



National Academy of Sports Medicine

# Preparing for the NASM Essentials of Sports Performance Training (PES) Exam

Preparing for the NASM Essentials of Sports  
Performance Training



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## **INTRODUCTION:**

Welcome to the National Academy of Sports Medicine's Performance Enhancement Specialist home-study course. At NASM, our mission is to help athletes accomplish all of their sports performance goals. We aim to give Sport Performance Professionals an integrated approach to sports performance, allowing them to guide others toward healthier lifestyles and maximum performance. Our educational continuum employs an easy-to-use, systematic approach in order to apply scientific, clinically accepted concepts.

### **Getting Help:**

At NASM, your success is our success. We want to help you in every way we can. The NASM staff is available to offer any assistance you may need throughout the course of your program. Whether you have technical or educational questions, we are available by phone and email 8:00 A.M to 5:00 P.M (PST) Monday through Friday. Please call our toll free number at 1-800-460-6276 or email us questions at [www.nasm.org](http://www.nasm.org).

### **Study Tips:**

The most important characteristic for students to possess is a deep and passionate desire to learn. That said, the following tips should help you maximize the time spent on the course materials. \*\*\*This is not an exhaustive list.



## UTILIZING THE NASM ESSENTIALS OF SPORTS PERFORMANCE TRAINING MATERIALS

1. **Use all the tools-** Textbook, Videos, Study Guide. **Hint-** The 45 day planner located in the Study Guide will help keep you on track.
  - a. Step 1: **Read** a chapter in the text.
  - b. Step 2: **Watch** the corresponding video presentations for that chapter.
  - c. Step 3: **Quiz** yourself by filling out the Study Guide and completing the online quiz for that chapter.
  - d. Step 4: **Review** any topics from that chapter you find difficult.
  - e. Step 5: **Retake** online quiz
2. **Practice exam.** Once you've completed all 16 chapters, take the online practice exam.
  - a. Take the online practice exam strictly from memory (close your book). Use the quizzes and practice exam results to see where you need to do more studying.
  - b. Also, don't bother memorizing the specific questions on the practice exam (they won't be on the test) - instead get to know the "concepts".
  - c. If you need help accessing the online practice exam please call 1-800-460-6276.
3. **Attend a live workshop.** The workshop is a great place to meet other trainers (maybe form a study group), ask questions, and gain hands-on experience.
4. **Call NASM (800-460-6276) with any questions.** We are here to help you succeed!
5. **Ask a friend/relative/mentor to quiz you.** This is a great chance to test your knowledge and show others how much you've learned.
6. **Take your time** when taking the exam and read each question thoroughly.
7. **Highlight** important sentences in the text as you read and make notes on the side of the page. Once you're finished with the book, re-read your notes and highlights.
8. **Study away from distractions.**
9. **Practice-** Take what you learn and apply it in the gym with your own workouts.
10. **Understanding vocabulary** is essential to understanding the questions on the final. If you don't know what the question is asking, it's hard to choose the right answer. Highlight key vocabulary terms as you read the text and try to use them in a sentence.



### EXAM BREAKDOWN

| <b>Details of NASM-CPT Examination</b> |                 |
|----------------------------------------|-----------------|
| Time given to complete exam            | 90 minutes      |
| Score required to pass exam            | 70%             |
| Number of Questions                    | 100             |
| Format of exam questions               | Multiple choice |
| Location of exam                       | Online          |

| <b>Eligibility Requirements</b>                                |
|----------------------------------------------------------------|
| 18 Years of Age                                                |
| NASM-CPT or 4-year degree in an Exercise Science related field |
| NASM exam enrollment paid in full                              |



**Chapter I Essentials of Integrated Training**

Sports Performance Professionals need to follow a comprehensive, systematic, and integrated training approach to help athletes achieve their desired performance goals. To bridge the ever widening gap between science and practical application, a full understanding of the structure and function of the human movement system is needed to stay on the cutting edge of research, sports science, and practical application.

