



XFE ACADEMY (PTY) Ltd.
Company Registration Number: 2020/086346/07

Head Office:

Tel: 010 312 6888
Email: info@xfeacademy.co.za

Training Centres:

Gauteng: Benoni
Western Cape: Strand

CATHSSETA Accreditation Number: 613/P/000019/2019

Masters Degree in Strength Training and Sport Performance

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 Processes

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. Mitochondrial 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



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- 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. Mecano Signal Transduction
 - 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. Central Governor 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. Strength Training to Enhance Movement Skills

- 2.1. Strength in Skill Development
 - 2.1.1. Importance of Strength in Skill Development



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- 2.1.2. Benefits of Strength Training in Skill Development
- 2.1.3. Types of Strength in Different Skills
- 2.1.4. Training Methods for Strength Development in Skills
- 2.2. Team Sports Skills
 - 2.2.1. General Concepts
 - 2.2.2. Performance Development Skills
 - 2.2.3. Skills: Classification
 - 2.2.3.1. Locomotive skills
 - 2.2.3.2. Manipulative skills
 - 2.3. Agility and Movements
 - 2.3.1. Basic Concepts
 - 2.3.2. The Importance of Sports
 - 2.3.3. Agility Components
 - 2.3.3.1. Movement Skills: Classification
 - 2.3.3.2. Physical Factors: Strength
 - 2.3.3.3. Anthropometric Factors
 - 2.3.3.4. Perceptual-Cognitive Components
 - 2.4. Posture
 - 2.4.1. Importance of Posture in the Different Skills
 - 2.4.2. Posture and Mobility
 - 2.4.3. Posture and CORE
 - 2.4.4. Posture and Center of Pressure
 - 2.4.5. Biomechanical Analysis of Efficient Posture
 - 2.4.6. Methodological Resources
 - 2.5. Linear Skills
 - 2.5.1. Characteristics of Linear Skills
 - 2.5.1.1. Main Planes and Vectors
 - 2.5.2. Classification
 - 2.5.2.1. Starting, Braking and Deceleration
 - 2.5.2.1.1. Definitions and Context of Use
 - 2.5.2.1.2. Biomechanical Analysis
 - 2.5.2.1.3. Methodological Resources
 - 2.5.2.2. Acceleration
 - 2.5.2.2.1. Definitions and Context of Use
 - 2.5.2.2.2. Biomechanical Analysis
 - 2.5.2.2.3. Methodological Resources
 - 2.5.2.3. Backpedal
 - 2.5.2.3.1. Definitions and Context of Use
 - 2.5.2.3.2. Biomechanical Analysis
 - 2.5.2.3.3. Methodological Resources
 - 2.6. Multi-Directional Skills: Shuffle
 - 2.6.1. Classification of Skills
 - 2.6.2. Shuffle: Definitions and Context of Use
 - 2.6.3. Biomechanical Analysis
 - 2.6.4. Methodological Resources
 - 2.7. Multi-Directional Skills: Crossover



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- 2.7.1. Crossover as a Change of Direction
- 2.7.2. Crossover as a Transitional Movement
- 2.7.3. Definitions and Context of Use
- 2.7.4. Biomechanical Analysis
- 2.7.5. Methodological Resources
- 2.8. Jump Skills 1
 - 2.8.1. Importance of Jumps in Different Skills
 - 2.8.2. Basic Concepts
 - 2.8.2.1. Biomechanics of Jumps
 - 2.8.2.2. CEA
 - 2.8.2.3. Stiffness
 - 2.8.3. Jump Classification
 - 2.8.4. Methodological Resources
- 2.9. Jump Skills 2
 - 2.9.1. Methods
 - 2.9.2. Acceleration and Jumps
 - 2.9.3. Shuffle and Jumps
 - 2.9.4. Crossover and Jumps
 - 2.9.5. Methodological Resources
- 2.10. Programming Variables

