario you are learning about. A concept that will allow you to integrate and fix learning in a more realistic and permanent way.

We have the best methodology, the most updated syllabus and a multitude of practical cases that will help you to prepare for success.



02

Objectives

TECH's main objective for this Advanced Master's Degree is to provide up-to-date and effective information on the different techniques and procedures of strength training and high performance sports. This is a series of goals that students will be able to achieve as they progress through the program, so that their level of professionalism will benefit at the end of the qualification in the face of advances in sports science.

If your goal is to acquire a qualification that will enable you to compete among the best, look no further. At TECH we have everything you need"

General Objectives

- Master and apply with certainty the most current training methods to improve sports performance
- To effectively master statistics and thus be able to make a correct use of the data obtained from the athlete, as well as to initiate research processes
- Master the principles governing Exercise Physiology, as well as Biochemistry
- Master the principles governing Biomechanics applied directly to Sports Performance
- Master the principles governing Nutrition applied to sports performance
- Successfully integrate all the knowledge acquired in the different modules in real practice
- Delve into the knowledge based on the most current scientific evidence with full applicability in the practical field of strength training
- Master all the most advanced methods of strength training
- Apply with certainty the most current educational methods to improve sports performance regarding strength
- Effectively master strength training for performance enhancement in time and mark sports as well as situational sports
- Master the principles governing Exercise Physiology, as well as Biochemistry
- Delve into the principles that govern the Theory of Complex Dynamic Systems as they relate to strength training
- Successfully integrate strength training for the improvement of Motor Skills immersed in sport
- Successfully master all the knowledge acquired in the different modules in real practice

Specific Objectives

Module 1. Exercise Physiology and Physical Activity

- Gain in-depth knowledge of the energy metabolic pathways and their exercise-mediated modifications and their role in human performance
- Learn key aspects of the neuromuscular system, motor control and its role in physical training
- In-depth knowledge of muscle physiology, the process of muscle contraction and the molecular basis of this process
- Interpret the general causes of fatigue and impact in different types and modalities of exercise
- Interpret the different physiological milestones and their application in practice

Module 2. Statistics Applied to Performance and Research

- Promote the ability to analyze data collected in the laboratory and in the field through various assessment tools
- Describe the different types of statistical analysis and their application in various situations for the understanding of phenomena that occur during training
- Develop strategies for data exploration to determine the best models to describe them
- Establish the generalities of predictive models through regression analysis that favor the incorporation of different units of analysis in the training field
- Generate the conditions for the correct interpretation of results in different types of research

Module 3. Strength Training from Theory to Practice

- Correctly interpret all theoretical aspects defining strength and its components
- Master the most effective strength training methods
- Develop sufficient criteria to be able to support the choice of different training methods in their practical application
- Be able to objectify the strength needs of each athlete
- Master the theoretical and practical aspects that define power development
- Correctly apply strength training in the prevention and rehabilitation of injuries

Module 4. Speed Training from Theory to Practice

- Interpret the key aspects of speed and change of direction technique
- Compare and differentiate the speed of situational sport with respect to the track and field model
- Incorporate elements of judgment of technical observation that make it possible to discriminate errors in the mechanics of the race and the procedures for their correction
- Delve into the the bioenergetic aspects of single and repeated sprinting and how they relate to the training processes
- Differentiate the mechanical aspects that may influence performance impairment and the mechanisms of injury occurrence when sprinting
- Apply in an analytical way the different means and methods of training for the development of the different phases of speed
- Program speed training in situational sports

Module 5. Endurance Training from Theory to Practice

- Study the different adaptations generated by aerobic endurance
- Apply the physical demands of situational sports
- Select the most appropriate tests to evaluate, monitor, tabulate and fractionate aerobic workloads
- Carry out the different methods to organize training sessions
- Design training sessions taking into account the sport

Module 6. Mobility from theory to performance

- Approach mobility as a basic physical capacity from a neurophysiological perspective
- Have a deep understanding of the neurophysiological principles that affect the development of mobility
- Apply stabilizing and mobilizing systems within the movement pattern
- Unpack and specify the basic concepts and objectives related to mobility training
- Develop the ability to design tasks and plans for the development of manifestations of mobility
- Apply the different methods of performance optimization through recovery methods
- Develop the ability to carry out a functional and neuromuscular assessment of the athlete
- Recognize and address the effects produced by an injury at the neuromuscular level in the athlete

Module 7. Sports Performance Assessment

- Delve in the different types of assessment and their applicability to the field of practice
- Select the most appropriate tests for your specific needs
- Correctly and safely administer the protocols of the different tests and the interpretation of the data collected
- Apply different types of technologies currently used in the field of exercise assessment, whether in the field of health and fitness performance at any level of demand

Module 8. Planning Applied to High Performance in Sports

- Understand the internal logic of planning, such as its proposed core models
- Apply the dose-response concept in training
- Clearly differentiate the impact of programming with planning and its dependencies
- Acquire the ability to design different planning models according to the work reality
- Apply the concepts learned in an annual and/or multi-year planning design

Module 9. Biomechanics Applied to High Performance in Sports

- Specialize in the principles of Biomechanics oriented to physical education and Sport
- Apply the basic knowledge and technologies of biomechanics as a function of physical education, sport, performance and daily life
- Value the importance of protocols and the different types of biomechanical evaluation as a fundamental factor in the process of sports development and assessment
- Develop critical and analytical thinking that will allow him/her to generate innovative protocols and procedures, with different types of technology

Module 10. Nutrition Applied to High Performance in Sports

- Learn the physiological and biochemical bases of energy metabolism during physical exertion
- Learn the processes and methods of nutritional evaluation of the athlete, as well as his body composition.
- Learn the different options to assess the athlete's energy expenditure
- Learn all the variables regarding nutrition in sports disciplines of very different characteristics
- Interpret the latest scientific evidence on sports supplementation
- Handle the nutritional aspects that are associated with eating disorders and sports injuries

Module 11. Strength Training for the Improvement of Movement Skills

- Know and interpret key aspects of biochemistry and thermodynamics
- Delve the functioning of the cardiovascular and respiratory systems and the use of oxygen during exercise
- Manage the general causes of fatigue and impact in different types and modalities of exercise
- Identify the different physiological breakthroughs and their practical application

Module 12. Strength Training Under the Paradigm of Complex Dynamic Systems

- Understand in-depth the relationship that exists between strength and skills
- Identify the main skills in sports in order to analyze them, understand them and then enhance them through training
- Organize and systematize the skill development process
- Link and relate field and gym work to enhance skills

Module 13. Prescription and Programming of Strength Training

- Master specific knowledge about the theory of systems in sports training
- Analyze the different components that are interrelated in strength training and their application in situational sports
- Guide strength training methodologies towards a perspective that addresses the specific demands of sport
- Develop a critical view of the reality of strength training for athletic and non-athletic populations

Module 14. Methodology of Strength Training

- Specialize and interpret the key aspects of strength training
- In-depth knowledge of the different components of the load
- Delve into key aspects of planning, periodization and load monitoring
- Gain in-depth knowledge of the different session set-up schemes
- Manage the most common prescribing, monitoring and adjustment models

Module 15. Theory of Strength Training and Bases for Structural Training

- Gain in-depth knowledge of the different methodological proposals of strength training and their applicability to the field of practice
- Select the most appropriate methods for specific needs
- Recognize and safely apply the different methods proposed in the literature

Module 16. Strength Training to Improve Speed

- Master the theoretical terms as far as Strength Training is concerned
- Master the theoretical terms as far as Power Training is concerned
- Master the methodological aspects of training for hypertrophic purposes
- Master the Physiological aspects of training for hypertrophic purposes

Module 17. Assessing Sports Performance in Strength Training

- Know and interpret the key aspects of the techniques for speed and changing direction.
- Compare and differentiate the speed of situational sport with respect to the track and field model
- Know in depth which are the mechanical aspects that can influence in the decrease of performance and in the mechanisms of injury production in sprinting
- Analytically apply the different means and methods of strength training for the development of sprinting

Module 18. Strength Training in Situational Sports

- Gain an in-depth understanding of the logic of movement-based training design
- Differentiate between means and methods for strength
- Detect priority movement patterns for applying force in the sport at hand
- Understand the functioning and application of technological means in the service of strength training

Module 19. Training in Medium and Long Duration Sports

- Gain an in-depth understanding of the logic of movement-based training design
- Differentiate between means and methods for strength
- Detect priority movement patterns for applying force in the sport at hand
- Understand the functioning and application of technological means in the service of strength training

We offer you high-level training to meet our goal of academic excellence, but, above all, to help you compete with the best"

03

Skills

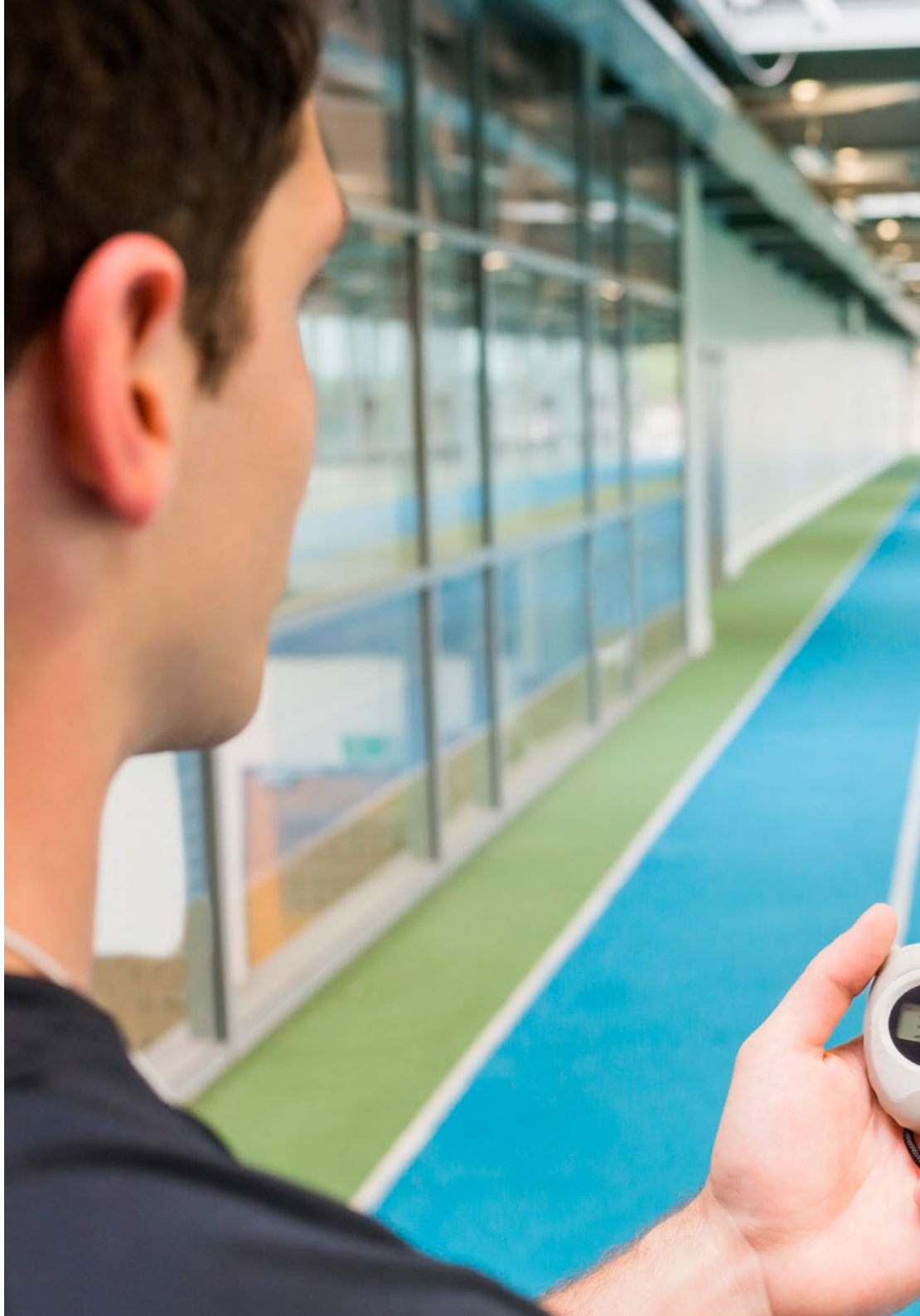
Once all the contents have been studied and the objectives of the program have been achieved, the professional will have superior skill and performance in this field. A very complete approach in a high-level master's degree which makes the difference.

Achieve success in any profession that requires effort and perseverance. But, above all, the support of professionals, who will give you the boost you need, with the necessary means and assistance. At TECH, we offer you everything you need"

General Skills

- Acquire knowledge based on the most current scientific evidence with full applicability in the practical field
- To master all the most advanced methods of sports performance evaluation
- Successfully integrate strength training to improve sports skills

Our objective is very simple: to offer you a quality specialization, with the best teaching system of the moment, so that you can improve and obtain personal and professional growth"



Specific Skills

- Delve into the functioning of the cardiovascular and respiratory systems and oxygen utilization during exercise
- Organize and systematize the skill development process
- Analyze the different components that are interrelated in strength training and their application in situational sports
- Delve into key aspects of strength training planning, periodization and monitoring of the Master in depth in the theoretical terms of strength training
- Compare and differentiate the speed of situational sport with respect to the track and field model
- Correctly and safely administer the protocols of the different tests and the interpretation of the data collected
- Detect priority movement patterns for applying force in the sport at hand
- Identify and analyze the mechanisms of force production in different endurance disciplines

04

Course Management

In its commitment to educational excellence, TECH has selected for this program the best faculty in the field of strength training and high performance sports. They are active teachers with an extensive professional background, which has helped them to stand out in the field of sports science. On the other hand, they are teachers chosen for their proven experience in the educational field, professionals from different areas and skills that make up a complete multidisciplinary cast.