| Essentials of Integrated Training                                                                                                                                                                                                                                                                                                                                             |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>Integrated Training Principles</p> <ul style="list-style-type: none"> <li>• Utilization of Stretch Shortening Cycle</li> <li>• Utilization of Integrated Training Continuum</li> <li>• Training in all Planes of Motion</li> <li>• Training with Optimum Posture</li> <li>• Training for Optimum Muscle Balance</li> <li>• Training for Optimum Muscle Function</li> </ul> |
| <p>Components of Integrated Sports Performance Training</p> <ul style="list-style-type: none"> <li>• Flexibility Training</li> <li>• Cardiorespiratory Training</li> <li>• Core training</li> <li>• Balance Training</li> <li>• Plyometric Training</li> <li>• Speed, Agility, &amp; Quickness Training</li> <li>• Resistance Training</li> </ul>                             |
| <p>Scientific Rationale for the OPT™ Model (stabilization, strength, power)</p> <ul style="list-style-type: none"> <li>• Stabilization Endurance Training</li> <li>• Strength Endurance Training</li> <li>• Hypertrophy Training</li> <li>• Maximal Strength Training</li> <li>• Power Training</li> <li>• Maximal Power Training</li> </ul>                                  |
| <p>Important Key Terms</p> <ul style="list-style-type: none"> <li>• Integrated training</li> <li>• Neuromuscular Efficiency</li> <li>• Stretch-shortening Cycle</li> <li>• Functional Strength</li> <li>• Altered Reciprocal Inhibition</li> <li>• Synergistic Dominance</li> <li>• Flexibility</li> <li>• Strength</li> </ul>                                                |



### Chapter 2 Introduction to Human Movement Science

Human movement science is the study of how the Human Movement System (HMS) functions in an interdependent, interrelated scheme. The HMS consists of the muscular system (functional anatomy), skeletal system (functional biomechanics), and the nervous system (motor behavior). Although they seem separate, each system and its components must collaborate to form interdependent links. This chapter will review the pertinent aspects of each component of the HMS as it relates to integrated sports performance training.

| Introduction to Human Movement Science                                                                                                                                                                                                                                                                                                                                                                                     |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Planes of Motion and Common Joint Motions (Table 2.1) <ul style="list-style-type: none"> <li>• Sagittal (flexion, extension, dorsiflexion, plantarflexion)</li> <li>• Frontal (abduction, adduction)</li> <li>• Transverse (internal rotation, external rotation)</li> </ul>                                                                                                                                               |
| Combined Joint Motions (Table 2.2) <ul style="list-style-type: none"> <li>• Pronation</li> <li>• Supination</li> </ul>                                                                                                                                                                                                                                                                                                     |
| Muscle Action Spectrum (Table 2.3) <ul style="list-style-type: none"> <li>• Concentric</li> <li>• Isometric</li> <li>• Eccentric</li> </ul>                                                                                                                                                                                                                                                                                |
| Muscular Force <ul style="list-style-type: none"> <li>• Length-tension Relationships</li> <li>• Force-velocity Curve</li> <li>• Force-couple Relationships</li> </ul>                                                                                                                                                                                                                                                      |
| Muscle Leverage and Arthrokinematics (Table 2.4) <ul style="list-style-type: none"> <li>• First Class Lever</li> <li>• Second Class Lever</li> <li>• Third Class Lever</li> </ul>                                                                                                                                                                                                                                          |
| Functional Anatomy ( <b>very important</b> ) <ul style="list-style-type: none"> <li>• Local Muscular System</li> <li>• Global Muscular System</li> <li>• 4 Sub-systems (DLS, POS, AOS, LS) (Figures 2.14, 2.15, 2.16, 2.17)</li> </ul>                                                                                                                                                                                     |
| Functional Anatomy of Major Muscles <ul style="list-style-type: none"> <li>• Focus on Isolated and Integrated functions (eccentric, isometric, concentric functions)</li> </ul>                                                                                                                                                                                                                                            |
| Motor Behavior (Figure 2.18) <ul style="list-style-type: none"> <li>• Motor Control                             <ul style="list-style-type: none"> <li>○ Proprioception</li> <li>○ Sensorimotor Integration</li> </ul> </li> <li>• Motor Learning                             <ul style="list-style-type: none"> <li>○ Feedback</li> <li>○ Knowledge of Results</li> <li>○ Knowledge of Performance</li> </ul> </li> </ul> |