Module 3. Strength Training under the Complex Dynamic Systems Paradigm

- 3.1. Introduction to Complex Dynamic Systems
 - 3.1.1. Models Applied to Physical Preparation
 - 3.1.2. Determining Positive and Negative Interaction
 - 3.1.3. Uncertainty in Complex Dynamical Systems
- 3.2. Motor Control and its Role in Performance
 - 3.2.1. Introduction to Motor Control Theories
 - 3.2.2. Movement and Function
 - 3.2.3. Motor Learning
 - 3.2.4. Motor Control Applied to Systems Theory
- 3.3. Communication Processes in Systems Theory
 - 3.3.1. From Message to Movement
 - 3.3.1.1. Efficient Communication Process
 - 3.3.1.2. Stages of Learning
 - 3.3.1.3. Role of Communication and Sports Development in Early Ages
 - 3.3.2. VAKT Principles
 - 3.3.3. Performance Knowledge vs. Outcome Knowledge
 - 3.3.4. Verbal feedback in System Interactions
- 3.4. Strength as an Essential Condition
 - 3.4.1. Strength Training in Team Sports
 - 3.4.2. Manifestations of Strength Within the System
 - 3.4.3. The Strength-Speed Continuum. Systemic Review
- 3.5. Complex Dynamical Systems and Training Methods
 - 3.5.1. Periodization. Historical Review



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- 3.5.1.1. Traditional Periodization
- 3.5.1.2. Contemporary Periodization
- 3.5.2. Analysis of Periodization Models in Training Systems
- 3.5.3. Evolution of Strength Training Methods
- 3.6. Strength and Motor Divergence
 - 3.6.1. Developing Strength at Early Ages
 - 3.6.2. The Manifestations of Strength in Infantile-Juvenile Ages
 - 3.6.3. Efficient Programming at Youth Ages
- 3.7. The Role of Decision-Making in Complex Dynamical Systems
 - 3.7.1. The Decision-Making Process
 - 3.7.2. Decisional Timing
 - 3.7.3. The Development of Decision Making
 - 3.7.4. Programming Training Based on Decision Making
- 3.8. Perceptual Abilities in Sports
 - 3.8.1. Visual Abilities
 - 3.8.1.1. Visual Recognition
 - 3.8.1.2. Central and Peripheral Vision
 - 3.8.2. Motor Experience
 - 3.8.3. Attentional Focus
 - 3.8.4. The Tactical Component
- 3.9. Systemic Vision of Programming
 - 3.9.1. Influence of Identity on Programming
 - 3.9.2. System as a Path to Long-Term Development
 - 3.9.3. Long-Term Development Programs
- 3.10. Global Programming: From System to Necessity
 - 3.10.1. Program Design
 - 3.10.2. Practical System Assessment Workshop

Module 4. Prescription and Programming of Strength Training

- 4.1. Introduction and Definition of Concepts
 - 4.1.1. General Concepts
 - 4.1.1.1. Planning, Periodization, Prescription
 - 4.1.1.2. Qualities, Methods, Objectives
 - 4.1.1.3. Complexity, Risk and Uncertainty
 - 4.1.1.4. Complementary Pairs
 - 4.2. Exercises
 - 4.2.1. General vs. Specific
 - 4.2.2. Simple vs. Complex
 - 4.2.3. Thrust vs. Ballistic
 - 4.2.4. Kinetics and Kinematics
 - 4.2.5. Basic Patterns
 - 4.2.6. Order, Emphasis, Importance
- 4.3. Variables in the Programming
 - 4.3.1. Intensity
 - 4.3.2. Effort



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- 4.3.3. Intension
- 4.3.4. Volume
- 4.3.5. Density
- 4.3.6. Weight
- 4.3.7. Dosage
- 4.4. Periodization Structures
 - 4.4.1. Microcycle
 - 4.4.2. Mesocycle
 - 4.4.3. Macrocycle
 - 4.4.4. Olympic Cycles
- 4.5. Session Structures
 - 4.5.1. Hemispheres
 - 4.5.2. Entries
 - 4.5.3. Weider
 - 4.5.4. Patterns
 - 4.5.5. Muscle
- 4.6. Prescription
 - 4.6.1. Load-Effort Tables
 - 4.6.2. Based on %
 - 4.6.3. Based on Subjective Variables
 - 4.6.4. Based on Speed (VBT)
 - 4.6.5. Others
- 4.7. Prediction and Monitoring
 - 4.7.1. Speed-Based Training
 - 4.7.2. Areas of Repetition
 - 4.7.3. Load Areas
 - 4.7.4. Time and Reps
- 4.8. Plan
 - 4.8.1. Series – Repetition Schemes
 - 4.8.1.1. Plateau
 - 4.8.1.2. Step
 - 4.8.1.3. Waves
 - 4.8.1.4. Steps
 - 4.8.1.5. Pyramids
 - 4.8.1.6. Light-Heavy
 - 4.8.1.7. Cluster
 - 4.8.1.8. Rest-Pause
 - 4.8.2. Vertical Planning
 - 4.8.3. Horizontal Planning
 - 4.8.4. Classifications and Models
 - 4.8.4.1. Constant
 - 4.8.4.2. Lineal
 - 4.8.4.3. Reverse Linear
 - 4.8.4.4. Blocks
 - 4.8.4.5. Accumulation
 - 4.8.4.6. Undulating