Our professors bring their vast experience and their teaching skills to offer you a stimulating and creative specialized educational program"

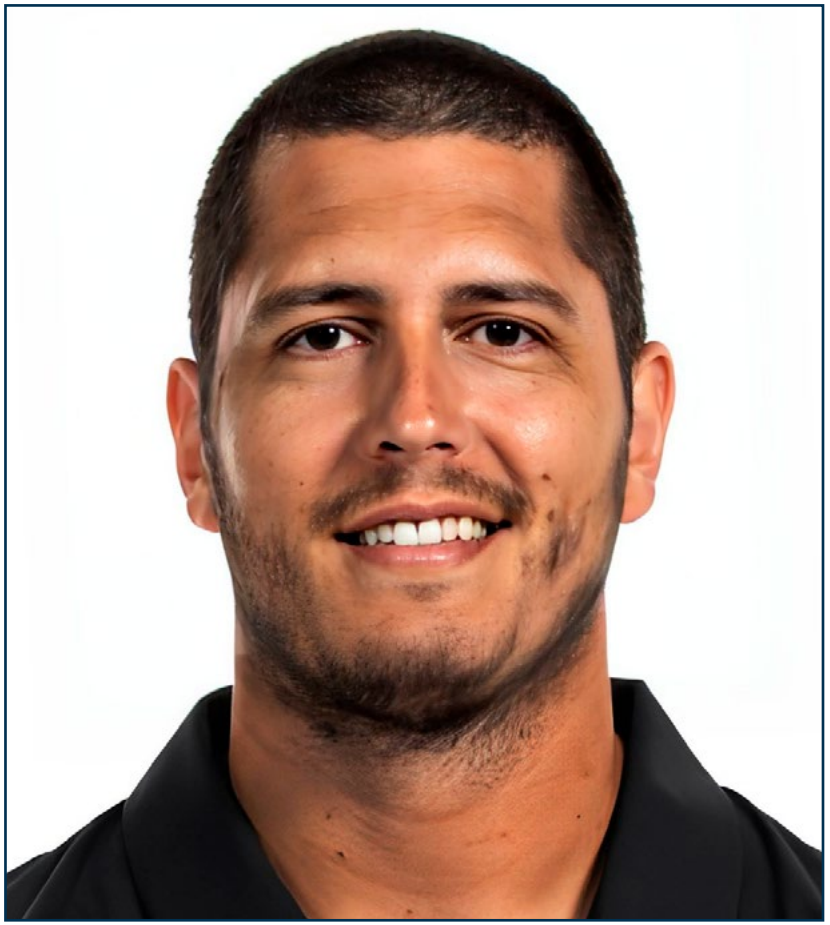
International Guest Director

Tyler Friedrich, Ph.D., is a leading personality in the international field of Sports Performance and Applied Sports Science. With a strong academic background, he has demonstrated an exceptional commitment to excellence and innovation, and has contributed to the success of numerous elite athletes internationally.

Throughout his career, Tyler Friedrich has deployed his expertise in a wide range of sporting disciplines, from football to swimming, volleyball to field hockey. His work in performance data analysis, especially through the Catapult athlete GPS system, and his integration of sports technology into performance programs, has established him as a leader in athletic performance optimization.

As Director of Sports Performance and Applied Sports Science, Dr. Friedrich has led strength and conditioning training, as well as the implementation of specific programs for several Olympic sports, including volleyball, rowing and gymnastics. Here, he has been responsible for integrating equipment services, sports performance in soccer and sports performance in Olympic sports. In addition, incorporating DAPER sports nutrition within an athlete performance team.

Also certified by USA Weightlifting and the National Strength and Conditioning Association, he is recognized for his ability to combine theoretical and practical knowledge in the development of high performance athletes. In this way, Dr. Tyler Friedrich has left an indelible mark on the world of Sports Performance, being an outstanding leader and driver of innovation in his field.

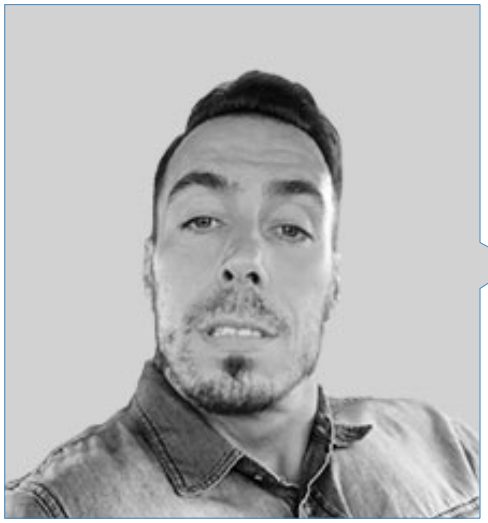


Dr. Friedrich, Tyler

- Director of Sports Performance and Applied Sports Science at Stanford University
- Sports Performance Specialist
- Associate Director of Athletics and Applied Performance at Stanford University
- Director of Olympic Sport Performance at Stanford University
- Sports Performance Coach at Stanford University
- Ph.D. in Philosophy, Health and Human Performance from Concordia University Chicago
- Master of Science in Exercise Science from the University of Dayton
- Bachelor of Science, Exercise Physiology from the University of Dayton

Thanks to TECH, you will be able to learn with the best professionals in the world"

Management



Dr. Rubina, Dardo

- Specialist in High Performance Sports
- CEO of Test and Training
- Physical Trainer at Moratalaz Sports School.
- Teacher of Physical Education in Football and Anatomy. CENAFE Schools Carlet
- Coordinator of Physical Preparation in Field Hockey. Club Gimnasia y Esgrima de Buenos Aires.
- Doctorate in High Performance Sports
- Postgraduate Certificate in Advanced Research Studies (DEA), University of Castilla la Mancha.
- Master in High Performance Sports by the Autonomous University of Madrid.
- Postgraduate in Physical Activity in Populations with Pathologies by the University of Barcelona.
- Competitive Bodybuilding Technician. Extremadura Federation of Bodybuilding and Fitness.
- Expert in Sports Scouting and Quantification of Training Load (specialization in Soccer), Sports Sciences. University of Melilla
- Expert in Advanced Weight Training by IFBB
- Expert in Advanced Nutrition by IFBB
- Specialist in Physiological Assessment and Interpretation of Physical Fitness by Bio
- Certification in Technologies for Weight Control and Physical Performance. Arizona State University

Professors

Añon, Pablo

- Physical trainer of the Women's National Volleyball Team for the Olympic Games
- Physical trainer of volleyball teams of the Argentine Men's First Division
- Physical trainer of professional golfers Gustavo Rojas and Jorge Berent
- Swimming coach of Quilmes Atlético Club
- National Professor of Physical Education (INEF) in Avellaneda
- Postgraduate degree in Sports Medicine and Applied Sports Sciences from the Universidad de la Plata
- Master's Degree in High Performance Sports from the Catholic University of Murcia
- Training courses oriented to the field of High Performance Sports

Carbone, Leandro

- Teacher of Strength Training and Physical Conditioning
- CEO of LIFT, a training and coaching company
- In charge of the Department of Sports Evaluations and Exercise Physiology. WellMets - Institute of Sports and Medicine in Chile
- CEO/ Manager at Complex I
- University Lecturer
- External Consultant for Speed4lift, a leading company in the area of sports technology
- Bachelor's Degree in Physical Activity from Universidad del Salvador
- Specialist in Exercise Physiology, Universidad Nacional de La Plata
- *MCs. Strength and Conditioning* at Greenwich University, UK

Mr. Masse, Juan Manuel

- Physical trainer for high performance athletes
- Director of the Athlon Science Study Group
- Physical trainer for several professional soccer teams in South America

Mr. Jareño Díaz, Juan

- Physical and Sport Preparation Specialist
- Coordinator of the education and physical preparation area at the Moratalaz Sports School
- University Lecturer
- Personal trainer and sports trainer at Estudio 9.8 Gravity
- Graduated in Physical Activity and Sport Sciences from the University of Castilla la Mancha
- Master's Degree in Physical Preparation in Soccer by the University of Castilla la Mancha
- Postgraduate degree in Personal Training from the University of Castilla la Mancha

Del Rosso, Sebastián

- Expert researcher in Sports Biochemistry
- Postdoctoral Researcher at the Clinical Biochemistry and Immunology Research Center
- Researcher in the Lifestyle and Oxidative Stress Research Group
- Co-author of numerous scientific publications
- Director of the Editorial Board of the journal PubliCE Standard
- Director of the Editorial Department of Grupo Sobre Entrenamiento
- PhD in Health Sciences from the National University of Cordoba
- Degree in Physical Education from the National University of Catamarca
- Master's Degree in Physical Education from the Catholic University of Brasilia

Vilariño, Leandro

- Physical trainer for high performance athletes
- Physical Trainer of the Bolivian Football Club The Strongest
- Physical Trainer of professional teams in the Argentinean league
- Degree in Physical Activity and Sport

César García, Gastón

- Expert Hockey and Rugby Physical Trainer
- Physical trainer of the professional field hockey player Sol Alias
- Physical trainer of the Carmen Tenis Club field hockey team
- Personal trainer for rugby and field hockey athletes
- Physical trainer for U18 rugby clubs
- Physical Education teacher for children
- Co-author of the book Estrategias para la evaluación de la condición física en niños y adolescentes (Strategies for the evaluation of physical condition in children and adolescents)
- Degree in Physical Education from the National University of Catamarca
- National Teacher of Physical Education by ESEF San Rafael
- Technician in Anthropometry level 1 and 2

Dr. Represas Lobeto, Gustavo Daniel

- Physical Trainer and Researcher oriented to High Performance Sports
- Responsible for the Laboratory of Sports Biomechanics at the National Center of High Performance Sports of Argentina
- Head of the Laboratory of Biomechanics, Functional Analysis of Movement and Human Performance at the National University of San Martín
- Physical trainer and Scientific Advisor of the Olympic Taekwondo team for the Sydney Olympic Games
- Physical trainer for professional rugby clubs and players
- Teacher in university studies
- PhD in High Performance Sports from the University of Castilla-La Mancha
- Degree in Physical Education and Sports from the Universidad Abierta Interamericana
- Master in High Performance Sports by the Autonomous University of Madrid.
- National Physical Education Teacher

Tinti, Hugo

- Physical Trainer of the Estudiantes de Merida Club
- Physical Trainer of the Estudiantes de Merida Club
- Former Physical Trainer at Oriente Petrolero Soccer Club
- Former Physical Trainer for Alianza Petrolera
- Former Physical Trainer of the fourth division of Club Arsenal
- Master's Degree in Sports Big Data from Universidad Católica San Antonio de Murcia
- Degree in Physical Education from the National University of San Martín

Rossanigo, Horacio

- Strength and Conditioning Coach at FC Barcelona
- Sports Director of Activarte Sport Barcelona
- Co-founder of Build Academy
- Physical Trainer at Acumen Sports
- Physical Education Teacher at Washington School
- Rugby Coach at Uncas Rugby Club
- Physical Education Teacher at the Instituto Superior Tandil
- Bachelor's Degree in Physical Education and Physiology of Physical Labor
- Master's Degree in Physical Preparation in Team Sports at INEF Barcelona

D. Gizzarelli, Matías Bruno

- Physical trainer for high performance athletes
- Coach specialized in EXOS performance for basketball players
- Degree in Physical Education
- Postgraduate Diploma in Applied Neurosciences
- Author of the Book *Baloncesto Formativo: Preparación Física*

Varela, Mauricio Carlos

- Specialist in Integral Physical Training
- Physical Education Teacher
- Personal trainer for older adults
- Physical Trainer, Personal Trainer of Elite Cyclists of the Astronomy Cycling Circuit
- Degree in Physical Education
- Postgraduate Diploma in Exercise Programming and Assessment. Postgraduate Course, FaHCE-UNLP
- ISAK level 1 accredited anthropometrist
- Member of the ISAK International Society for the Advancement of Cineanthropometry

Ms. González Cano, Henar

- Sports Nutritionist
- Nutritionist and Anthropometrist at GYM SPARTA
- Nutritionist and Anthropometrist at Promentium Center
- Nutritionist in Male soccer Equipment
- Lecturer in courses related to Strength and Fitness
- Speaker at training events on Sports Nutrition
- Graduate in Human Nutrition and Dietetics from the University of Valladolid
- Graduate in Human Nutrition and Dietetics from the University of Valladolid
- Course of Nutrition and Dietetics applied to physical exercise by the University of Vich

Garzon Duarte, Mateo

- Independent physical trainer
- Assistant and substitute teacher of Biochemistry and Training at Universidad del Salvador
- Physical trainer and coordinator at SportsLab, a high performance sports center specialized in tennis
- MGD-Personalized Training S&C Coach
- Bachelor's Degree in Physical Activity from Universidad del Salvador
- Certified Strength and Conditioning Specialist by CSCS, CSCS
- Professional Massage Therapist for the Medical School Center

Palarino, Matías

- Physical Trainer of the Professional Staff of Club Social y Deportivo Defensa y Justicia.
- CEO in An&En Analysis and Training
- Physical Trainer of the Men's Soccer Reserve Team of Club Atlético Vélez Sarsfield
- Physical trainer in Professional Soccer
- Physical Trainer in Field Hockey
- Physical Trainer in Rugby
- Personal trainer
- Graduate in High Performance Sports at the National University of Lomas in Zamora
- Professor of Physical Education by the ISEF nº1.
- Extensive teaching experience in physical preparation and load control courses

Trobadelo, Pablo Omar

- Physical Trainer of the Argentine Women's Volleyball National Team
- Trainer and consultant in T Movement, Strength & Performance
- Sports Technical Coordinator at KI Gym Concept
- Master's Degree in Training and Development of Sports Performance from the National University of Lomas de Zamora

Vaccarini, Adrián Ricardo

- Physical trainer specialized in top level soccer
- Head of the Applied Sciences Field of the Peruvian Football Federation
- Second Physical Trainer of the Peruvian National Senior Soccer Team
- Physical Trainer of the Peruvian Sub 23 National Team
- Responsible for the research and performance analysis area of Quilmes
- Responsible for the research and performance analysis area of Velez Sarsfield
- Regular speaker at High Performance Sport Congresses
- Degree in Physical Education
- National Physical Education Teacher

We have selected the best teaching staff to offer you training of the highest academic level"

05

Structure and Content

The contents of this program have been developed by different professors with a clear purpose: to ensure that our students acquire each and every one of the skills necessary to become true experts in this subject. The content of this Advanced Master's Degree will allow you to learn all aspects of the different disciplines involved in this field. A comprehensive and well-structured program that will lead the professional to the highest standards of quality and success.