### Chapter 3 Sports Performance Testing

Designing an individualized sports performance program can only be properly accomplished by having an understanding of an athlete's goals, needs, and abilities. The information necessary to create the right program for a specific athlete (or group of athletes) comes through proper sports performance testing.

| Sports Performance Testing                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>Types of Subjective Information</p> <ul style="list-style-type: none"> <li>• PAR-Q (Figure 3.2)</li> <li>• Medical History (Figure 3.3)</li> <li>• Past Injuries/ Surgeries</li> <li>• Chronic Conditions</li> <li>• Medications (Table 3.1, 3.2)</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| <p>Types of Objective Information</p> <ul style="list-style-type: none"> <li>• Physiological Assessments                             <ul style="list-style-type: none"> <li>○ Heart Rate,</li> <li>○ Blood Pressure,</li> </ul> </li> <li>• Body Composition                             <ul style="list-style-type: none"> <li>○ Skinfold (Figures 3.7, 3.8, 3.9, 3.10)</li> <li>○ Circumference</li> <li>○ BMI</li> </ul> </li> <li>• <b>**Postural Assessments</b> <ul style="list-style-type: none"> <li>○ Static Posture</li> <li>○ Overhead Squat (Table 3.6 very important)</li> <li>○ Single-leg Squat (Table 3.7 very important)</li> <li>○ Pushing</li> <li>○ Pulling</li> <li>○ LESS Test</li> </ul> </li> <li>• Performance Assessments                             <ul style="list-style-type: none"> <li>○ Core Stability Assessments, Strength Assessments, Power Assessments, Speed, Agility, &amp; Quickness Assessment, Cardiorespiratory Assessments</li> </ul> </li> </ul> |
| <p>Important Concepts</p> <ul style="list-style-type: none"> <li>• Structural Efficiency</li> <li>• Functional Efficiency</li> <li>• Functional Strength</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| <p><b>**Learn how to identify common muscle imbalances (overactive and underactive muscles) when performing various dynamic postural assessments (i.e. Overhead Squat, Single-leg Squat etc).</b></p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |





### Chapter 4 Flexibility Training for Performance Enhancement

This chapter provides an overview of the most current rationale supporting flexibility training so that Sports Performance Professionals can not only understand the dynamic nature of integrated flexibility training (IFT), but design IFT programs for their athletes for optimum performance and function.