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- 4.8.4.7. Reverse Undulating
- 4.8.4.8. Volume-Intensity
- 4.9. Adaptation
 - 4.9.1. Dosage-Response Model
 - 4.9.2. Robust-Optimal
 - 4.9.3. Fitness – Fatigue
 - 4.9.4. Micro Doses
- 4.10. Assessments and Adjustments
 - 4.10.1. Self-Regulated Load
 - 4.10.2. Adjustments Based on VBT
 - 4.10.3. Based on RIR and RPE
 - 4.10.4. Based on Percentages
 - 4.10.5. Negative Pathway

Module 5. Methodology of Strength Training

- 5.1. Training Methods Derived from Powerlifting
 - 5.1.1. Functional Isometrics
 - 5.1.2. Forced Repetitions
 - 5.1.3. Eccentrics in Competition Exercises
 - 5.1.4. Main Characteristics of the Most-Used Methods in Powerlifting
- 5.2. Training Methods from Weightlifting
 - 5.2.1. Bulgarian Method
 - 5.2.2. Russian Method
 - 5.2.3. Origin of Popular Methodologies in Olympic Weightlifting School
 - 5.2.4. Differences Between the Bulgarian and Russian Concepts
- 5.3. Zatsiorsky Methods
 - 5.3.1. Maximum Effort Method (ME)
 - 5.3.2. Repeated Effort Method (RE)
 - 5.3.3. Dynamic Effort Method (DE)
 - 5.3.4. Load Components and Main Characteristics of Zatsiorsky's Methods
 - 5.3.5. Interpretation and Differences for: Mechanical Variables (Force, Power and Speed) Revealed among ME, RE and DE, and their Internal Response (PSE)
- 5.4. Pyramidal Methods
 - 5.4.1. Classic Ascending
 - 5.4.2. Classic Descending
 - 5.4.3. Double
 - 5.4.4. Skewed Pyramid
 - 5.4.5. Truncated Pyramid
 - 5.4.6. Flat or Stable Pyramid
 - 5.4.7. Load Components (Volume and Intensity) for Different Pyramidal Method Proposals
- 5.5. Training Methods Derived from Body and Muscle Building
 - 5.5.1. Superseries
 - 5.5.2. Triseries
 - 5.5.3. Compound Series



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- 5.5.4. Giant Series
- 5.5.5. Congestive Series
- 5.5.6. Wave-Like Loading
- 5.5.7. ACT (Anti-Catabolic Training)
- 5.5.8. Bulk
- 5.5.9. Cluster
- 5.5.10. Zatziorsky 10x10
- 5.5.11. Heavy Duty
- 5.5.12. Ladder
- 5.5.13. Characteristics and Load Components of the Different Methodological Proposals of Training Systems Coming From Bodybuilding
- 5.6. Methods from Sports Training
 - 5.6.1. Plyometry
 - 5.6.2. Circuit Training
 - 5.6.3. Cluster Training
 - 5.6.4. Contrast
 - 5.6.5. Main Characteristics of Strength Training Methods Derived from Sports Training
- 5.7. Methods From Non-Conventional and CROSSFIT Training
 - 5.7.1. EMOM (Every Minute on the Minute)
 - 5.7.2. Tabata
 - 5.7.3. AMRAP (As Many Reps as Possible)
 - 5.7.4. For Time
 - 5.7.5. Main Characteristics of Strength Training Methods Derived from CrossFit Training
- 5.8. Speed-Based Training (VBT)
 - 5.8.1. Theoretical Foundation
 - 5.8.2. Practical Considerations
 - 5.8.3. Own Data
- 5.9. The Isometric Method
 - 5.9.1. Concepts and Physiological Fundamentals of Isometric Stresses
 - 5.9.2. Proposal of Yuri Verkoshansky
- 5.10. Methodology of Repeat Power Ability (RPA) From Alex Natera
 - 5.10.1. Theoretical Foundation
 - 5.10.2. Practical Applications
 - 5.10.3. Published Data vs. Own Data
- 5.11. Training Methodology Proposed by Fran Bosch
 - 5.11.1. Theoretical Foundation
 - 5.11.2. Practical Applications
 - 5.11.3. Published Data vs Own Data
- 5.12. Cal Dietz and Matt Van Dyke's Three-Phase Methodology
 - 5.12.1. Theoretical Foundation
 - 5.12.2. Practical Applications
- 5.13. New Trends in Quasi-Isometric Eccentric Training
 - 5.13.1. Neurophysiological Rationale and Analysis of Mechanical Responses Using Position Transducers and Force Platforms for Each Strength Training Approach