We offer you the most advanced knowledge of the moment in this field so that you can acquire a higher level of education that will allow you to compete with the best"

Module 1. Exercise Physiology and Physical Activity

1.1. Thermodynamics and Bioenergetics
- 1.1.1. Definition
- 1.1.2. General concepts
  - 1.1.2.1. Organic Chemistry
  - 1.1.2.2. Functional Groups
  - 1.1.2.3. Enzymes
  - 1.1.2.4. Coenzymes
  - 1.1.2.5. Acids and Bases
  - 1.1.2.6. pH

1.2. Energy Systems
- 1.2.1. General concepts
  - 1.2.1.1. Capacity and Power
  - 1.2.1.2. Cytoplasmic Vs. Mitochondrial
- 1.2.2. Phosphagen Metabolism
  - 1.2.2.1. ATP - PC
  - 1.2.2.2. Pentose Pathway
  - 1.2.2.3. Nucleotide Metabolism
- 1.2.3. Carbohydrate Metabolism
  - 1.2.3.1. Glycolysis
  - 1.2.3.2. Glycogenogenesis
  - 1.2.3.3. Glycogenolysis
  - 1.2.3.4. Gluconeogenesis
- 1.2.4. Lipid Metabolism
  - 1.2.4.1. Bioactive Lipids
  - 1.2.4.2. Lipolysis
  - 1.2.4.3. Beta-oxidation
  - 1.2.4.4. De Novo Lipogenesis
- 1.2.5. Oxidative Phosphorylation
  - 1.2.5.1. Oxidative Decarboxylation of Pyruvate
  - 1.2.5.2. Krebs Cycle
  - 1.2.5.3. Electron Transport Chain
  - 1.2.5.4. ROS
  - 1.2.5.5. *Mitochondial Crosstalk*

1.3. Signaling Pathways
- 1.3.1. Second Messengers
- 1.3.2. Steroid Hormones
- 1.3.3. AMPK
- 1.3.4. NAD+
- 1.3.5. PGC1

1.4. Skeletal Muscle
- 1.4.1. Structure and Function
- 1.4.2. Fibers
- 1.4.3. Innervation
- 1.4.4. Muscle Cytoarchitecture
- 1.4.5. Protein Synthesis and Breakdown
- 1.4.6. mTOR

1.5. Neuromuscular Adaptations
- 1.5.1. Motor Unit Recruitment
- 1.5.2. Synchronization
- 1.5.3. *Neural Drive*
- 1.5.4. Golgi Tendon Organ and Neuromuscular Spindle

1.6. Structural Adaptations
- 1.6.1. Hypertrophy
- 1.6.2. Signal Mechanotransduction
- 1.6.3. Metabolic Stress
- 1.6.4. Muscle Damage and Inflammation
- 1.6.5. Changes in Muscular Architecture

1.7. Fatigue
- 1.7.1. Central Fatigue
- 1.7.2. Peripheral Fatigue
- 1.7.3. HRV
- 1.7.4. Bioenergetic Model
- 1.7.5. Cardiovascular Model
- 1.7.6. Thermoregulator Model
- 1.7.7. Psychological Model
- 1.7.8. Governor Central Model

1.8. Maximum Oxygen Consumption
- 1.8.1. Definition
- 1.8.2. Assessment
- 1.8.3. VO2 Kinetics
- 1.8.4. VAM
- 1.8.5. Running Economics

1.9. Thresholds
- 1.9.1. Lactate and Ventilatory Threshold
- 1.9.2. MLSS
- 1.9.3. Critical Power
- 1.9.4. HIIT and LIT
- 1.9.5. Anaerobic Speed Reserve

1.10. Extreme Physiological Conditions
- 1.10.1. Height
- 1.10.2. Temperature
- 1.10.3. Diving

Module 2. Statistics Applied to Performance and Research

2.1. Notions of Probability
- 2.1.1. Simple Probability
- 2.1.2. Conditional Probability
- 2.1.3. Bayes' Theorem

2.2. Probability Distributions
- 2.2.1. Binomial Distribution
- 2.2.2. Poisson distribution
- 2.2.3. Normal Distribution

2.3. Statistical Inference
- 2.3.1. Population Parameters
- 2.3.2. Estimation of Population Parameters
- 2.3.3. Sampling Distributions Associated with the Normal Distribution
- 2.3.4. Distribution of the Sample Mean
- 2.3.5. Point Estimators
- 2.3.6. Properties of Estimators
- 2.3.7. Estimator Comparison Criteria
- 2.3.8. Estimators by Confidence Regions
- 2.3.9. Method of Obtaining Confidence Intervals
- 2.3.10. Confidence Intervals Associated With Normal Distribution
- 2.3.11. Central Limit Theorem

2.4. Hypothesis Test
- 2.4.1. P-Value
- 2.4.2. Statistical Power

2.5. Exploratory Analysis and Descriptive Statistics
- 2.5.1. Graphs and Tables
- 2.5.2. Chi-Square Test
- 2.5.3. Relative Risk
- 2.5.4. Odds Ratio

2.6. The T-Test
- 2.6.1. One-Sample T-Test
- 2.6.2. T-Test for Two Independent Samples
- 2.6.3. T-Test for Paired Samples

2.7. Correlation Analysis

2.8. Simple Linear Regression Analysis
- 2.8.1. The Regression Line and its Coefficients
- 2.8.2. Residuals
- 2.8.3. Regression Assessment Using Residuals
- 2.8.4. Coefficient of Determination

2.9. Variance and Analysis of Variance (ANOVA)
- 2.9.1. *One-Way* ANOVA
- 2.9.2. *Two-Way* ANOVA
- 2.9.3. ANOVA for Repeated Measures
- 2.9.4. Factorial ANOVA

Module 3. Strength Training from Theory to Practice

3.1. Strength: Conceptualization
- 3.1.1. Strength Defined from a Mechanical Point of View
- 3.1.2. Strength Defined from a Physiology Point of View
- 3.1.3. Define the Concept of Applied Strength
- 3.1.4. Time-Strength Curve
  - 3.1.4.1. Interpretation
- 3.1.5. Define the Concept of Maximum Strength
- 3.1.6. Define the Concept of RFD
- 3.1.7. Define the Concept of Useful Strength
- 3.1.8. Strength-Speed-Power Curves
  - 3.1.8.1. Interpretation
- 3.1.9. Define the Concept of Strength Deficit

3.2. Training Load
- 3.2.1. Define the Concept of Strength Training Load
- 3.2.2. Define the Concept of Load
- 3.2.3. Load Concept: Volume
  - 3.2.3.1. Definition and Applicability in Practice
- 3.2.4. Load Concept: Intensity
  - 3.2.4.1. Definition and Applicability in Practice
- 3.2.5. Load Concept: Density
  - 3.2.5.1. Definition and Applicability in Practice
- 3.2.6. Define the Concept of Effort Character
  - 3.2.6.1. Definition and Applicability in Practice

3.3. Strength Training in the Prevention and Rehabilitation of Injuries
- 3.3.1. Conceptual and Operational Framework in Injury Prevention and Rehabilitation
  - 3.3.1.1. Terminology
  - 3.3.1.2. Concepts
- 3.3.2. Strength Training and Injury Prevention and Rehabilitation Under Scientific Evidence
- 3.3.3. Methodological Process of Strength Training in Injury Prevention and Functional Recovery
  - 3.3.3.1. Defining the Method
  - 3.3.3.2. Applying the Method in Practice
- 3.3.4. Role of Core Stability (CORE) in Injury Prevention
  - 3.3.4.1. Definition of CORE
  - 3.3.4.2. CORE Training

3.4. Plyometric Method
- 3.4.1. Physiological Mechanisms
  - 3.4.1.1. Specific General Information
- 3.4.2. Muscle Actions in Plyometric Exercises
- 3.4.3. The Stretch-Shortening Cycle (CEA)
  - 3.4.3.1. Use of Energy or Elastic Capacity
  - 3.4.3.2. Reflex Involvement Series and Parallel Elastic Energy Accumulation
- 3.4.4. CEA Classification Scheme
  - 3.4.4.1. Short CEA
  - 3.4.4.2. Long CEA
- 3.4.5. Properties of the Muscle and Tendon
- 3.4.6. Central Nervous System
  - 3.4.6.1. Recruitment
  - 3.4.6.2. Frequency (F)
  - 3.4.6.3. Synchronization
- 3.4.7. Practical Considerations

3.5. Power Training
- 3.5.1. Definition of Power
  - 3.5.1.1. Conceptual Aspects of Power
  - 3.5.1.2. The Importance of Power in a Context of Sport Performance
  - 3.5.1.3. Clarification of Power Terminology
- 3.5.2. Factors Contributing to Peak Power Development
- 3.5.3. Structural Aspects Conditioning Power Production
  - 3.5.3.1. Muscle Hypertrophy
  - 3.5.3.2. Muscle Structure
  - 3.5.3.3. Ratio of Fast and Slow Fibers in a Cross Section
  - 3.5.3.4. Muscle Length and its Effect on Muscle Contraction
  - 3.5.3.5. Quantity and Characteristics of Elastic Components

3.5.4. Neural Aspects Conditioning Power Production
3.5.4.1. Action Potential
3.5.4.2. Speed of Motor Unit Recruitment
3.5.4.3. Muscle Coordination
3.5.4.4. Intermuscular Coordination
3.5.4.5. Prior Muscle Status (PAP)
3.5.4.6. Neuromuscular Reflex Mechanisms and Their Incidence
3.5.5. Theoretical Aspects for Understanding the Force-Time Curve
3.5.5.1. Strength Impulse
3.5.5.2. Phases of the Force-Time Curve
3.5.5.3. Acceleration Phases of the Force-Time Curve
3.5.5.4. Maximum Acceleration Area of the Force-Time Curve
3.5.5.5. Slowing Phase of the Force-Time Curve
3.5.6. Theoretical Aspects for Understanding Power Curves
3.5.6.1. Power-Time Curve
3.5.6.2. Power-Displacement Curve
3.5.6.3. Optimal Workload for Maximum Power Development
3.5.7. Practical Considerations

3.6. Vector Strength Training
3.6.1. Definition of Force Vector
3.6.1.1. Axial Vector
3.6.1.2. Horizontal Vector
3.6.1.3. Rotational Vector
3.6.2. Benefits of Using this Terminology
3.6.3. Definition of Basic Vectors in Training
3.6.3.1. Analysis of the Main Sporting Actions
3.6.3.2. Analysis of the Main Overload Exercises
3.6.3.3. Analysis of the Main Training Exercises
3.6.4. Practical Considerations

3.7. Main Methods for Strength Training
3.7.1. Own Body Weight
3.7.2. Free Exercises
3.7.3. PAP
3.7.3.1. Definition
3.7.3.2. Application of PAP Prior to Energy-Related Sports Disciplines
3.7.4. Exercises with Machines
3.7.5. *Complex Training*
3.7.6. Exercises and Their Transfer
3.7.7. Contrasts
3.7.8. *Cluster Training*
3.7.9. Practical Considerations

3.8. VBT
3.8.1. Conceptualization of the Application of VBT
3.8.1.1. Degree of Stability of Execution Speed with Each Percentage of 1MR
3.8.2. Difference Between Scheduled Load and Actual Load
3.8.2.1. Definition of the Concept
3.8.2.2. Variables Involved in the Difference Between Programmed Load and Actual Training Load
3.8.3. VBT as a Solution to the Problem of Using 1MR and nMR to Program Loads
3.8.4. VBT and Degree of Fatigue
3.8.4.1. Connection to Lactate
3.8.4.2. Connection to Ammonium
3.8.5. VBT in Relation to the Loss of Speed and Percentage of Repetitions Performed
3.8.5.1. Define the Different Degrees of Effort in the Same Series
3.8.5.2. Different Adaptations According to the Degree of Speed Loss in the Series
3.8.6. Methodological Proposals According to Different Authors
3.8.7. Practical Considerations

3.9. Strength in Connection to Hypertrophy
- 3.9.1. Hypertrophy-Inducing Mechanism: Mechanical Stress
- 3.9.2. Hypertrophy-Inducing Mechanism: Metabolic Stress
- 3.9.3. Hypertrophy-Inducing Mechanism: Muscle Damage
- 3.9.4. Hypertrophy Programming Variables
  - 3.9.4.1. Frequency (F)
  - 3.9.4.2. Volume
  - 3.9.4.3. Intensity
  - 3.9.4.4. Cadence
  - 3.9.4.5. Series and Repetitions
  - 3.9.4.6. Density
  - 3.9.4.7. Order in the Execution of Exercises
- 3.9.5. Training Variables and Their Different Structural Effects
  - 3.9.5.1. Effect on Different Types of Fiber
  - 3.9.5.2. Effects on the Tendon
  - 3.9.5.3. Bundle Length
  - 3.9.5.4. Peneation Angle
- 3.9.6. Practical Considerations

3.10. Eccentric Strength Training
- 3.10.1. Conceptual framework
  - 3.10.1.1. Definition of Eccentric Training
  - 3.10.1.2. Different Types of Eccentric Training
- 3.10.2. Eccentric Training and Performance
- 3.10.3. Eccentric Training in the Prevention and Rehabilitation of Injuries
- 3.10.4. Technology Applied to Eccentric Training
  - 3.10.4.1. Conical Pulleys
  - 3.10.4.2. Isoinertial Devices
- 3.10.5. Practical Considerations

Module 4. Speed Training from Theory to Practice

4.1. Speed
- 4.1.1. Definition
- 4.1.2. General concepts
  - 4.1.2.1. Manifestations of Speed
  - 4.1.2.2. Factors that Determine Performance
  - 4.1.2.3. Difference Between Speed and Quickness
  - 4.1.2.4. Segmental Speed
  - 4.1.2.5. Angular Speed
  - 4.1.2.6. Reaction Time

4.2. Dynamics and Mechanics of Linear Sprint (100m Model)
- 4.2.1. Kinematic Analysis of the Take-off
- 4.2.2. Dynamics and Strength Application During Take-off
- 4.2.3. Kinematic Analysis of the Acceleration Phase
- 4.2.4. Dynamics and Strength Application During Acceleration
- 4.2.5. Kinematic Analysis of Running at Maximum Speed
- 4.2.6. Dynamics and Strength Application During Maximum Speed

4.3. Phases of Sprinting (Technique Analysis)
- 4.3.1. Technical Description of the Take-off
- 4.3.2. Technical Description of the Race During the Acceleration Phase
  - 4.3.2.1. Technical Model of the Kinogram for the Acceleration Phase
- 4.3.3. Technical Description of the Race During the Maximum Speed Phase
  - 4.3.3.1. Technical Kinogram Model (ALTIS) for Technique Analysis
- 4.3.4. Speed and Endurance

4.4. Speed Bioenergetics
- 4.4.1. Bioenergetics of Single Sprints
  - 4.4.1.1. Myoenergetics of Single Sprints
  - 4.4.1.2. ATP-PC System
  - 4.4.1.3. Glycolytic System
  - 4.4.1.4. Adenylate Kinase Reaction

4.4.2. Bioenergetics of Repeated Sprints
4.4.2.1. Energy Comparison Between Single and Repeated Sprints
4.4.2.2. Behavior of Energy Production Systems During Repeated Sprints
4.4.2.3. Recovery of PC
4.4.2.4. Connection Between Aerobic Power and Recovery Processes of CP
4.4.2.5. Determinants of Performance in Repeated Sprints
4.5. Analysis of Acceleration Technique and Maximum Speed in Team Sports
4.5.1. Description of the Technique in Team Sports
4.5.2. Comparison of Sprinting Technique in Team Sports vs.. Athletic Events
4.5.3. Timing and Motion Analysis of Speed Events in Team Sports
4.6. Methodological Approach to Teaching the Technique
4.6.1. Technical Teaching of the Different Phases of the Race
4.6.2. Common Errors and Ways to Correct Them
4.7. Means and Methods for Speed Development
4.7.1. Means and Methods for Acceleration Phase Training
4.7.1.1. Connection of Force to Acceleration
4.7.1.2. Sled
4.7.1.3. Slopes
4.7.1.4. Jumpability
4.7.1.4.1. Building the Vertical Jump
4.7.1.4.2. Building the Horizontal Jump
4.7.1.5. Training the ATP-PC System
4.7.2. Means and Methods for Training *Top Speed*
4.7.2.1. Plyometry
4.7.2.2. *Overspeed*
4.7.2.3. Interval-Intensive Methods
4.7.3. Means and Methods for Developing Speed and Endurance
4.7.3.1. Interval-Intensive Methods
4.7.3.2. Repetition Method
4.8. Agility and Change of Direction
4.8.1. Definition of Agility
4.8.2. Definition of Change of Direction
4.8.3. Determinants of Agility and COD
4.8.4. Change of Direction Technique
4.8.4.1. Shuffle
4.8.4.2. Crossover
4.8.4.3. Agility and COD Training Drills
4.9. Assessment and Control of Speed Training
4.9.1. Strength-Speed Profile
4.9.2. Test With Photocells and Variants With Other Control Devices
4.9.3. RSA
4.10. Programming Speed Training