| Flexibility Training for Performance Enhancement                                                                                                                                                                                                                                                                                            |
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| <p>Causes of Muscle Imbalances (Table 4.2)</p> <ul style="list-style-type: none"> <li>• Altered Reciprocal Inhibition</li> <li>• Synergistic Dominance</li> <li>• Arthrokinetic Dysfunction</li> </ul>                                                                                                                                      |
| <p>Muscle Tissue Structure and Function</p> <ul style="list-style-type: none"> <li>• All-Or-None Principle</li> <li>• Connective Tissue                             <ul style="list-style-type: none"> <li>○ Endomysium, Perimysium, Epimysium</li> </ul> </li> </ul>                                                                       |
| <p>Factors Limiting Flexibility</p> <ul style="list-style-type: none"> <li>• Aging (Table 4.3)</li> <li>• Immobilization (Table 4.4)</li> <li>• Loss of Ground Substance (Table 4.5)</li> </ul>                                                                                                                                             |
| <p>Soft-Tissue Biomechanics</p> <ul style="list-style-type: none"> <li>• Elasticity</li> <li>• Viscoelasticity</li> <li>• Plasticity</li> <li>• Davis’s Law</li> <li>• Wolff’s Law</li> </ul>                                                                                                                                               |
| <p>Integrated Flexibility Continuum (Table 4.13)</p> <ul style="list-style-type: none"> <li>• Corrective Flexibility</li> <li>• Active Flexibility</li> <li>• Functional Flexibility</li> </ul>                                                                                                                                             |
| <p>Types of Stretches</p> <ul style="list-style-type: none"> <li>• Self-Myofascial Release</li> <li>• Static Stretching</li> <li>• Active-Isolated Stretching</li> <li>• Neuromuscular Stretching</li> <li>• Dynamic Stretching</li> </ul> <p><b>**learn how to identify and perform all types of flexibility exercises</b></p>             |
| <p>NASM Position Stands</p> <ul style="list-style-type: none"> <li>• NASM’s position on the use of static stretching to enhance range of motion</li> <li>• NASM’s position on the use of flexibility training and strength enhancement</li> <li>• NASM’s position on the use of flexibility training and performance enhancement</li> </ul> |



**Chapter 5 Cardiorespiratory Training for Performance Enhancement**

Sports Performance Professionals must be creative in developing new cardiorespiratory training experiences. As such programs expand, becoming new and more diverse, athletes will want to know how to start and plan a safe program that will create success while minimizing the risk of injury and avoiding underperformance, staleness, overreaching, and overtraining.

| Cardiorespiratory Training for Performance Enhancement                                                                                                                                                                                                                                                                                                                                                                 |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Review of Energy System (Table 5.1) <ul style="list-style-type: none"> <li>• Aerobic system</li> <li>• Anaerobic system</li> </ul>                                                                                                                                                                                                                                                                                     |
| Understanding Heart Rate Formulas, Heart Rate Training Zones, and Base Training <ul style="list-style-type: none"> <li>• Estimate Heart Rate Max (220-age)</li> <li>• Karvonen Method</li> <li>• Training Zones                             <ul style="list-style-type: none"> <li>○ Respiratory Quotient (Zones 1,2,3)</li> <li>○ Heart Rate Training (Zones 1,2,3) (Table 5.4 very important)</li> </ul> </li> </ul> |
| Benefits of Interval Training <ul style="list-style-type: none"> <li>• EPOC</li> </ul>                                                                                                                                                                                                                                                                                                                                 |
| Phases of Cardiorespiratory Performance Training <ul style="list-style-type: none"> <li>• Phase 1. Base Training</li> <li>• Phase 2. Interval Training</li> <li>• Phases 3-5 (linear training, multidirectional training, sport specific training)</li> </ul> Checking for Signs of Overtraining<br>Using the Assessment to Determine a Starting Point                                                                 |
| Key terms <ul style="list-style-type: none"> <li>• Pulmonary Ventilation</li> <li>• Cardiac Output</li> <li>• Stroke Volume</li> <li>• Anaerobic Threshold</li> <li>• Respiratory Quotient</li> </ul>                                                                                                                                                                                                                  |



### Chapter 6 Core Training Concepts for Performance Enhancement

In recent years, Sports Performance Professionals have increased the emphasis on core training in sports conditioning programs. Historically, physical therapists prescribed core exercises for individuals with low-back problems. Today, core training is a common practice for healthy athletes on sports teams and in sports conditioning centers.