Module 6. Theory of Strength Training and Basis for Structural training



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- 6.1. Strength, its Conceptualization and Terminology
 - 6.1.1. Strength from Mechanics
 - 6.1.2. Strength from Physiology
 - 6.1.3. Concept Strength Deficit
 - 6.1.4. Concept of Applied Strength
 - 6.1.5. Concept of Useful Strength
 - 6.1.6. Terminology of Strength Training
 - 6.1.6.1. Maximum Strength
 - 6.1.6.2. Explosive Strength
 - 6.1.6.3. Elastic Explosive Strength
 - 6.1.6.4. Reflective Elastic Explosive Strength
 - 6.1.6.5. Ballistic Strength
 - 6.1.6.6. Rapid Force
 - 6.1.6.7. Explosive Power
 - 6.1.6.8. Speed Strength
 - 6.1.6.9. Resistance Training
- 6.2. Concepts Connected to Power 1
 - 6.2.1. Definition of Power
 - 6.2.1.1. Conceptual Aspects of Power
 - 6.2.1.2. Importance of Power in Sports Performance Context
 - 6.2.1.3. Clarification of Power Terminology
 - 6.2.2. Factors Contributing to Peak Power Development
 - 6.2.3. Structural Aspects Conditioning Power Production
 - 6.2.3.1. Muscle Hypertrophy
 - 6.2.3.2. Muscle Structure
 - 6.2.3.3. Ratio of Fast and Slow Fibers in a Cross Section
 - 6.2.3.4. Muscle Length and its Effect on Muscle Contraction
 - 6.2.3.5. Quantity and Characteristics of Elastic Components
 - 6.2.4. Neural Aspects Conditioning Power Production
 - 6.2.4.1. Action Potential
 - 6.2.4.2. Speed of Motor Unit Recruitment
 - 6.2.4.3. Muscle Coordination
 - 6.2.4.4. Intermuscular Coordination
 - 6.2.4.5. Prior Muscle Status (PAP)
 - 6.2.4.6. Neuromuscular Reflex Mechanisms and their Incidence
- 6.3. Concepts Connected to Power 2
 - 6.3.1. Theoretical Aspects for Understanding Strength– Time Curve
 - 6.3.1.1. Strength Impulse
 - 6.3.1.2. Phases of the Strength–Time Curve
 - 6.3.1.3. Phases of Acceleration in Strength– Time Curve
 - 6.3.1.4. Maximum Acceleration Area in Strength– Time Curve
 - 6.3.1.5. Deceleration Phase in Strength– Time Curve
 - 6.3.2. Theoretical Aspects for Understanding Power Curves
 - 6.3.2.1. Power– Time Curve
 - 6.3.2.2. Energy– Displacement Curve