Module 5. Endurance Training from Theory to Practice

5.1. General concepts
5.1.1. General Definitions
5.1.1.1. Education
5.1.1.2. Trainability
5.1.1.3. Sports Physical Preparation
5.1.2. Objectives of Endurance Training
5.1.3. General Principles of Training
5.1.3.1. Principles of Load
5.1.3.2. Principles of Organization
5.1.3.3. Principles of Specialization
5.2. Physiology of Aerobic Training
5.2.1. Physiological Response to Aerobic Endurance Training
5.2.1.1. Responses to Continuous Stress
5.2.1.2. Responses to Intervallic Stress
5.2.1.3. Responses to Intermittent Stress
5.2.1.4. Responses to Stress in Small-Space Games

5.2.2. Factors Related to Aerobic Endurance Performance
5.2.2.1. Aerobic Power
5.2.2.2. Anaerobic Threshold
5.2.2.3. Maximum Aerobic Speed
5.2.2.4. Economy of Effort
5.2.2.5. Use of Substrates
5.2.2.6. Characteristics of Muscle Fibers
5.2.3. Physiological Adaptations to Aerobic Endurance
5.2.3.1. Adaptations to Continuous Stress
5.2.3.2. Adaptations to Intervallic Stress
5.2.3.3. Adaptations to Intermittent Stress
5.2.3.4. Adaptations to Stress in Small-Space Games
5.3. Situational Sports and Their Relation to Aerobic Endurance
5.3.1. Group I Situational Sport Demands: Soccer, Rugby and Hockey
5.3.2. Group II Situational Sport Demands: Basketball, Handball, Futsal
5.3.3. Group III Situational Sport Demands: Tennis and Volleyball
5.4. Monitoring and Assessment of Aerobic Endurance
5.4.1. Direct Treadmill Evaluation vs. In the Field
5.4.1.1. VO2max Treadmill vs. In the Field
5.4.1.2. VAM Treadmill vs. In the Field
5.4.1.3. AIH vs. VFA
5.4.1.4. Time Limit (VAM)
5.4.2. Continuous Indirect Tests
5.4.2.1. Time Limit (VFA)
5.4.2.2. 1,000m Test
5.4.2.3. 5-Minute Test
5.4.3. Incremental and Maximum Indirect Tests
5.4.3.1. UMTT, UMTT-Brue, VAMEVAL and T-Bordeaux
5.4.3.2. UNCa Test; Hexagon, Track, Hare
5.4.4. Indirect Back-and-Forth and Intermittent Tests
5.4.4.1. 20m *Shuttle Run Test* (*Course Navette*)
5.4.4.2. YoYo Test
5.4.4.3. Intermittent Tests; 30-15 IFT, Carminatti, 45-15. Test
5.4.6. Specific Tests With Ball
5.4.6.1. Hoff Test
5.4.7. Proposal Based on the VFA
5.4.7.1. VFA Contact Points for Soccer, Rugby and Hockey
5.4.7.2. VFA Contact Points for Basketball, Futsal and Handball
5.5. Planning Aerobic Exercise
5.5.1. Exercise Model
5.5.2. Training Frequency
5.5.3. Duration of the Exercise
5.5.4. Training Intensity
5.5.5. Density
5.6. Methods to Develop Aerobic Endurance
5.6.1. Continuous Training
5.6.2. Interval Training
5.6.3. Intermittent Training
5.6.4. SSG Training (Small-Space Games)
5.6.5. Mixed Training (Circuits)
5.7. Program Design
5.7.1. Preseason Period
5.7.2. Competitive Period
5.7.3. Postseason Period
5.8. Special Aspects Related to Training
5.8.1. Concurrent Training
5.8.2. Strategies to Design Concurrent Training
5.8.3. Adaptations Generated by Concurrent Training
5.8.4. Differences Between Genders
5.8.5. De-Training
5.9. Aerobic Training in Children and Youth
5.9.1. General concepts
5.9.1.1. Growth, Development and Maturation
5.9.2. Evaluation of VO2máx and VAM
5.9.2.1. Indirect Measurement
5.9.2.2. Indirect Field Measurement

5.9.3. Physiological Adaptations in Children and Youth
5.9.3.1. VO2máx and VAM Adaptations
5.9.4. Design of Aerobic Training
5.9.4.1. Intermittent Method
5.9.4.2. Adherence and Motivation
5.9.4.3. Games in Small Spaces

Module 6. Mobility Training from Theory to Practice

6.1. Neuromuscular System
6.1.1. Neurophysiological Principles: Inhibition and Excitability
6.1.1.1. Adaptations of the Nervous System
6.1.1.2. Strategies to Modify Corticospinal Excitability
6.1.1.3. Keys to Neuromuscular Activation
6.1.2. Somatosensory Information Systems
6.1.2.1. Information Subsystems
6.1.2.2. Types of Reflexes
6.1.2.2.1. Monosynaptic Reflexes
6.1.2.2.2. Polysynaptic Reflexes
6.1.2.2.3. Muscle-Tendinous-Articular Reflexes
6.1.2.3. Responses to Dynamic and Static Stretches
6.2. Motor Control and Movement
6.2.1. Stabilizing and Mobilising Systems
6.2.1.1. Local System: Stabilizer System
6.2.1.2. Global System: Mobilizing System
6.2.1.3. Respiratory Pattern
6.2.2. Movement Pattern
6.2.2.1. Coactivation
6.2.2.2. *Joint by Joint* Theory
6.2.2.3. Primary Motion Complexes
6.3. Understanding Mobility
6.3.1. Key Concepts and Beliefs in Mobility
6.3.1.1. Manifestations of Mobility in Sport
6.3.1.2. Neurophysiological and Biomechanical Factors Influencing Mobility Development
6.3.1.3. Impact of Mobility on Strength Development
6.3.2. Objectives of Training Mobility in Sport
6.3.2.1. Mobility in the Training Session
6.3.2.2. Benefits of Mobility Training
6.3.3. Mobility and Stability by Structures
6.3.3.1. Foot-Ankle Complex
6.3.3.2. Knee-Hip Complex
6.3.3.3. Spine-Shoulder Complex
6.4. Training Mobility
6.4.1. Fundamental Block:
6.4.1.1. Strategies and Tools to Optimize Mobility
6.4.1.2. Specific Pre-Exercise Scheme
6.4.1.3. Specific Post-Exercise Scheme
6.4.2. Mobility and Stability in Basic Movements
6.4.2.1. *Squat & Deadlift*
6.4.2.3. Acceleration & Multidirection
6.5. Methods of Recovery
6.5.1. Proposal for Effectiveness Based on Scientific Evidence
6.6. Methods for Training Mobility
6.6.1. Tissue-Centered Methods: Passive Tension and Active Tension Stretching
6.6.2. Methods Focused on Arthro-Coinematics: Isolated Stretching and Integrated Stretching
6.6.3. Eccentric Training
6.7. Mobility Training Programming
6.7.1. Effects of Stretching in the Short and Long Term
6.7.2. Optimal Timing for Applying Stretching
6.8. Athlete Assessment and Analysis
6.8.1. Functional and Neuromuscular Assessment
6.8.1.1. Key Concepts in Assessment
6.8.1.2. Evaluation Process
6.8.1.2.1. Analyze the Movement Pattern
6.8.1.2.2. Identify the Test
6.8.1.2.3. Detect the Weak Links

6.8.2. Athlete Assessment Methodology
6.8.2.1. Types of Tests
6.8.2.1.1. Analytical Assessment Test
6.8.2.1.2. General Assessment Test
6.8.2.1.3. Specific-Dynamic Assessment Test
6.8.2.2. Assessment by Structures
6.8.2.2.1. Foot-Ankle Complex
6.8.2.2.2. Knee-Hip Complex
6.8.2.2.3. Spine-Shoulder Complex
6.9. Mobility in Injured Athletes
6.9.1. Pathophysiology of Injury: Effects on Mobility
6.9.1.1. Muscle Structure
6.9.1.2. Tendon Structure
6.9.1.3. Ligament Structure
6.9.2. Mobility and Preventiion of Injuries: Practical Case
6.9.2.1. Ruptured Ischialis in the Runner

Module 7. Sports Performance Assessment

7.1. Assessment
7.1.1. Definitions: Test, Assessment, Measurement
7.1.2. Validity, Reliability
7.1.3. Purposes of the Evaluation
7.2. Types of Tests
7.2.1. Laboratory Test
7.2.1.1. Strengths and Limitations of Laboratory Tests
7.2.2. Field Tests
7.2.2.1. Strengths and Limitations of Field Tests
7.2.3. Direct Tests
7.2.3.1. Applications and Transfer to Training
7.2.4. Indirect Tests
7.2.4.1. Practical Considerations and Transfer to Training
7.3. Assessment of Body Composition
7.3.1. Bioimpedance
7.3.1.1. Considerations in its Application to Field
7.3.1.2. Limitations on the Validity of Its Data
7.3.2. Anthropometry
7.3.2.2. Tools for its Implementation
7.3.2.3. Models of Analysis for Body Composition
7.3.3. Body Mass Index (IMC)
7.3.3.1. Restrictions on the Data Obtained for the Interpretation of Body Composition
7.4. Assessing Aerobic Fitness
7.4.1. Vo2max Test on the Treadmill
7.4.1.1. Astrand Test
7.4.1.2. Balke Test
7.4.1.3. ACSM Test
7.4.1.4. Bruce Test
7.4.1.5. Foster Test
7.4.1.6. Pollack Test
7.4.2. Cycloergometer VO2máx Test
7.4.2.1. Astrand-Ryhming
7.4.2.1. Fox Test
7.4.3. Cycloergometer Power Test
7.4.3.1. Wingate Test
7.4.4. Vo2max Test in he Field
7.4.4.1. Leger Test
7.4.4.2. Montreal University Test
7.4.4.3. Mile Test
7.4.4.4. 12-Minute Test
7.4.4.5. 2.4Km Test
7.4.5. Field Test to Establish Training Areas
7.4.5.1. 30-15 IFT Test
7.4.6. UNca Test

7.4.7. Yo-Yo Test
7.4.7.1. Yo-Yo Endurance YYET Level 1 and 2
7.4.7.2. Yo-Yo Intermittent Endurance YYEIT Level 1 and 2
7.4.7.3. Yo-Yo Intermittent Recovery YYIRT Level 1 and 2

7.5. Neuromuscular Fitness Evaluation
7.5.1. Submaximal Repetition Test
7.5.1.1. Practical Applications for its Assessment
7.5.1.2. Validated Estimation Formulas for the Different Training Exercises
7.5.2. 1MR or MR Test
7.5.2.1. Protocol for its Performance
7.5.2.2. Limitations of 1MR or MR Assessment
7.5.3. Horizontal Jump Test
7.5.3.1. Assessment Protocols
7.5.4. Speed Test (5m,10m,15m, Etc.)
7.5.4.1. Considerations on the Data Obtained in Time/Distance Assessments
7.5.5. Maximum/Submaximum Incremental Progressive Tests
7.5.5.1. Validated Protocols
7.5.5.2. Practical Applications
7.5.6. Vertical Jump Test
7.5.6.1. SJ Jump
7.5.6.2. CMJ Jump
7.5.6.3. ABK Jump
7.5.6.4. DJ Test
7.5.6.5. Continuous Jump Test
7.5.7. Strength/Speed Vertical/Horizontal Profiles
7.5.7.1. Morin and Samozino Assessment Protocols
7.5.7.2. Practical Applications from a Strength/Speed Profile
7.5.8. Isometric Tests With Load Cell
7.5.8.1. Voluntary Isometric Maximal Strength Test (IMS)
7.5.8.2. Bilateral Deficit Isometry Test (%BLD)
7.5.8.3. Lateral Deficit (%LD)
7.5.8.4. Hamstring/Quadriceps Ratio Test

7.6. Assessment and Monitoring Tools
7.6.1. Cardiofrecuency Meters
7.6.1.1. Device Characteristics
7.6.1.2. Training Areas by Heart Rate
7.6.2. Lactate Analyzers
7.6.2.1. Device Types, Performance and Characteristics
7.6.2.2. Training Zones According to the Lactate Threshold Limit (LT)
7.6.3. Gas Analyzers
7.6.3.1. Laboratory vs Portable Laptops
7.6.4. GPS
7.6.4.1. GPS Types, Characteristics, Strengths and Limitations
7.6.4.2. Metrics Established to Interpret the External Load
7.6.5. Accelerometers
7.6.5.1. Types of Accelerometers and Characteristics
7.6.5.2. Practical Applications of Data Obtained From an Accelerometer
7.6.6. Position Transducers
7.6.6.1. Types of Transducers for Vertical and Horizontal Movements
7.6.6.2. Variables Measured and Estimated by of a Position Transducer
7.6.6.3. Data Obtained from a Position Transducer and its Applications to Training Programming
7.6.7. Strength Platforms
7.6.7.1. Types and Characteristics.of Strength Platforms
7.6.7.2. Variables Measured and Estimated by Means of a Strength Platform
7.6.7.3. Practical Approach to Training Programming
7.6.8. Load Cells
7.6.8.1. Cell Types, Characteristics and Performance
7.6.8.2. Uses and Applications for Sports Performance and Health
7.6.9. Photoelectric Cells
7.6.9.1. Characteristics and Limitations of the Devices
7.6.9.2. Practical Uses and Applicability
7.6.10. Movile Applications
7.6.10.1. Description of the Most Used Apps on the Market: My Jump, PowerLift, Runmatic, Nordic

7.7. Internal and External Load
- 7.7.1. Objective Means of Assessment
  - 7.7.1.1. Speed of Execution
  - 7.7.1.2. Average Mechanical Power
  - 7.7.1.3. GPS Device Metrics
- 7.7.2. Subjective Means of Assessment
  - 7.7.2.1. PSE
  - 7.7.2.2. sPSE
  - 7.7.2.3. Chronic/Acute Load Ratio