| Core Training Concepts for Performance Enhancement                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>What is the core?</p> <ul style="list-style-type: none"> <li>• Core                             <ul style="list-style-type: none"> <li>○ Structures that make up the lumbo-pelvic-hip complex (LPHC)</li> </ul> </li> <li>• Core stability                             <ul style="list-style-type: none"> <li>○ LPHC stability comprised of local stability (local stabilization system), global stability (global stabilization system), and global mobility</li> </ul> </li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| <p>Functional Anatomy of the Core</p> <ul style="list-style-type: none"> <li>• Local stabilization system (Table 6.1)                             <ul style="list-style-type: none"> <li>○ <b>**learn which muscles comprise the local stabilization system</b></li> </ul> </li> <li>• Global stabilization system (Table 6.1)                             <ul style="list-style-type: none"> <li>○ <b>**learn which muscles comprise the global stabilization system</b></li> </ul> </li> <li>• Movement system (Table 6.1)                             <ul style="list-style-type: none"> <li>○ <b>**learn which muscles comprise the movement system</b></li> </ul> </li> <li>• Core stabilization mechanisms                             <ul style="list-style-type: none"> <li>○ Thoracolumbar stabilization mechanism</li> <li>○ Intra-abdominal pressure mechanism</li> </ul> </li> <li>• Drawing-in maneuver</li> <li>• Abdominal bracing</li> </ul> |
| <p>Core Training Program</p> <ul style="list-style-type: none"> <li>• Core-stabilization exercises</li> <li>• Core-strength exercises</li> <li>• Core-power exercises</li> </ul> <p><b>**learn how to identify and perform all types of core exercises</b></p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| <p>Core Training Program Design Parameters (Table 6.3 very important)</p> <ul style="list-style-type: none"> <li>• Stabilization level of OPT Model (phase 1) = core-stabilization exercises</li> <li>• Strength level of OPT Model (phases 2,3,4) = core-strength exercises</li> <li>• Power level of OPT Model (phases 5,6) = core-power exercises</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| <p>Key Terms</p> <ul style="list-style-type: none"> <li>• Core</li> <li>• Core Stability</li> <li>• Local Core Stabilizers</li> <li>• Global Core Stabilizers</li> <li>• Movement System</li> <li>• Drawing-in Maneuver</li> <li>• Bracing</li> <li>• Functional Strength</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |



**Chapter 7 Balance Training Concepts for Performance Enhancement**

Balance is a component of all movement no matter if strength, speed, skill, or flexibility dominates the movement in question. For example, a relatively simple activity such as sprinting is a highly complex movement pattern that requires losing, regaining, and maintaining balance on alternating legs all in less than one tenth of a second!

| Balance Training Concepts for Performance Enhancement                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>Postural Control System</p> <ul style="list-style-type: none"> <li>• Proprioception</li> <li>• Kinesthesia</li> <li>• Mechanoreceptors                             <ul style="list-style-type: none"> <li>○ Skin receptors</li> <li>○ Muscle mechanoreceptors                                     <ul style="list-style-type: none"> <li>▪ Golgi tendon organ</li> <li>▪ Muscle spindle</li> </ul> </li> <li>○ Joint mechanoreceptors                                     <ul style="list-style-type: none"> <li>▪ Ruffini Afferents</li> <li>▪ Paciniform Afferents</li> <li>▪ Golgi Afferents</li> <li>▪ Nocioceptors</li> </ul> </li> <li>○ Ligamentous mechanoreceptors</li> </ul> </li> </ul> |
| <p>Scientific Rational for Balance Training</p> <ul style="list-style-type: none"> <li>• Dynamic joint stabilization</li> <li>• Multisensory condition</li> <li>• Controlled instability</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| <p>Guidelines for Balance Training</p> <ul style="list-style-type: none"> <li>• <b>Table 7.1 (pg 190) very important</b></li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| <p>Balance Training Program</p> <ul style="list-style-type: none"> <li>• Balance-stabilization exercises</li> <li>• Balance-strength exercises</li> <li>• Balance-power exercises</li> </ul> <p><b>**learn how to identify and perform all types of balance exercises</b></p>                                                                                                                                                                                                                                                                                                                                                                                                                         |
| <p>Balance Training Program Design Parameters (<b>Table 7.2 very important</b>)</p> <ul style="list-style-type: none"> <li>• Stabilization level of OPT Model (phase 1) = balance-stabilization exercises</li> <li>• Strength level of OPT Model (phases 2,3,4) = balance-strength exercises</li> <li>• Power level of OPT Model (phases 5,6) = balance-power exercises</li> </ul>                                                                                                                                                                                                                                                                                                                    |