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- 6.3.2.3. Optimal Workload for Maximum Power Development
- 6.4. Relating Concepts of Strength and their Connection to Sports Performance
 - 6.4.1. Strength Training Objectives
 - 6.4.2. Power Training Cycle/Phase Relationship
 - 6.4.3. Maximum Force-Power Relationship
 - 6.4.4. Relationship between Power and Improvement in Athletic Performance
 - 6.4.5. Strength-Sports Performance Relationship
 - 6.4.6. Strength-Speed Relationship
 - 6.4.7. Strength-Jump Relationship
 - 6.4.8. Relationship between Strength and Changes in Direction
 - 6.4.9. Connection Between Strength and Other Aspects of Athletic Performance
 - 6.4.9.1. Maximum Strength and Its Effects on Training
- 6.5. Neuromuscular System (Hypertrophic Training)
 - 6.5.1. Structure and Function
 - 6.5.2. Motor Unit
 - 6.5.3. Sliding Theory
 - 6.5.4. Types of Fiber
 - 6.5.5. Types of Contraction
- 6.6. Responses and their Adaptation to the Neuromuscular System (Hypertrophic Training)
 - 6.6.1. Nerve Impulse Adaptations
 - 6.6.2. Muscle Activation Adaptations
 - 6.6.3. Motor unit Synchronization Adaptations
 - 6.6.4. Adaptations in Antagonist Coactivation
 - 6.6.5. Adaptations in Doublets
 - 6.6.6. Muscle Preactivation
 - 6.6.7. Muscular Stiffness
 - 6.6.8. Reflexes
 - 6.6.9. Internal Models of Motor Engrams
 - 6.6.10. Muscle Tone
 - 6.6.11. Action Potential Speed
- 6.7. Hypertrophy
 - 6.7.1. Introduction
 - 6.7.1.1. Parallel and Serial Hypertrophy
 - 6.7.1.2. Sarcoplasmic Hypertrophy
 - 6.7.2. Satellite Cells
 - 6.7.3. Hyperplasia
- 6.8. Mechanisms that Induce Hypertrophy*
 - 6.8.1. Mechanism that Induces Hypertrophy: Mechanical Stress
 - 6.8.2. Mechanism that Induces Hypertrophy: Metabolic Stress
 - 6.8.3. Mechanism that Induces Hypertrophy: Muscle Damage
- 6.9. Variables for Hypertrophy Training Programming*
 - 6.9.1. Volume
 - 6.9.2. Intensity
 - 6.9.3. Frequency (F)
 - 6.9.4. Weight
 - 6.9.5. Density



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- 6.9.6. Selecting Exercises
- 6.9.7. Order in the Execution of Exercises
- 6.9.8. Type of Muscle Action
- 6.9.9. Duration of Rest Intervals
- 6.9.10. Duration of Repetitions
- 6.9.11. Range of Movement
- 6.10. Main Factors Affecting High-Level Hypertrophic Development
 - 6.10.1. Genetics
 - 6.10.2. Age
 - 6.10.3. Sex
 - 6.10.4. Training Status

Module 7. Strength Training to Improve Speed

- 7.1. Strength
 - 7.1.1. Definition
 - 7.1.2. General Concepts
 - 7.1.2.1. Manifestations of Strength
 - 7.1.2.2. Factors that Determine Performance
 - 7.1.2.3. Strength Requirements for Sprint Improvement Strength-Sprint Relationship
 - 7.1.2.4. Strength-Speed Curve
 - 7.1.2.5. Relationship of the S-S and Power Curve and its Application to Sprint Phases
 - 7.1.2.6. Development of Muscular Strength and Power
 - 7.2. Dynamics and Mechanics of Linear Sprint (100m Model)
 - 7.2.1. Kinematic Analysis of the Take-off
 - 7.2.2. Dynamics and Strength Application During Take-off
 - 7.2.3. Kinematic Analysis of the Acceleration Phase
 - 7.2.4. Dynamics and Strength Application During Acceleration
 - 7.2.5. Kinematic Analysis of Running at Maximum Speed
 - 7.2.6. Dynamics and Strength Application During Maximum Speed
 - 7.3. Acceleration Technique and Maximum Speed Analysis in Team Sports
 - 7.3.1. Description of Technique in Team Sports
 - 7.3.2. Comparison of Sprinting Technique in Team Sports vs. Athletic Events
 - 7.3.3. Timing and Motion Analysis of Speed Events in Team Sports
 - 7.4. Exercises as Basic and Special Means of Strength Development for Sprint Improvement
 - 7.4.1. Basic Movement Patterns
 - 7.4.1.1. Description of Patterns with Emphasis on Lower Limb Exercises
 - 7.4.1.2. Mechanical Demand of the Exercises
 - 7.4.1.3. Exercises Derived from Olympic Weightlifting
 - 7.4.1.4. Ballistic Exercises
 - 7.4.1.5. S-S Curve of the Exercises
 - 7.4.1.6. Strength Production Vector
 - 7.5. Special Methods of Strength Training Applied to Sprinting
 - 7.5.1. Maximum Effort Method
 - 7.5.2. Dynamic Effort Method
 - 7.5.3. Repeated Effort Method