7.8. Fatigue
- 7.8.1. General Concepts of Fatigue and Recovery
- 7.8.2. Assessments
  - 7.8.2.1. Laboratory Objectives: CK, Urea, Cortisol, Etc.
  - 7.8.2.2. Field Objectives: CMJ, Isometric Tests, etc.
  - 7.8.2.3. Subjective: Wellnes Scales, TQR, etc.
- 7.8.3. Recovery Strategies: Cold-Water Immersion, Nutritional Strategies, Self-Massage, Sleep

7.9. Considerations for Practical Applications
- 7.9.1. Vertical Jump Test Practical Applications
- 7.9.2. Maximum/Submaximum Incremental Progressive Test Practical Applications
- 7.9.3. Vertical Strength-Speed Profile. Practical Applications

Module 8. Planning Applied to High Performance in Sports

8.1. Basic Fundamentals
- 8.1.1. Adaptation Criteria
  - 8.1.1.1. General Adaptation Syndrome
  - 8.1.1.2. Current Performance Capability, Training Requirement
- 8.1.2. Fatigue, Performance and Conditioning as Tools
- 8.1.3. Dose-Response Concept and its Application

8.2. Basic Concepts and Applications
- 8.2.1. Concept and Application of the Plan
- 8.2.2. Concept and Application of Peridization
- 8.2.3. Concept and Application of Programming
- 8.2.4. Concept and Application of Load Control

8.3. Conceptual Development of Planning and its Different Models
- 8.3.1. First Historical Planning Records
- 8.3.2. First Proposals, Analyzing the Bases
- 8.3.3. Classic Models:
  - 8.3.3.1. Traditional
  - 8.3.3.2. Pendulum
  - 8.3.3.3. High Loads

8.4. Models Focused on Individuality and/or Load Concentration
- 8.4.1. Blocks
- 8.4.2. Integrated Macrocycle
- 8.4.3. Integrated Model
- 8.4.4. ATR
- 8.4.5. Keeping in Shape
- 8.4.6. By Objectives
- 8.4.7. Structural Bells
- 8.4.8. Self-Regulation (APRE)

8.5. Models Focused on Specificity and/or Movement Capacity
- 8.5.1. Cognitive (or Structured Microcycle),
- 8.5.2. Tactical Periodization
- 8.5.3. Conditional Development by Movement Capacity

8.6. Criteria for Correct Programming and Periodization
- 8.6.1. Criteria for Programming and Periodization in Strength Training
- 8.6.2. Criteria for Programming and Periodization in Endurance Training
- 8.6.3. Criteria for Programming and Periodization in Speed Training
- 8.6.4. "Interference" Criteria in Scheduling and Periodization Concurrent Training

8.7. Planning Through Load Control With a GNSS Device (GPS)
- 8.7.1. Basis of Session Saving for Appropriate Control
  - 8.7.1.1. Calculation of the Average Group Session for a Correct Load Analysis
  - 8.7.1.2. Common Errors in Saving and Their Impact on Plannning
- 8.7.2. Relativization of the Load, a Function of Competence
- 8.7.3. Load Control by Volume or Density, Range and Limitations

8.8. Integrating Thematic Unit 1 (Practical Application)
- 8.8.1. Construction of a Real Model of Short-Term from Planning
  - 8.8.1.1. Selecting and Applying the Periodization Model
  - 8.8.1.2. Designing the Corresponding Planning

8.9. Integrating Thematic Unit 2 (Practical Application)
- 8.9.1. Producing a Pluriannual Plannification
- 8.9.2. Producing an Annual Plannification

Module 9. Biomechanics Applied to High Performance in Sports

9.1. Introduction to Biomechanics
- 9.1.1. Biomechanics: Concept, Introduction and Purpose
  - 9.1.1.1. Its Connection to Functional Anatomy
- 9.1.2. Biomechanics and Performance
  - 9.1.2.1. Its Application to Physical Education and Sport
  - 9.1.2.2. Parts of Biomechanics, Generalities
  - 9.1.2.3. Measuring Tools
- 9.1.3. Kinematics: Basic Concepts and Practical Applications

9.2. Movement in One Dimension
- 9.2.1. Speed
  - 9.2.1.1. Concept of Speed
  - 9.2.1.2. Average speed
  - 9.2.1.3. Instant Speed
  - 9.2.1.4. Constant Speed
  - 9.2.1.5. Variable Speed
  - 9.2.1.6. Equations and Units
  - 9.2.1.7. Interpretation of Space-Time and Speed-Distance Graphs
  - 9.2.1.8. Examples in Sport
- 9.2.2. Acceleration
  - 9.2.2.1. Concept of Acceleration
  - 9.2.2.2. Average Acceleration
  - 9.2.2.3. Instant Acceleration
  - 9.2.2.4. Constant Acceleration
  - 9.2.2.5. Variable Acceleration
  - 9.2.2.6. Connection With the Speed at Constant Acceleration
  - 9.2.2.7. Equations and Units
  - 9.2.2.8. Interpretation of Acceleration-Distance Graphs, Connection With Speed-Time Graphs
  - 9.2.2.9. Examples in Sport
- 9.2.3. Free Fall
  - 9.2.3.1. Acceleration of Gravity
  - 9.2.3.2. Ideal Conditions
  - 9.2.3.3. Variations of Gravity
  - 9.2.3.4. Equations
- 9.2.4. Graphical Surroundings
  - 9.2.4.1. Accelerations and Speeds in Free Fall

9.3. Movement in a Plane
- 9.3.1. Speed
  - 9.3.1.1. Concept Through its Vectorial Components
  - 9.3.1.2. Interpreting Graphs Examples in Sport
- 9.3.2. Acceleration
  - 9.3.2.1. Concept Through its Vectorial Components
  - 9.3.2.2. Interpreting Graphs
  - 9.3.2.3. Examples in Sport
- 9.3.3. Projectile Movement
  - 9.3.3.1. Fundamental Components
  - 9.3.3.2. Initial Speed
  - 9.3.3.3. Initial Angle
  - 9.3.3.4. Ideal Conditions Initial Angle for Maximum Reach
  - 9.3.3.5. Equations Interpreting Graphs
  - 9.3.3.6. Examples Applied to Jumps and Throws

9.4. Kinematics of Rotations
- 9.4.1. Angular Speed
  - 9.4.1.1. Angular Movement
  - 9.4.1.2. Average Angular Speed
  - 9.4.1.3. Instant Angular Speed
  - 9.4.1.4. Equations and Units
  - 9.4.1.5. Interpretation and Examples in Sport
- 9.4.2. Angular Acceleration
  - 9.4.2.1. Average and Instant Angular Speed
  - 9.4.2.2. Equations and Units
  - 9.4.2.3. Interpretation and Examples in Sport Constant Angular Acceleration

9.5. Dynamics
- 9.5.1. First Law of Newton
  - 9.5.1.1. Interpretation
  - 9.5.1.2. Concept of Mass
  - 9.5.1.3. Equations and Units
  - 9.5.1.4. Examples in Sport
- 9.5.2. Second Law of Newton
  - 9.5.2.1. Interpretation
  - 9.5.2.2. Concept of Weight and Deference to Mass
  - 9.5.2.3. Equations and Units Examples in Sport
- 9.5.3. Third Law of Newton
  - 9.5.3.1. Interpretation
  - 9.5.3.2. Equations
  - 9.5.3.3. Centripetal and Centrifugal Force
  - 9.5.3.4. Examples in Sport
- 9.5.4. Work, Power and Energy
  - 9.5.4.1. Concept of Work
  - 9.5.4.2. Equations, Units, Interpretation and Examples
- 9.5.5. Power
  - 9.5.5.1. Equations, Units, Interpretation and Examples
- 9.5.6. Generalities on the Concept of Energy
  - 9.5.6.1. Types of Energy, Units and Conversion
- 9.5.7. Kinetic Energy
  - 9.5.7.1. Concept and Equations
- 9.5.8. Potential Elastic Energy
  - 9.5.8.1. Concept and Equations
  - 9.5.8.2. The Work and Energy Theorem
  - 9.5.8.3. Interpretation from Examples in Sport
- 9.5.9. Amount of Movement and Collisions Interpretation
  - 9.5.9.1. Equations Center of Mass and Movement of the Center of Mass
  - 9.5.9.2. Collisions, Types, Equations and Graphs
  - 9.5.9.3. Examples in Athletism
  - 9.5.9.4. Impulsive Forces Calculation of the Initial Speed in a Jump That is Considered as a Collision

9.6. Dynamics of Rotations
- 9.6.1. Moment of Inertia:
  - 9.6.1.1. Moment of a Force, Concept and Units
  - 9.6.1.2. Lever Arm
- 9.6.2. Kinetic Energy of Rotation
  - 9.6.2.1. Moment of Inertia, Concept and Units
  - 9.6.2.2. Summary of Equations
  - 9.6.2.3. Interpretation. Examples in Sport

9.7. Statics-Mechanical Balance
- 9.7.1. Vectorial Algebra
  - 9.7.1.1. Operations Between Vectors Using Graphical Methods
  - 9.7.1.2. Addition and Subtraction
  - 9.7.1.3. Calculating Momentum
- 9.7.2. Center of Gravity: Concept, Properties, Interpretation of Equations
  - 9.7.2.1. Examples in Sport Rigid Bodies Human Body Model

9.8. Biomechanical Analysis
- 9.8.1. Analysis of Normal Gait and Running
  - 9.8.1.1. Center of Mass Phases and Fundamental Equations
  - 9.8.1.2. Types of Kinematic and Dynamometric Records
  - 9.8.1.3. Related Graphs
  - 9.8.1.4. Connections of Graphs With Speed

9.8.2. Jumps in Sport
9.8.2.1. Decomposing Movement
9.8.2.2. Center of Gravity
9.8.2.3. Phases
9.8.2.4. Distances and Component Heights
9.9. Video Analysis
9.9.1. Different Variables Measured Through Video Analysis
9.9.2. Technological Options for Video Analysis
9.9.3. Practical Examples
9.10. Case Studies
9.10.1. Biomechanical Analysis of Acceleration
9.10.2. Biomechanical Analysis of *Sprinting*
9.10.3. Biomechanical Analysis of Deceleration

Module 10. Nutrition Applied to High Performance in Sports

10.1. Energy Metabolism of Physical Effort
10.1.1. Matter and Energy: Introduction to Thermodynamics
10.1.2. Physicochemical Characteristics of Macronutrients
10.1.3. Digestion and Metabolism of Carbohydrates
10.1.4. Digestion and Metabolism of Lipids
10.1.5. Digestion and Metabolism of Proteins
10.1.6. Phosphagen System
10.1.7. Glycolytic System
10.1.8. Oxidative System
10.1.9. Metabolic Integration
10.1.10. Classification of Physical Effort
10.2. Assessing Nutritional Status and Body Composition
10.2.1. Retrospective and Prospective Methods
10.2.2. ABCDE Model
10.2.3. Clinical Assessment
10.2.4. Body composition
10.2.5. Indirect Methods.
10.2.6. Double Indirect Methods
10.2.7. Dual X-ray Absorptiometry
10.2.8. Vector Analysis of Electrical Bioimpedance
10.2.9. Cineanthropometry
10.2.10. Data Analysis in Kinanthropometry
10.3. Assessing Energy Expenditure
10.3.1. Components of Total Daily Energy Expenditure
10.3.2. Basal Metabolic Rate and Resting Energy Expenditure
10.3.3. Thermal Effect of Food
10.3.4. NEAT and Energy Expenditure Due to Physical Exertion
10.3.5. Technologies for Quantifying Energy Expenditure
10.3.6. Indirect Calorimetry
10.3.7. Estimation of Energy Expenditure
10.3.8. Ex-Post Calculations
10.3.9. Practical Recommendations
10.4. Bodybuilding Nutrition and Body Recomposition
10.4.1. Characteristics of Bodybuilding
10.4.2. Nutrition for *Bulking*
10.4.3. Nutrition for Preparation
10.4.4. Post-Competition Nutrition
10.4.5. Effective Supplements
10.4.6. Body Recomposition
10.4.7. Nutritional Strategies
10.4.8. Macronutrient Distribution
10.4.9. *Diet Breaks, Refeeds* and Intermittent Restrictions
10.4.10. Principles and Dangers of Pharmacology

10.5. Nutrition in Strength-Based Sports
- 10.5.1. Characteristics of Collective Sports
- 10.5.2. Energy Requirements
- 10.5.3. Protein Requirements
- 10.5.4. Distribution of Carbohydrates and Fats
- 10.5.5. Nutrition for Olympic Lifting
- 10.5.6. Nutrition for Sprint Racing
- 10.5.7. Nutrition for *Powerlifting*
- 10.5.8. Nutrition in Jumping and Throwing Sports
- 10.5.9. Nutrition in Combat-Based Sports
- 10.5.10. Morphological Characteristics of the Athlete

10.6. Nutrition in Team Sports
- 10.6.1. Characteristics of Collective Sports
- 10.6.2. Energy Requirements
- 10.6.3. Preseason Nutrition
- 10.6.4. Competitive Nutrition
- 10.6.5. Nutrition Before, During and After the Match
- 10.6.6. Fluid Replenishment
- 10.6.7. Recommendations for Lower Divisions
- 10.6.8. Nutrition in Soccer, Basketball and Volleyball
- 10.6.9. Nutrition in Rugby, Hockey and Baseball
- 10.6.10. Morphological Characteristics of the Athlete

10.7. Nutrition in Endurance-Based Sports
- 10.7.1. Characteristics of Endurance Sports
- 10.7.2. Energy Requirements
- 10.7.3. Glycogen Overcompensation
- 10.7.4. Energy Replenishment During Competition
- 10.7.5. Fluid Replenishment
- 10.7.6. Beverages and Sports Confectionery
- 10.7.7. Nutrition for Cycling
- 10.7.8. Nutrition for Running and Marathon
- 10.7.9. Nutrition for Triathlon
- 10.7.10. Nutrition for Other Olympic Sports

10.8. Nutritional Ergogenic Aids
- 10.8.1. Classification Systems
- 10.8.2. Creatine
- 10.8.3. Caffeine
- 10.8.4. Nitrates
- 10.8.5. β-alanin
- 10.8.6. Bicarbonate and Sodium Phosphate
- 10.8.7. Protein Supplements
- 10.8.8. Modified Carbohydrates
- 10.8.9. Herbal Extracts
- 10.8.10. Contaminant Supplementation

10.9. Eating Disorders and Sports Injuries
- 10.9.1. Anorexia
- 10.9.2. Bulimia Nervosa
- 10.9.3. Orthorexia and bigorexia
- 10.9.4. Binge Eating and Purging Disorder
- 10.9.5. Relative Energy Deficiency Syndrome
- 10.9.6. Micronutrient Deficiency
- 10.9.7. Nutrition Education and Prevention
- 10.9.8. Sports Injuries
- 10.9.9. Nutrition During Physical Rehabilitation