**Chapter 8 Plyometric Training Concepts for Performance Enhancement**

The ability of muscles to exert maximal force output in a minimal amount of time (also known as rate of force production) enhances performance during functional activities. All else being equal, success in most functional activities depends on the speed at which muscular force is generated. Power output and reactive neuromuscular control represents a component of function. Power and reactive neuromuscular control are perhaps the best measures of success in activities that require rapid force production. Plyometric training, also called reactive training, makes use of the stretch-shortening cycle to produce maximum force in the shortest amount of time and to enhance neuromuscular control efficiency, rate of force production, and reduce neuromuscular inhibition

| <b>Plyometric Training Concepts for Performance Enhancement (Chapter 8)</b>                                                                                                                                                                                                                                                                                                                               |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>What is Plyometric Training</p> <ul style="list-style-type: none"> <li>• Stretch-shortening cycle</li> <li>• Integrated Performance Paradigm (Figure 8.1)</li> <li>• Three Phases of Plyometric Exercise (<b>very important</b>)                             <ul style="list-style-type: none"> <li>○ Eccentric phase</li> <li>○ Amortization phase</li> <li>○ Concentric phase</li> </ul> </li> </ul> |
| <p>Physiological Principles of Plyometric Training</p> <ul style="list-style-type: none"> <li>• Elastic Properties of Muscle</li> </ul>                                                                                                                                                                                                                                                                   |
| <p>Proposed Mechanism by Which Plyometric Training Enhances Performance</p> <ul style="list-style-type: none"> <li>• Enhanced Muscle Spindle Activity</li> <li>• Desensitization of the Golgi Tendon Organ</li> <li>• Enhanced Neuromuscular Efficiency</li> </ul>                                                                                                                                        |
| <p>Plyometric Training Parameters</p> <ul style="list-style-type: none"> <li>• <b>Table 8.1 (pg. 212) very important</b></li> </ul>                                                                                                                                                                                                                                                                       |
| <p>Balance Training Program</p> <ul style="list-style-type: none"> <li>• Plyometric-stabilization exercises</li> <li>• Plyometric-strength exercises</li> <li>• Plyometric-power exercises</li> </ul> <p><b>**learn how to identify and perform all types of plyometric exercises</b></p>                                                                                                                 |
| <p>Balance Training Program Design Parameters (<b>Table 8.2 very important</b>)</p> <ul style="list-style-type: none"> <li>• Stabilization level of OPT Model (phase 1) = plyometric-stabilization exercises</li> <li>• Strength level of OPT Model (phases 2,3,4) = plyometric-strength exercises</li> <li>• Power level of OPT Model (phases 5,6) = plyometric-power exercises</li> </ul>               |



**Chapter 9 Speed, Agility, & Quickness for Performance Enhancement**

Speed, agility, and quickness are some of the most significant, and visible components of athletic success. An improvement in the ability to react quickly, apply significant force rapidly in the appropriate direction, and to redirect that force if needed is the ultimate goal of a program to improve speed, agility, and quickness. A carefully designed program that addresses these factors of athleticism significantly improves overall performance and reduces the risk of injury.