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- 7.5.4. French Complex and Contrast Method
- 7.5.5. Speed-Based Training
- 7.5.6. Strength Training as a Means of Injury Risk Reduction
- 7.6. Means and Methods of Strength Training for Speed Development
 - 7.6.1. Means and Methods of Strength Training for the Development of the Acceleration Phase
 - 7.6.1.1. Connection of Force to Acceleration
 - 7.6.1.2. Sledding and Racing Against Resistance
 - 7.6.1.3. Slopes
 - 7.6.1.4. Jumpability
 - 7.6.1.4.1. Building the Vertical Jump
 - 7.6.1.4.2. Building the Horizontal Jump
 - 7.6.2. Means and Methods for Top Speed Training
 - 7.6.2.1. Plyometry
 - 7.6.2.1.1. Concept of the Shock Method
 - 7.6.2.1.2. Historical Perspective
 - 7.6.2.1.3. Shock Method Methodology for Speed Improvement
 - 7.6.2.1.4. Scientific Evidence
- 7.7. Means and Methods of Strength Training Applied to Agility and Change of Direction
 - 7.7.1. Determinants of Agility and COD
 - 7.7.2. Multidirectional Jumps
 - 7.7.3. Eccentric Strength
- 7.8. Assessment and Control of Strength Training
 - 7.8.1. Strength-Speed Profile
 - 7.8.2. Load-Speed Profile
 - 7.8.3. Progressive Loads
- 7.9. Integration
 - 7.9.1. Case Study

Module 8. Assessing Sports Performance in Strength Training

- 8.1. Assessment
 - 8.1.1. General Concepts on Assessment, Test and Measuring
 - 8.1.2. Test Characteristics
 - 8.1.3. Types of Tests
 - 8.1.4. Assessment Objectives
- 8.2. Neuromuscular Technology and Assessments
 - 8.2.1. Contact Mat
 - 8.2.2. Strength Platforms
 - 8.2.3. Load Cell
 - 8.2.4. Accelerometers
 - 8.2.5. Position Transducers
 - 8.2.6. Cellular Applications for Neuromuscular Evaluation
- 8.3. Submaximal Repetition Test
 - 8.3.1. Assessment Protocol
 - 8.3.2. Validated Estimation Formulae for the Different Training Exercises
 - 8.3.3. Mechanical and Internal Load Responses During a Submaximal Repetition Test



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- 8.4. Progressive Maximum Incremental Exercise Test (IETmax)
 - 8.4.1. Naclerio and Figueroa Protocol 2004
 - 8.4.2. Mechanical (Linear Encoder) and Internal Load (PSE) Responses During a Max TPI
 - 8.4.3. Determining the Optimal Zone for Power Training
- 8.5. Horizontal Jump Test
 - 8.5.1. Assessment Without Use of Technology
 - 8.5.2. Technologically Assisted Assessment (Horizontal Encoder and Force Platform)
- 8.6. Simple Vertical Jump Test
 - 8.6.1. Squat Jump Assessment
 - 8.6.2. Counter Movement Jump Assessment
 - 8.6.3. Assessment of an Abalakov Salto ABK
 - 8.6.4. Drop Jump Assessment
- 8.7. Repeated Vertical Jump Test (Rebound Jump)
 - 8.7.1. 5-second Repeated Jump Test
 - 8.7.2. 15-second Repeated Jump Test
 - 8.7.3. 30-second Repeated Jump Test
 - 8.7.4. Fast Strength Endurance Index (Bosco)
 - 8.7.5. Effort Exercise Index in Rebound Jump Test
- 8.8. Mechanical Responses (Strength, Power and Speed/Time) during Single and Repeated Jump Tests
 - 8.8.1. Strength/Time in Simple and Repeated Jumps
 - 8.8.2. Speed/Time in Single and Repeated Jumps
 - 8.8.3. Power/Time in Simple and Repeated Jumps
- 8.9. Strength/Speed Profiles in Horizontal Vectors
 - 8.9.1. Theoretical Basis of an S/S Profile
 - 8.9.2. Morin and Samozino Assessment Protocols
 - 8.9.3. Practical Applications
 - 8.9.4. Contact Carpet, Linear Encoder and Force Platform Force Evaluation
- 8.10. Strength/Speed Profiles in Vertical Vectors
 - 8.10.1. Theoretical Basis of an S/S Profile
 - 8.10.2. Morin and Samozino Assessment Protocols
 - 8.10.3. Practical Applications
 - 8.10.4. Contact Carpet, Linear Encoder and Force Platform Evaluation of Forces
- 8.11. Isometric Tests
 - 8.11.1. McCall Test
 - 8.11.1.1. Evaluation Protocol and Values Recorded With a Force Platform
 - 8.11.2. Mid-Thigh Pull Test
 - 8.11.2.1. Evaluation Protocol and Values Recorded With a Force Platform