10.10. Advances and Research in Sports Nutrition
- 10.10.1. Nutrigenetics.
- 10.10.2. Nutrigenomics
- 10.10.3. Modulation of the Microbiota
- 10.10.4. Probiotics and Prebiotics in Sport
- 10.10.5. Emerging Products
- 10.10.6. Systems Biology
- 10.10.7. Non-Experimental Designs
- 10.10.8. Experimental Designs
- 10.10.9. Systematic Reviews and Meta-Analyses

Module 11. Strength Training for the Improvement of Movement Skills

11.1. Strength in Skill Development
- 11.1.1. The Importance of Strength in Developing *Skills*
- 11.1.2. Benefits of*Skills-based* strength training
- 11.1.3. Types of strength present in *Skills*
- 11.1.4. Training Means Necessary for the Development of Srength in *Skills*

11.2. *Skills* in Team Sports
- 11.2.1. General concepts
- 11.2.2. *Skills* in Performance Development
- 11.2.3. Classifying *Skills*
  - 1.2.3.1. *Locomotive Skills*
  - 1.2.3.2. *Manipulative Skills*

11.3. Agility and Movements
- 11.3.1. Basic Concepts
- 11.3.2. The Importance of Sports
- 11.3.3. Agility Components
  - 11.3.3.1. Classification of Movement skills
  - 11.3.3.2. Physical Factors: Strength
  - 11.3.3.3. Anthropometric Factors
  - 11.3.3.4. Perceptual-Cognitive Components

11.4. Posture
- 11.4.1. The Importance of Posture in *Skills*
- 11.4.2. Posture and Mobility
- 11.4.3. Posture and CORE
- 11.4.4. Posture and Center of Pressure
- 11.4.5. Biomechanical Analysis of Efficient Posture
- 11.4.6. Methodological Resources

11.5. Linear *Skills* (Linear Abilities)
- 11.5.1. Features of Linear *Skills*
  - 11.5.1.1. Main Planes and Vectors
- 11.5.2. Classification
  - 11.5.2.1. Starting, Braking and Deceleration
    - 11.5.2.1.1. Definitions and Context of Use
    - 11.5.2.1.2. Biomechanical Analysis
    - 11.5.2.1.3. Methodological Resources
  - 11.5.2.2. Acceleration
    - 11.5.2.2.1. Definitions and Context of Use
    - 11.5.2.2.2. Biomechanical Analysis
    - 11.5.2.2.3. Methodological Resources
  - 11.5.2.3. *Backpedal*
    - 11.5.2.3.1. Definitions and Context of Use
    - 11.5.2.3.2. Biomechanical Analysis
    - 11.5.2.3.3. Methodological Resources

11.6. Multidirectional *Skills*: Shuffle
- 11.6.1. Classification of Multidirectional *Skills*
- 11.6.2. Shuffle: Definitions and Context of Use
- 11.6.3. Biomechanical Analysis
- 11.6.4. Methodological Resources

11.7. Multidirectional *Skills*: Crossover
- 11.7.1. Crossover as a Change of Direction
- 11.7.2. Crossover as a Transitional Movement
- 11.7.3. Definitions and Context of Use
- 11.7.4. Biomechanical Analysis
- 11.7.5. Methodological Resources

11.8. *Jump Skills* 1
- 11.8.1. The Importance of Jumps in *Skills*
- 11.8.2. Basic Concepts
  - 11.8.2.1. Biomechanics of Jumps
  - 11.8.2.2. CEA
  - 11.8.2.3. *Stiffness*
- 11.8.3. Jump Classification
- 11.8.4. Methodological Resources

11.9. *Jump Skills* 2
- 11.9.1. Methods
- 11.9.2. Acceleration and Jumps
- 11.9.3. Shuffle and Jumps
- 11.9.4. Crossover and Jumps
- 11.9.5. Methodological Resources

11.10. Programming Variables

Module 12. Strength Training Under the Paradigm of Complex Dynamic Systems

12.1. Introduction to Complex Dynamical Systems
- 12.1.1. Models Applied to Physical Preparation
- 12.1.2. Determination of Positive and Negative Interactions
- 12.1.3. Uncertainty in Complex Dynamical Systems

12.2. Motor Control and its Role in Performance
- 12.2.1. Introduction to Motor Control Theories
- 12.2.2. Movement and Function
- 12.2.3. Motor Learning
- 12.2.4. Motor Control Applied to Systems Theory

12.3. Communication Processes in the Theory of Systems
- 12.3.1. From Message to Movement
  - 12.3.1.1. The Efficient Communication Process
  - 12.3.1.2. The Stages of Learning
  - 12.3.1.3. The Role of Communication and Sport Development in Early Ages
- 12.3.2. VAKT Principle
- 12.3.3. Performance Knowledge vs. Outcome Knowledge
- 12.3.4. Verbal *Feedback* in System Interactions

12.4. Strength as an Essential Condition
- 12.4.1. Strength Training in Team Sports
- 12.4.2. Manifestations of Strength Within the System
- 12.4.3. The Strength-Speed Continuum. Systemic Review

12.5. Complex Dynamical Systems and Training Methods
- 12.5.1. Periodization. Historical Review
  - 12.5.1.1. Traditional Periodization
  - 12.5.1.2. Contemporary Periodization
- 12.5.2. Analysis of Periodization Models in Training Systems
- 12.5.3. Evolution of Strength Training Methods

12.6. Strength and Motor Divergence
- 12.6.1. Developing Strength at Early Ages
- 12.6.2. The Manifestations of Strength in Infantile-Juvenile Ages
- 12.6.3. Efficient Programming at Youth Ages

12.7. The Role of Decision-Making in Complex Dynamical Systems
- 12.7.1. The Decision-Making Process
- 12.7.2. Decisional Timing
- 12.7.3. The Development of Decision Making
- 12.7.4. Programming Training Based on Decision Making

12.8. Perceptual Abilities in Sports
- 12.8.1. Visual Abilities
  - 12.8.1.1. Visual Recognition
  - 12.8.1.2. Central and Peripheral Vision
- 12.8.2. Motor Experience
- 12.8.3. Attentional Focus
- 12.8.4. The Tactical Component

12.9. Systemic Vision of Programming
- 12.9.1. The Influence of Identity on Programming
- 12.9.2. The System as a Path to Long-Term Development.
- 12.9.3. Long-Term Development Program

12.10. Global Programming: from System to Need
- 12.10.1. Program Design
- 12.10.2. Practical System Assessment Workshop

Module 13. Prescription and Programming of Strength Training

13.1. Introduction and Definition of Concepts
- 13.1.1. General concepts
  - 13.1.1.1. Planning, Periodization, Prescription
  - 13.1.1.2. Qualities, Methods, Objectives
  - 13.1.1.3. Complexity, Risk and Uncertainty
  - 13.1.1.4. Complementary Peers

13.2. Exercises
- 13.2.1. General Vs. Specific
- 13.2.2. Simple Vs. Complexity
- 13.2.3. Push Vs. Ballistic
- 13.2.4. Kinetics and Kinematics
- 13.2.5. Basic Patterns
- 13.2.6. Order, Emphasis, Importance

13.3. Programming Variables
- 13.3.1. Intensity
- 13.3.2. Effort
- 13.3.3. Intension
- 13.3.4. Volume
- 13.3.5. Density
- 13.3.6. Weight
- 13.3.7. Dose

13.4. Periodization Structures
- 13.4.1. Microcycle
- 13.4.2. Mesocycle
- 13.4.3. Macrocycle
- 13.4.4. Olympic Cycles

13.5. Session Structures
- 13.5.1. Hemispheres
- 13.5.2. Entries
- 13.5.3. Weider
- 13.5.4. Patterns
- 13.5.5. Muscle

13.6. Prescription
- 13.6.1. Load-Effort Tables
- 13.6.2. Based on %
- 13.6.3. Based on Subjective Variables
- 13.6.4. Based on Speed (VBT)
- 13.6.5. Others

13.7. Prediction and Monitoring
- 13.7.1. Speed-Based Training
- 13.7.2. Areas of Repetition
- 13.7.3. Load Areas
- 13.7.4. Time and Reps

13.8. Education
- 13.8.1. Series-Repetition Schemes
  - 13.8.1.1. *Plateau*
  - 13.8.1.2. *Step*
  - 13.8.1.3. Waves
  - 13.8.1.4. Steps
  - 13.8.1.5. Pyramids
  - 13.8.1.6. *Light-Heavy*
  - 13.8.1.7. *Cluster*
  - 13.8.1.8. *Rest-Pause*
- 13.8.2. Vertical Planning
- 13.8.3. Horizontal Planning
- 13.8.4. Classifications and Models
  - 13.8.4.1. Constant
  - 13.8.4.2. Lineal
  - 13.8.4.3. Reverse Linear
  - 13.8.4.4. Blocks
  - 13.8.4.5. Accumulation
  - 13.8.4.6. Undulating
  - 13.8.4.7. Reverse Undulating
  - 13.8.4.8. Volume-Intensity

13.9. Adaptation
- 13.9.1. Dose-Response Model
- 13.9.2. Robust-Optimal
- 13.9.3. *Fitness-Fatigue*
- 13.9.4. Micro Doses

13.10. Assessments and Adjustments
- 13.10.1. Self-Regulated Load
- 13.10.2. Adjustments Based on VBT
- 13.10.3. Based on RIR and RPE
- 13.10.4. Based on Percentages
- 13.10.5. Negative Pathway

Module 14. Methodology of Strength Training

14.1. Methods of Training From *Powerlifting*
- 14.1.1. Functional Isometrics
- 14.1.2. Forced Repetitions
- 14.1.3. Eccentrics in Competition Exercises
- 14.1.4. Main Characteristics of the Most Commonly Used Methods in *Powerlifting*

14.2. Methods of Training from Weightlifting
- 14.2.1. Bulgarian Method
- 14.2.2. Russian Method
- 14.2.3. Origin of the Popular Methodologies in the School of Olympic Lifting
- 14.2.4. Differences Between the Bulgarian and Russian Concepts

14.3. Zatsiorsky Methods
- 14.3.1. Maximum Effort Method (ME)
- 14.3.2. Repeated Effort Method (RE)
- 14.3.3. Dynamic Effort Method (DE)
- 14.3.4. Load Components and Main Features of the Zatsiorsky Methods
- 14.3.5. Interpretation and Differences of Mechanical Variables (Force, Power and Speed) Revealed Between ME, RE and DE and Their Internal Response (PSE)

14.4. Pyramidal Methods
- 14.4.1. Classic Ascending
- 14.4.2. Classic Descending
- 14.4.3. Double
- 14.4.4. Skewed Pyramid
- 14.4.5. Truncated Pyramid
- 14.4.6. Flat or Stable Pyramid
- 14.4.7. Load Components (Volume and Intensity) of the Different Proposals of the Pyramidal Method

14.5. Training Methods From Bodybuilding
- 14.5.1. Superseries
- 14.5.2. Triseries
- 14.5.3. Compound Series
- 14.5.4. Giant Series
- 14.5.5. Congestive Series
- 14.5.6. *Wave-Like Loading*
- 14.5.7. ACT (*Anti-Catabolic Training*)
- 14.5.8. *Bulk*
- 14.5.9. *Cluster*
- 14.5.10. 10x10 *Zatsiorsky*
- 14.5.11. *Heavy Duty*
- 14.5.12. Ladder
- 14.5.13. Characteristics and Load Components of the Different Methodological Proposals of Training Systems Coming From Bodybuilding

14.6. Methods from Sports Training
- 14.6.1. Plyometry
- 14.6.2. *Circuit Training*
- 14.6.3. *Cluster Training*
- 14.6.4. Contrast
- 14.6.5. Main Characteristics of Strength Training Methods Derived from Sports Training

14.7. Methods from Unconventional Training and Crossfit
- 14.7.1. EMOM (*Every Minute on the Minute*)
- 14.7.2. Tabata
- 14.7.3. AMRAP (*As Many Reps as Possible*)
- 14.7.4. *For Time*
- 14.7.5. Main Characteristics of Strength Training Methods Derived from Crossfit Training

14.8. Speed-Based Training (VBT)
- 14.8.1. Theoretical Foundation
- 14.8.2. Practical Considerations
- 14.8.3. Own Data

14.9. The Isometric Method
- 14.9.1. Concepts and Physiological Fundamentals of Isometric Stresses
- 14.9.2. Proposal of Yuri Verkhoshansky

14.10. *Repeat Power Ability* (RPA) Method of Alex Natera
- 14.10.1. Theoretical Foundation
- 14.10.2. Practical Applications
- 14.10.3. Published Data vs Own Data

14.11. Training Method Proposed by Frans Bosch
- 14.11.1. Theoretical Foundation
- 14.11.2. Practical Applications
- 14.11.3. Published Data vs Own Data

14.12. Cal Dietz and Matt Van Dyke's Three-Phase Methodology
- 14.12.1. Theoretical Foundation
- 14.12.2. Practical Applications

14.13. New Trends in Quasi-Isometric Eccentric Training
- 14.13.1. Neurophysiological Rationale and Analysis of Mechanical Responses Using Position Transducers and Force Platforms for Each Strength Training Approach

Module 15. Theory of Strength Training and Bases for Structural Training

15.1. Strength, its Conceptualization and Terminology
- 15.1.1. Concept Strength Deficit
- 15.1.2. Concept of Applied Strength
- 15.1.3. Concept of Useful Strength
- 15.1.4. Terminology of Strength Training
  - 15.1.4.1. Maximum Strength
  - 15.1.4.2. Explosive Strength
  - 15.1.4.3. Elastic-Explosive Strength
  - 15.1.4.4. Reflective Elastic Explosive Strength
  - 15.1.4.5. Ballistic Strength
  - 15.1.4.6. Rapid Force
  - 15.1.4.7. Explosive Power
  - 15.1.4.8. Speed Strength
  - 15.1.4.9. Resistance Training

15.2. Concepts Connected to Power 1
- 15.2.1. Definition of Power
  - 15.2.1.1. Conceptual Aspects of Power
  - 15.2.1.2. The Importance of Power in a Context of Sport Performance
  - 15.2.1.3. Clarification of Power Terminology
- 15.2.2. Factors Contributing to Peak Power Development
- 15.2.3. Structural Aspects Conditioning Power Production
  - 15.2.3.1. Muscle Hypertrophy
  - 15.2.3.2. Muscle Structure
  - 15.2.3.3. Ratio of Fast and Slow Fibers in a Cross Section
  - 15.2.3.4. Muscle Length and its Effect on Muscle Contraction
  - 15.2.3.5. Quantity and Characteristics of Elastic Components
- 15.2.4. Neural Aspects Conditioning Power Production
  - 15.2.4.1. Action Potential
  - 15.2.4.2. Speed of Motor Unit Recruitment
  - 15.2.4.3. Muscle Coordination
  - 15.2.4.4. Intermuscular Coordination
  - 15.2.4.5. Prior Muscle Status (PAP)
  - 15.2.4.6. Neuromuscular Reflex Mechanisms and Their Incidence