| Speed, Agility, & Quickness for Performance Enhancement                                                                                                                                                                                                                                                                                                                                                                                                                                          |
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| <p>Training for Speed of Movement</p> <ul style="list-style-type: none"> <li>• Stability, Strength &amp; Power</li> <li>• Muscle and Joint Elasticity</li> <li>• Joint Mobility and Flexibility</li> <li>• Movement Technique</li> <li>• Specialized Drills                             <ul style="list-style-type: none"> <li>○ Overspeed/assisted drill</li> <li>○ Resisted speed drills</li> </ul> </li> </ul>                                                                                |
| <p>Developing Linear Speed, Agility/MDS, and Quickness</p> <ul style="list-style-type: none"> <li>• Linear Speed                             <ul style="list-style-type: none"> <li>○ Stride rate</li> <li>○ Stride length</li> </ul> </li> <li>• Linear Speed Technique                             <ul style="list-style-type: none"> <li>○ Drive phase</li> <li>○ Recovery phase</li> <li>○ Support phase</li> <li>○ Frontside mechanics</li> <li>○ Backside mechanics</li> </ul> </li> </ul> |
| <p>Agility and Multidirectional Speed (MDS)</p> <ul style="list-style-type: none"> <li>• Agility</li> <li>• Multidirectional speed</li> </ul>                                                                                                                                                                                                                                                                                                                                                    |
| <p>Quickness</p> <ul style="list-style-type: none"> <li>• Reaction Time</li> <li>• Total Response Time</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                |
| <p>Program Design for Speed, Agility/MDS, and Quickness</p> <ul style="list-style-type: none"> <li>• Needs of the Athlete</li> <li>• Needs of the Sport</li> <li>• Proper Organization and Integration</li> </ul> <p><b>**learn how to identify and perform all types of SAQ exercises</b></p>                                                                                                                                                                                                   |
| <p>OPT SAQ Program Design</p> <ul style="list-style-type: none"> <li>• Table 9.3 (pg. 255)</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                            |



**Chapter 10 Integrated Resistance Training for Performance Enhancement**

This chapter will concentrate on providing an understanding of the progressive outcomes from resistance training that will allow the greatest performance benefit.

| Integrated Resistance Training for Performance Enhancement                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |  |
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| <p>Training Principles</p> <ul style="list-style-type: none"> <li>• Principle of Specificity (SAID Principle)                             <ul style="list-style-type: none"> <li>○ Mechanical Specificity</li> <li>○ Neuromuscular Specificity</li> <li>○ Metabolic Specificity</li> </ul> </li> <li>• Principle of Overload</li> <li>• Principle of Variation</li> <li>• Principle of Individualization</li> <li>• Principle of Adaptation (Table 10.1)</li> <li>• General Adaptation Syndrome                             <ul style="list-style-type: none"> <li>○ Alarm Reaction</li> <li>○ Resistance Development</li> <li>○ Exhaustion</li> </ul> </li> </ul> |  |
| <p>Progressive Outcomes of Resistance Training</p> <ul style="list-style-type: none"> <li>• Stabilization</li> <li>• Muscular Endurance</li> <li>• Hypertrophy</li> <li>• Strength</li> <li>• Power</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                     |  |
| <p>Resistance Training Systems</p> <ul style="list-style-type: none"> <li>• Single-set system</li> <li>• Multiple-set system</li> <li>• Pyramid system</li> <li>• Superset system</li> <li>• Circuit Training system</li> <li>• Peripheral Heart Action system</li> <li>• Split-routine system</li> <li>• Vertical loading</li> <li>• Horizontal loading</li> </ul>                                                                                                                                                                                                                                                                                                |  |
| <p>Resistance Training Program</p> <ul style="list-style-type: none"> <li>• Resistance-stabilization</li> <li>• Resistance-strength exercises</li> <li>• Resistance-power exercises</li> </ul> <p><b>**learn how to identify and perform all types of resistance exercises for each body part</b></p>                                                                                                                                                                                                                                                                                                                                                              |  |
| <p>Resistance Training Program Design Parameters</p> <ul style="list-style-type: none"> <li>• Stabilization level of OPT Model (phase 1) = resistance-stabilization exercises</li> <li>• Strength level of OPT Model (phases 2,3,4) = resistance-strength exercises</li> <li>• Power level of OPT Model (phases 5,6) = resistance-power exercises</li> </ul>                                                                                                                                                                                                                                                                                                       |  |