Module 9. Strength Training in Situational Sports

- 9.1. Fundamentals
 - 9.1.1. Functional and Structural Adaptations
 - 9.1.1.1. Functional Adaptations
 - 9.1.1.2. Load-Pause Ratio (Density) as a Criterion for Adaptation



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- 9.1.1.3. Strength as a Base Quality
- 9.1.1.4. Structural Adjustment Mechanisms or Indicators
- 9.1.1.5. Utilization, Conceptualization of the Muscular Adaptations Provoked, as an Adaptive Mechanism of the Imposed Load. (Mechanical Stress, Metabolic Stress, Muscle Damage)
- 9.1.2. Motor Unit Recruitment
 - 9.1.2.1. Recruitment Order, Central Nervous System Regulatory Mechanisms, Peripheral Adaptations, Central Adaptations Using Tension, Speed or Fatigue as a Tool for Neural Adaptation
 - 9.1.2.2. Order of Recruitment and Fatigue During Maximum Effort
 - 9.1.2.3. Recruitment Order and Fatigue During Sub-Maximum Efforts
 - 9.1.2.4. Fibrillar Recovery
- 9.2. Specific Fundamentals
 - 9.2.1. Movement as a Starting Point
 - 9.2.2. Quality of Movement as a General Objective for Motor Control, Motor Pattern and Motor Programming
 - 9.2.3. Priority Horizontal Movements
 - 9.2.3.1. Accelerating, Braking, Change of Direction with Inside Leg and Outside Leg, Maximum Absolute Speed and/or Sub-Maximum Speed Technique, Correction and Application According to Specific Movements in Competition
 - 9.2.4. Priority Vertical Movements
 - 9.2.4.1. Jumps, Hops, Bounds Technique, Correction and Application According to Specific Movements in Competition
- 9.3. Technological Means for Strength Training and External Load Control Assessment
 - 9.3.1. Introduction to Technology and Sport
 - 9.3.2. Strength and Power Training Assessment and Control Technology
 - 9.3.2.1. Rotary Encoder (Operation, Interpretation Variables, Intervention Protocols, Application)
 - 9.3.2.2. Load Cell (Operation, Interpretation Variables, Intervention Protocols, Application)
 - 9.3.2.3. Strength Platforms (Operation, Interpretation Variables, Intervention Protocols, Application)
 - 9.3.2.4. Electric Photocells (Operation, Interpretation Variables, Intervention Protocols, Application)
 - 9.3.2.5. Contact Mat (Operation, Interpretation Variables, Intervention Protocols, Application)
 - 9.3.2.6. Accelerometer (Operation, Interpretation Variables, Intervention Protocols, Application)
 - 9.3.2.7. Mobile Device Applications (Operation, Interpretation Variables, Intervention Protocols, Application)
 - 9.3.3. Intervention Protocols for the Assessment and Control of Training
- 9.4. Internal Load Control
 - 9.4.1. Subjective Load Perception by Perceived Exertion Rating
 - 9.4.1.1. Subjective Perception of Load to Estimate Relative Load (% 1MR)
 - 9.4.2. Scope
 - 9.4.2.1. As Exercise Control



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- 9.4.2.1.1. Repetitions and PRE
- 9.4.2.1.2. Repetitions in Reserve
- 9.4.2.1.3. Scale of Speed
- 9.4.2.2. Controlling the Overall Effect of a Session
- 9.4.2.3. As Periodization Tool
 - 9.4.2.3.1. Use of (APRE) Self-Regulated Progressive Resistance Exercise, Data Interpretation and Relation to Correct Dosage of Load during Session
- 9.4.3. Recovery Quality Scale, Interpretation and Practical Application in the Session (TQR 0-10)
- 9.4.4. As a Tool for Daily Practice
- 9.4.5. Application
- 9.4.6. Recommendations
- 9.5. Means for Strength Training
 - 9.5.1. Role of Means in Designing Method
 - 9.5.2. Means According to Method and Central Sporting Objective
 - 9.5.3. Types of Means
 - 9.5.4. Movement Patterns and Activations as a Central Axis for Media Selection and Method Implementation
- 9.6. Building a Method
 - 9.6.1. Defining the Types of Exercises
 - 9.6.1.1. Cross-Connectors as Guides to Movement Objective
 - 9.6.2. Exercise Evolution
 - 9.6.2.1. Rotational Component Modification and Number of Supports According to Plane of Motion
 - 9.6.3. Exercise Organization
 - 9.6.3.1. Relationship with Priority Horizontal and Vertical Movements (2.3 and 2.4)
- 9.7. Practical Implementation of a Method (Programming)
 - 9.7.1. Logical Implementation of the Plan
 - 9.7.2. Implementation of a Group Session
 - 9.7.3. Individual Programming in a Group Context
 - 9.7.4. Strength in Context Applied to the Game
 - 9.7.5. Periodization Proposal
- 9.8. ITU 1 (Integrating Thematic Unit)
 - 9.8.1. Training Construction for Functional and Structural Adaptations and Recruitment Order
 - 9.8.2. Constructing a Training Monitoring and/or Assessment System
 - 9.8.3. Movement-Based Training Construction for the Implementation of Fundamentals, Means and External and Internal Load Control
- 9.9. ITU 2 (Integrating Thematic Unit)
 - 9.9.1. Construction of a Group Training Session
 - 9.9.2. Construction of a Group Training Session in Context Applied to the Game
 - 9.9.3. Construction of a Periodization of Analytical and Specific Loads