15.3. Concepts Connected to Power 2
- 15.3.1. Theoretical Aspects for Understanding the Force-Time Curve
  - 15.3.1.1. Strength Impulse
  - 15.3.1.2. Phases of the Force-Time Curve
  - 15.3.1.3. Acceleration Phases of the Force-Time Curve
  - 15.3.1.4. Maximum Acceleration Area of the Force-Time Curve
  - 15.3.1.5. Slowing Phase of the Force-Time Curve
- 15.3.2. Theoretical Aspects for Understanding Power Curves
  - 15.3.2.1. Power-Time Curve
  - 15.3.2.2. Power-Displacement Curve
  - 15.3.2.3. Optimal Workload for Maximum Power Development

15.4. Relating Concepts of Strength and their Connection to Sports Performance
- 15.4.1. Objective of Strength Training
- 15.4.2. Relationship of Power to the Training Cycle or Phase
- 15.4.3. Connection of Maximum Force and Power
- 15.4.4. Connection Between Power and the Improvement of Athletic Performance
- 15.4.5. Connection Between Strength and Sports Performance
- 15.4.6. Relation between Strength and Speed
- 15.4.7. Connection Between Strength and Jump
- 15.4.8. Conneciton Between Strength and Changes in Direction
- 15.4.9. Connection Between Strength and Other Aspects of Athletic Performance
  - 15.4.9.1. Maximum Strength and its Effects on Training

15.5. Neuromuscular System (Hypertrophic Training)
- 15.5.1. Structure and Function
- 15.5.2. Motor Unit
- 15.5.3. Sliding Theory
- 15.5.4. Types of Fiber
- 15.5.5. Types of Contraction

15.6. Neuromuscular System Responses and Adaptations (Hypertrophic Training)
- 15.6.1. Nerve Impulse Adaptations
- 15.6.2. Muscle Activation Adaptations
- 15.6.3. Motor unit Synchronization Adaptations
- 15.6.4. Antagonist Coactivation Adaptations
- 15.6.5. Adaptations in Doublets
- 15.6.6. Muscle Preactivation
- 15.6.7. Muscle *Stiffness*
- 15.6.8. Reflexes
- 15.6.9. Internal Models of Motor Engrams
- 15.6.10. Muscle Tone
- 15.6.11. Action Potential Speed

15.7. Hypertrophy
- 15.7.1. Introduction
  - 15.7.1.1. Parallel and Serial Hypertrophy
  - 15.7.1.2. Sarcoplasmic Hypertrophy
- 15.7.2. Satellite Cells
- 15.7.3. Hyperplasia

15.8. Mechanisms that Induce Hypertrophy
- 15.8.1. Mechanism that Induces Hypertrophy: Mechanical Stress
- 15.8.2. Mechanism that Induces Hypertrophy: Metabolic Stress
- 15.8.3. Mechanism that Induces Hypertrophy: Muscle Damage

15.9. Variables for Hypertrophy Training Programming
- 15.9.1. Volume
- 15.9.2. Intensity
- 15.9.3. Frequency (F)
- 15.9.4. Weight
- 15.9.5. Density
- 15.9.6. Selecting Exercises
- 15.9.7. Order in the Execution of Exercises
- 15.9.8. Type of Muscle Action
- 15.9.9. Duration of Rest Intervals
- 15.9.10. Duration of Repetitions
- 15.9.11. Range of Movement

15.10. Main Factors Affecting Hypertrophic Development at the Highest Level
- 15.10.1. Genetics
- 15.10.2. Age
- 15.10.3. Sex
- 15.10.4. Training Status

Module 16. Strength Training to Improve Speed

16.1. Strength
- 16.1.1. Definition
- 16.1.2. General concepts
  - 16.1.2.1. Manifestations of Strength
  - 16.1.2.2. Factors that Determine Performance
  - 16.1.2.3. Strength Requirements for *Sprint* Improvement. Connection Between Force Manifestations and *Sprint*
  - 16.1.2.4. Strength-Speed Curve
  - 16.1.2.5. Relationship of the S-S and Power Curve and its Application to Sprint Phases
  - 16.1.2.6. Developing Muscle Strength and Power

16.2. Dynamics and Mechanics of *Linear Sprint* (100m Model)
- 16.2.1. Kinematic Analysis of the Take-off
- 16.2.2. Dynamics and Strength Application During Take-off
- 16.2.3. Kinematic Analysis of the Acceleration Phase
- 16.2.4. Dynamics and Strength Application During Acceleration
- 16.2.5. Kinematic Analysis of Running at Maximum Speed
- 16.2.6. Dynamics and Strength Application During Maximum Speed

16.3. Analysis of Acceleration Technique and Maximum Speed in Team Sports
- 16.3.1. Description of the Technique in Team Sports
- 16.3.2. Comparison of Sprinting Technique in Team Sports vs. Athletic Events
- 16.3.3. Timing and Motion Analysis of Speed Events in Team Sports

16.4. Exercises as Basic and Special Means of Strength Development for *Sprint* Improvement
- 16.4.1. Basic Movement Patterns
  - 16.4.1.1. Description of Patterns with Emphasis on Lower Limb Exercises
  - 16.4.1.2. Mechanical Demand of the Exercises
  - 16.4.1.3. Exercises Derived from Olympic Weightlifting
  - 16.4.1.4. Ballistic Exercises
  - 16.4.1.5. S-S Curve of the Exercises
  - 16.4.1.6. Strength Production Vector

16.5. Special Methods of Strength Training Applied to *Sprinting*
- 16.5.1. Maximum Effort Method
- 16.5.2. Dynamic Effort Method
- 16.5.3. Repeated Effort Method
- 16.5.4. French *Complex* and Contrast Method
- 16.5.5. Speed-Based Training
- 16.5.6. Strength Training as a Means of Injury Risk Reduction

16.6. Means and Methods of Strength Training for Speed Development
- 16.6.1. Means and Methods of Strength Training for the Development of the Acceleration Phase
  - 16.6.1.1. Connection of Force to Acceleration
  - 16.6.1.2. Sledding and Racing Against Resistance
  - 16.6.1.3. Slopes
  - 16.6.1.4. Jumpability
    - 16.6.1.4.1. Building the Vertical Jump
    - 16.6.1.4.2. Building the Horizontal Jump
- 16.6.2. Means and Methods for Training *Top Speed*
  - 16.6.2.1. Plyometry
    - 16.6.2.1.1. Concept of the Shock Method
    - 16.6.2.1.2. Historical Perspective
    - 16.6.2.1.3. Shock Method Methodology for Speed Improvement
    - 16.6.2.1.4. Scientific Evidence

16.7. Means and Methods of Strength Training Applied to Agility and Change of Direction
- 16.7.1. Determinants of Agility and COD
- 16.7.2. Multidirectional Jumps
- 16.7.3. Eccentric Strength

16.8. Assessment and Control of Strength Training
- 16.8.1. Strength-Speed Profile
- 16.8.2. Load-Speed Profile
- 16.8.3. Progressive Loads

16.9. Integration
- 16.9.1. Case Study

Module 17. Assessing Sports Performance in Strength Training

17.1. Assessment
- 17.1.1. General Concepts on Assessment, Test and Measuring
- 17.1.2. Test Characteristics
- 17.1.3. Types of Tests
- 17.1.4. Assessment Objectives

17.2. Neuromuscular Technology and Assessments
- 17.2.1. Contact Mat
- 17.2.2. Strength Platforms
- 17.2.3. Load Cell
- 17.2.4. Accelerometers
- 17.2.5. Position Transducers
- 17.2.6. Cellular Applications for Neuromuscular Evaluation

17.3. Submaximal Repetition Test
- 17.3.1. Protocol for its Assessment
- 17.3.2. Validated Estimation Formulas for the Different Training Exercises
- 17.3.3. Mechanical and Internal Load Responses During a Submaximal Repetition Test

17.4. Progressive Incremental Maximal Test (TPImax)
- 17.4.1. Naclerio and Figueroa Protocol 2004
- 17.4.2. Mechanical (Linear Encoder) and Internal Load (PSE) Responses During a Max TPI.
- 17.4.3. Determining the Optimal Zone for Power Training

17.5. Horizontal Jump Test
- 17.5.1. Assessmen Without Using Technology
- 17.5.2. Assessment Using Technology (Horizontal Encoder and Force Platform).

17.6. Simple Vertical Jump Test
- 17.6.1. *Squat Jump* (SJ) Assessment
- 17.6.2. *Countermovement* Jump (CMJ) Assessment
- 17.6.3. Assessment of an Abalakov Salto ABK
- 17.6.4. *Drop Jump* (DJ) Assessment

17.7. *Rebound Jump* Test
- 17.7.1. 5-second Repeated Jump Test
- 17.7.2. 15-second Repeated Jump Test
- 17.7.3. 30-second Repeated Jump Test
- 17.7.4. Fast Strength Endurance Index (Bosco)
- 17.7.5. Effort Exercise Rate in the *Rebound Jump Test*

17.8. Mechanical responses (Strength, Power and Speed/Time) During Single and Repeated Jumps Tests
- 17.8.1. Strength/Time in Simple and Repeated Jumps
- 17.8.2. Speed/Time in Single and Repeated Jumps
- 17.8.3. Power/Time in Simple and Repeated Jumps

17.9. Strength/Speed Profiles in Horizontal Vectors
- 17.9.1. Theoretical Basis of an S/S Profile
- 17.9.2. Morin and Samozino Assessment Protocols
- 17.9.3. Practical Applications
- 17.9.4. Contact Carpet, Linear Encoder and Force Platform Evaluation of Forces

17.10. Strength/Speed Profiles in Vertical Vectors
- 17.10.1. Theoretical Basis of an S/S Profile
- 17.10.2. Morin and Samozino Assessment Protocols
- 17.10.3. Practical Applications
- 17.10.4. Contact Carpet, Linear Encoder and Force Platform Evaluation of Forces

17.11. Isometric Tests
- 17.11.1. McCall Test
  - 17.11.1.1. Evaluation Protocol and Values Recorded With a Force Platform
- 17.11.2. Mid-Thigh Pull Test
  - 17.11.2.1. Evaluation Protocol and Values Recorded With a Force Platform

Module 18. Strength Training in Situational Sports

18.1. Basic Fundamentals
- 18.1.1. Functional and Structural Adaptations
  - 18.1.1.1. Functional Adaptations
  - 18.1.1.2. Load-Pause Ratio (Density) as a Criterion for Adaptation
  - 18.1.1.3. Strength as a Base Quality
  - 18.1.1.4. Mechanisms or Indicators for Structural Adjustments
  - 18.1.1.5. Utilization, Conceptualization of the Muscular Adaptations Provoked, as an Adaptive Mechanism of the Imposed Load. (Mechanical Stress, Metabolic Stress, Muscle Damage)
- 18.1.2. Motor Unit Recruitment
  - 18.1.2.1. Recruitment Order, Central Nervous System Regulatory Mechanisms, Peripheral Adaptations, Central Adaptations Using Tension, Speed or Fatigue as a Tool for Neural Adaptation.
  - 18.1.2.2. Order of Recruitment and Fatigue During Maximum Effort
  - 18.1.2.3. Order of Recruitment and Fatigue During Submaximal Effort
  - 18.1.2.4. Fibrillar Recovery

18.2. Specific Fundamentals
- 18.2.1. Movement as a Starting Point
- 18.2.2. Quality of Movement as a General Objective for Motor Control, Motor Patterning and Motor Programming
- 18.2.3. Priority Horizontal Movements
  - 18.2.3.1. Accelerating, Braking, Change of Direction with Inside Leg and Outside Leg; Absolute Maximum and/or Submaximum Speed and Technique, Correction and Application According to the Specific Movements in Competition
- 18.2.4. Priority Vertical Movements
  - 18.2.4.1. *Jumps, Hops, Bounds*. Technique, Correction and Application According to the Specific Movements in Competition

18.3. Technological Means for the Assessment of Strength Training and External Load Control
- 18.3.1. Introduction to Technology and Sport
- 18.3.2. Technology for Strength and Power Training Assessment and Control
  - 18.3.2.1. Rotary Encoder (Operation, Interpretation Variables, Intervention Protocols, Application)
  - 18.3.2.2. Load Cell (Operation, Interpretation Variables, Intervention Protocols, Application)
  - 18.3.2.3. Strength Platforms (Operation, Interpretation Variables, Intervention Protocols, Application)
  - 18.3.2.4. Electric Photocells (Operation, Interpretation Variables, Intervention Protocols, Application)
  - 18.3.2.5. Contact Mat (Operation, Interpretation Variables, Intervention Protocols, Application)
  - 18.3.2.6. Accelerometer (Operation, Interpretation Variables, Intervention Protocols, Application)
  - 18.3.2.7. Applications for Mobile Devices (Operation, Interpretation Variables, Intervention Protocols, Application)
- 18.3.3. Intervention Protocols for the Assessment and Control of Training

18.4. Controlling the Internal Load
- 18.4.1. Subjective Load Perception by Rating the Perceived Exertion
  - 18.4.1.1. Subjective Perception of Load to Estimate Relative Load (% 1MR)
- 18.4.2. Scope
  - 18.4.2.1. As Exercise Control
    - 18.4.2.1.1. Repetitions and PRE
    - 18.4.2.1.2. Repetitions in Reserve
    - 18.4.2.1.3. Scale of Speed
  - 18.4.2.2. Controlling the Overall Effect of a Session
  - 18.4.2.3. As a Tool for Periodization
    - 18.4.2.3.1. Use of (APRE) Self-Regulated Progressive Resistance Exercise, Interpretation of the Data and its Relation to the Correct Dosage of the Load in the Session
- 18.4.3. Recovery Quality Scale, Interpretation and Practical Application in the Session (TQR 0-10)
- 18.4.4. As a Tool for Daily Practice
- 18.4.5. Application
- 18.4.6. Recommendations

18.5. Means for Strength Training
- 18.5.1. Role of the Mean in Designing a Method
- 18.5.2. Means at the Service of a Method and in Function of a Central Sporting Objective
- 18.5.3. Types of Means
- 18.5.4. Movement Patterns and Activations as a Central Axis for Media Selection and Method Implementation

18.6. Building a Method
- 18.6.1. Defining the Types of Exercises
  - 18.6.1.1. Cross-Connectors as a Guide to the Movement Target
- 18.6.2. Exercise Evolution
  - 18.6.2.1. Modification of the Rotational Component and the Number of Supports According to the Plane of Motion
- 18.6.3. Exercise Organization
  - 18.6.3.1. Relationship With Priority Horizontal and Vertical Movements (2.3 and 2.4)

18.7. Practical Implementation of a Method (Programming)
- 18.7.1. Logical Implementation of the Plan
- 18.7.2. Implementation of a Group Session
- 18.7.3. Individual Programming in a Group Context
- 18.7.4. Strength in Context Applied to the Game
- 18.7.5. Periodization Proposal

18.8. ITU 1 (Integrating Thematic Unit)
- 18.8.1. Training Construction for Functional and Structural Adaptations and Recruitment Order
- 18.8.2. Constructing a Training Monitoring and/or Assessment System
- 18.8.3. Movement-Based Training Construction for the Implementation of Fundamentals, Means and External and Internal Load Control

18.9. ITU 2 (Integrating Thematic Unit)
- 18.9.1. Construction of a Group Training Session
- 18.9.2. Construction of a Group Training Session in Context Applied to the Game
- 18.9.3. Construction of a Periodization of Analytical and Specific Loads

Module 19. Training in Medium and Long Duration Sports

19.1. Strength
- 19.1.1. Definition and Concept
- 19.1.2. Continuum of Conditional Capabilities
- 19.1.3. Strength Requirements for Endurance Sports. Scientific Evidence
- 19.1.4. Strength Manifestations and Their Relationship to Neuromuscular Adaptations in Endurance Sports

19.2. Scientific Evidence on the Adaptations of Strength Training and its Influence on Medium and Long Duration Endurance Tests
- 19.2.1. Neuromuscular Adaptations
- 19.2.2. Metabolic and Endocrine Adaptations
- 19.2.3. Adaptations When Performing Specific Tests

19.3. Principle of Dynamic Correspondence Applied to Endurance Sports
- 19.3.1. Biomechanical Analysis of Force Production in Different Gestures: Running, Cycling, Swimming, Rowing, Cross-Country Skiing
- 19.3.2. Parameters of Muscle Groups Involved and Muscle Activation
- 19.3.3. Angular Kinematics
- 19.3.4. Rate and Duration of Force Production
- 19.3.5. Stress Dynamics
- 19.3.6. Amplitude and Direction of Movement

19.4. Concurrent Strength and Endurance Training
- 19.4.1. Historical Perspective
- 19.4.2. Interference Phenomenon
  - 19.4.2.1. Molecular Aspects
  - 19.4.2.2. Sports Performance
- 19.4.3. Effects of Strength Training on Endurance
- 19.4.4. Effects of Resistance Training on Strength Demonstrations
- 19.4.5. Types and Modes of Load Organization and Their Adaptive Responses
- 19.4.6. Concurrent Training. Evidence on Different Sports

19.5. Strength Training
- 19.5.1. Means and Methods for Maximum Strength Development
- 19.5.2. Means and Methods for Explosive Strength Development
- 19.5.3. Means and Methods for Reactive Strength Development
- 19.5.4. Compensatory and Injury Risk Reduction Training
- 19.5.5. Plyometric Training and Jumping Development as an Important Part of Improving Running Economy

19.6. Exercises and Special Means of Strength Training for Medium and Long Endurance Sports
- 19.6.1. Movement Patterns
- 19.6.2. Basic Exercises
- 19.6.3. Ballistic Exercises
- 19.6.4. Dynamic Exercises
- 19.6.5. Resisted and Assisted Strength Exercises
- 19.6.6. CORE Exercises

19.7. Strength Training Programming Based on the Microcycle Structure
- 19.7.1. Selection and Order of Exercises
- 19.7.2. Weekly Frequency of Strength Training
- 19.7.3. Volume and Intensity According to the Objective
- 19.7.4. Recovery Times

19.8. Strength Training Aimed at Different Cyclic Disciplines
- 19.8.1. Strength Training for Middle-Distance and Long-Distance Runners
- 19.8.2. Strength Training for Cycling
- 19.8.3. Strength Training for Swimming
- 19.8.4. Strength Training for Rowing
- 19.8.5. Strength Training for Cross-Country Skiing

19.9. Controlling the Training Process
- 19.9.1. Load Speed Profile
- 19.9.2. Progressive Load Test

06

Methodology

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

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

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

Case Study to contextualize all content

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

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

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

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

A learning method that is different and innovative

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

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

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

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

Relearning Methodology

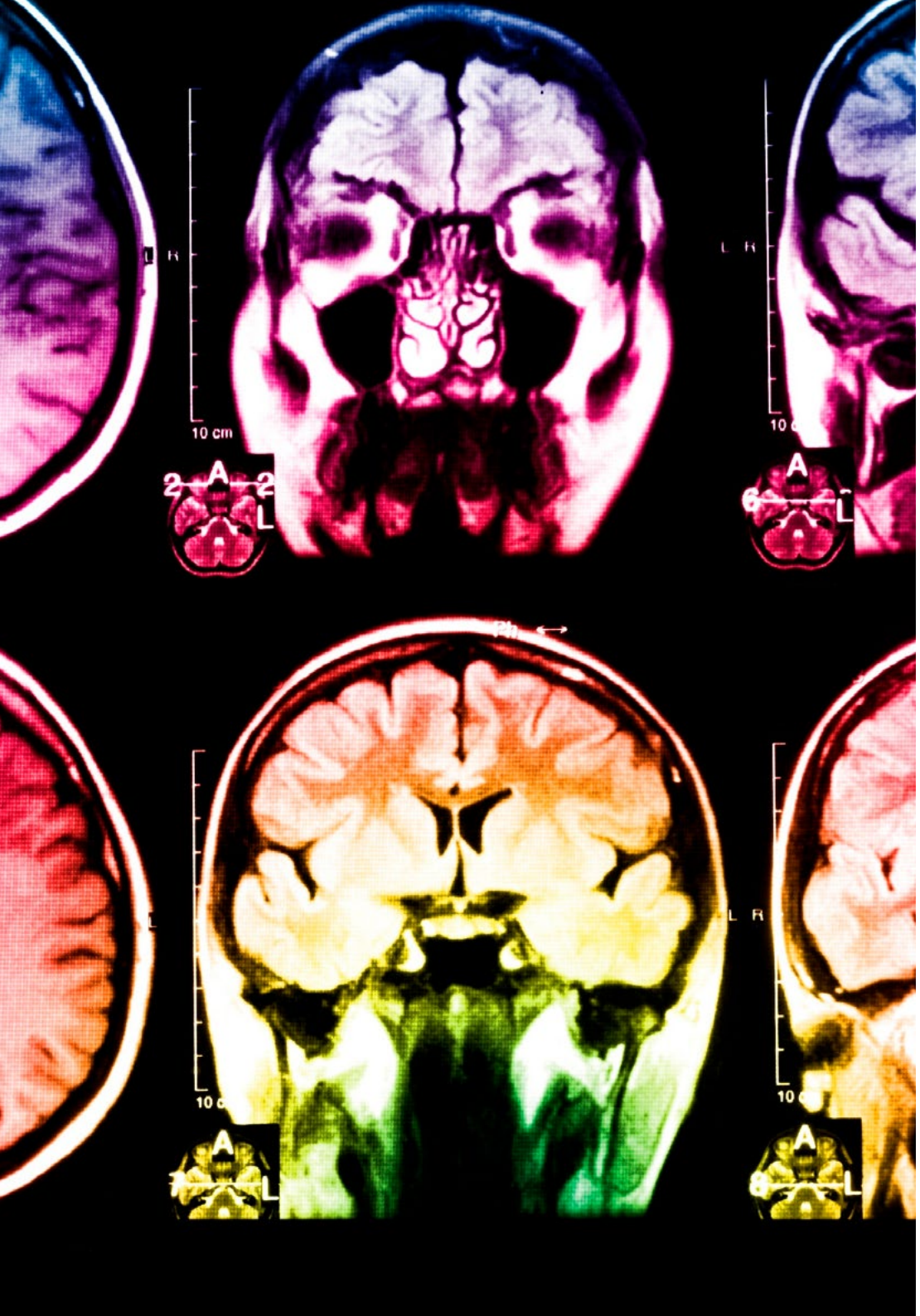
TECH effectively combines the Case Study methodology with a 100% online learning system based on repetition, which combines 8 different teaching elements in each lesson.

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

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

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

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



In our program, learning is not a linear process, but rather a spiral (learn, unlearn, forget, and re-learn). Therefore, we combine each of these elements concentrically. With this methodology, we have 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, markets, and financial 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.

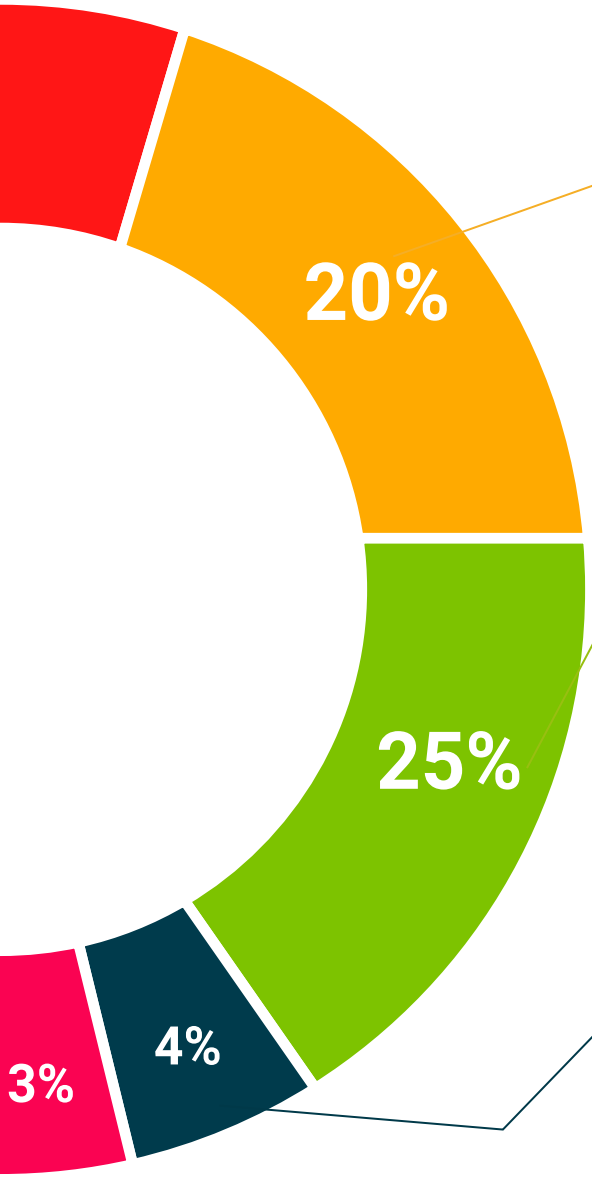
Learning from an Expert strengthens knowledge and memory, and generates confidence in future difficult decisions.

Practising Skills and Abilities

They will carry out activities to develop specific competencies and skills in each thematic 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 situation. 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.

07

Certificate

The Professional Master's Degree in Strength Training and High Performance in Sports 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 **Advanced Master's Degree in Strength Training and High Performance in Sports** contains the most complete and up-to-date scientific program on the market.

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

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

Title: **Advanced Master's Degree in Strength Training and High Performance in Sports**

Official Nº of Hours: **3,000 hours.**

Endorsed by the NBA


tech technological university

Awards the followi ng

CERTIFICATE

to

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

For having successfully passed and accredited the following program

ADVANCED MASTER'S DEGREE

in

Strength Training and High Performance in Sports

This is a qualification awarded by this University, equivalent to 3,000 h, 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 Navar ro
Dean

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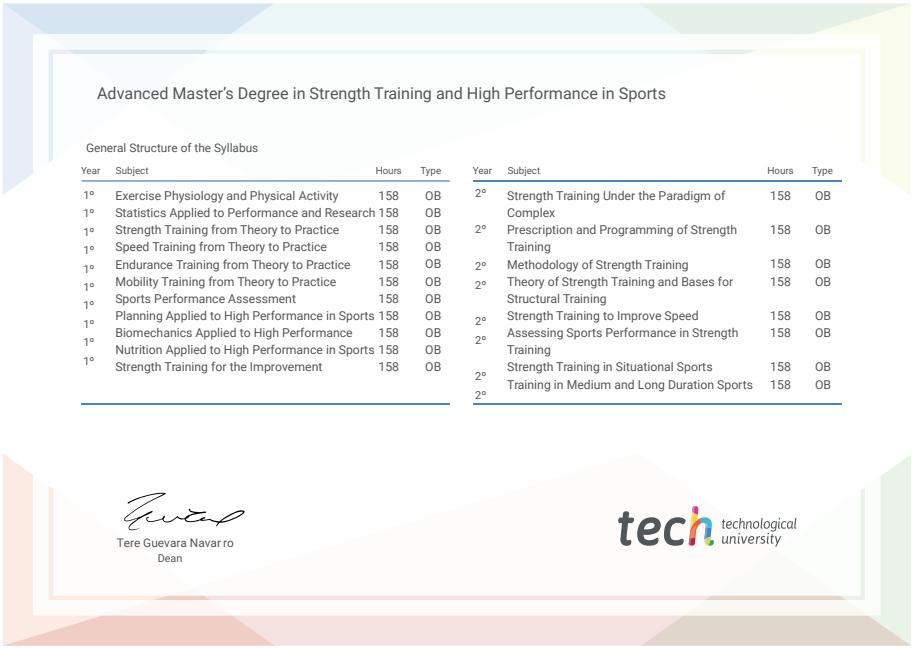
This qualification must always be accompanied by the university degree issued by the competent authority to practice professionally in each country.U

nique TECH Code: AFWORD23S techtitute.com/certificates


Advanced Master's Degree in Strength Training and High Performance in Sports

General Structure of the Syllabus

Year	Subject	Hours	Type
1º	Exercise Physiology and Physical Activity	158	OB
1º	Statistics Applied to Performance and Research	158	OB
1º	Strength Training from Theory to Practice	158	OB
1º	Speed Training from Theory to Practice	158	OB
1º	Endurance Training from Theory to Practice	158	OB
1º	Mobility Training from Theory to Practice	158	OB
1º	Sports Performance Assessment	158	OB
1º	Planning Applied to High Performance in Sports	158	OB
1º	Biomechanics Applied to High Performance	158	OB
1º	Nutrition Applied to High Performance in Sports	158	OB
1º	Strength Training for the Improvement	158	OB
2º	Strength Training Under the Paradigm of Complex	158	OB
2º	Prescription and Programming of Strength Training	158	OB
2º	Methodology of Strength Training	158	OB
2º	Theory of Strength Training and Bases for Structural Training	158	OB
2º	Strength Training to Improve Speed	158	OB
2º	Assessing Sports Performance in Strength Training	158	OB
2º	Strength Training in Situational Sports	158	OB
2º	Training in Medium and Long Duration Sports	158	OB

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

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Advanced Master's Degree

Strength Training and High Performance in Sports

- Modality: **online**
- Duration: **2 years**
- Certificate: **TECH Technological University**
- Dedication: **16h/week**
- Schedule: **at your own pace**
- Exams: **online**

Advanced Master's Degree

Strength Training and High Performance in Sports

Endorsed by the NBA

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