Module 10. Training in Medium and Long Duration Sports

10.1. Strength



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- 10.1.1. Definition and Concept
- 10.1.2. Continuum of Conditional Abilities
- 10.1.3. Strength Requirements for Endurance Sports. Scientific Evidence
- 10.1.4. Strength Manifestations and Their Relationship to Neuromuscular Adaptations in Endurance Sports
- 10.2. Scientific Evidence on the Adaptations of Strength Training and its Influence on Medium and Long Duration Endurance Tests
 - 10.2.1. Neuromuscular Adaptations
 - 10.2.2. Metabolic and Endocrine Adaptations
 - 10.2.3. Adaptations When Performing Specific Tests
- 10.3. Principle of Dynamic Correspondence Applied to Endurance Sports
 - 10.3.1. Biomechanical Analysis of Force Production in Different Gestures: Running, Cycling, Swimming, Rowing, Cross-Country Skiing
 - 10.3.2. Parameters of Muscle Groups Involved and Muscle Activation
 - 10.3.3. Angular Kinematics
 - 10.3.4. Rate and Duration of Force Production
 - 10.3.5. Stress Dynamics
 - 10.3.6. Amplitude and Direction of Movement
- 10.4. Concurrent Strength and Endurance Training
 - 10.4.1. Historical Perspective
 - 10.4.2. Interference Phenomenon
 - 10.4.2.1. Molecular Aspects
 - 10.4.2.2. Sports Performance
 - 10.4.3. Effects of Strength Training on Endurance
 - 10.4.4. Effects of Resistance Training on Strength Demonstrations
 - 10.4.5. Types and Modes of Load Organization and Their Adaptive Responses
 - 10.4.6. Concurrent Training. Evidence on Different Sports
- 10.5. Strength Training
 - 10.5.1. Means and Methods for Maximum Strength Development
 - 10.5.2. Means and Methods for Explosive Strength Development
 - 10.5.3. Means and Methods for Reactive Strength Development
 - 10.5.4. Compensatory and Injury Risk Reduction Training
 - 10.5.5. Plyometric Training and Jumping Development as an Important Part of Improving Running Economy
- 10.6. Exercises and Special Means of Strength Training for Medium and Long Endurance Sports
 - 10.6.1. Movement Patterns
 - 10.6.2. Basic Exercises
 - 10.6.3. Ballistic Exercises
 - 10.6.4. Dynamic Exercises
 - 10.6.5. Resisted and Assisted Strength Exercises
 - 10.6.6. Core Exercises
- 10.7. Strength Training Programming Based on the Microcycle Structure
 - 10.7.1. Selection and Order of Exercises
 - 10.7.2. Weekly Frequency of Strength Training
 - 10.7.3. Volume and Intensity According to the Objective
 - 10.7.4. Recovery Times



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- 10.8. Strength Training Aimed at Different Cyclic Disciplines
 - 10.8.1. Strength Training for Middle-Distance and Long-Distance Runners
 - 10.8.2. Strength Training for Cycling
 - 10.8.3. Strength Training for Swimming
 - 10.8.4. Strength Training for Rowing
 - 10.8.5. Strength Training for Cross-Country Skiing
- 10.9. Controlling the Training Process
 - 10.9.1. Load Speed Profile
 - 10.9.2. Progressive Load Test