### Chapter 11 Olympic Lifting for Performance Enhancement

The scientific rationale for incorporating Olympic lifts and their derivatives into an athlete's program to enhance sports performance is evident both practically and scientifically. The utilization of the Olympic lifts has long been in practice. As performance specialists become more knowledgeable in the process of program design, more information on Olympic lifting is necessary to make the most effective exercise prescriptions. The purpose of this chapter is to shed light on the proven effectiveness of the Olympic lifts as well as to describe and illustrate the established techniques to properly execute the lifts.

| Olympic Lifting for Performance Enhancement                                                                                                                                                                                                                                                                                 |
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| <p>Scientific Rationale for Olympic Lifting</p> <ul style="list-style-type: none"> <li>• Principle of Specificity                             <ul style="list-style-type: none"> <li>○ Maximum Strength</li> <li>○ Reactive Strength</li> <li>○ Power Endurance</li> <li>○ Rate of Force Development</li> </ul> </li> </ul> |
| <p>Movement Patterns and Region of Movement</p> <ul style="list-style-type: none"> <li>• Neutral Spine</li> <li>• Universal Athletic Position</li> <li>• Hip Hinge</li> </ul>                                                                                                                                               |
| <p>Olympic Lifts and the Vertical Jump: Their Relationship to Sports Performance</p> <ul style="list-style-type: none"> <li>• Ample evidence to support Olympic lifting improves vertical jump measures and athletic performance</li> </ul>                                                                                 |
| <p>Olympic Lifting Prerequisites and How they Affect Lifting Techniques</p> <ul style="list-style-type: none"> <li>• Flexibility and Mobility</li> <li>• Stability</li> <li>• Posture</li> <li>• Neuromuscular Control</li> </ul>                                                                                           |
| <p>Example Olympic Lifts</p> <ul style="list-style-type: none"> <li>• Snatch</li> <li>• Clean &amp; Jerk</li> <li>• Power Clean</li> <li>• Hang Clean</li> <li>• Clean from High Blocks</li> <li>• Snatch Deadlift</li> <li>• Back Squat</li> <li>• Spotting</li> </ul>                                                     |
| <p>Compensations: Possible Causes and How to Correct Them</p> <ul style="list-style-type: none"> <li>• Trunk Flexion in the Power Clean</li> <li>• Excessive Lumbar Extension and Anterior Tilt in the Overhead Positions</li> <li>• Improper Knee Tracking During Squatting Movements</li> </ul>                           |
| <p>The Appropriate Phases for Olympic Lifting in the OPT Model</p> <ul style="list-style-type: none"> <li>• Phases 4 &amp; 5 (Maximal Strength Training, Power Training)</li> </ul>                                                                                                                                         |





**Chapter 12 The Science of Periodization and the OPT Model**

To achieve consistent success with athletes, the Sports Performance Professional must be able to design an integrated training program that addresses all the needs of the athlete. A well-designed program must be systematically organized to provide a planned progression over a period of time. The training program should be a methodical approach to improve physical, physiological, psychological, and performance adaptations. The best way to achieve consistent, superior results is to follow a periodized training program. Evidence also exists showing that a multicomponent program that includes, but is not limited to, flexibility, core, balance, plyometrics, speed/agility/quickness, resistance, and cardiorespiratory training can decrease injury and improve performance

| The Science of Periodization and the OPT Model                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
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| <p>Acute Variables of Training (Table 12.1 very important)</p> <ul style="list-style-type: none"> <li>• Repetitions (Table 12.3)</li> <li>• Sets (Table 12.4)</li> <li>• Training Intensity (Table 12.5)</li> <li>• Repetition Tempo (Table 12.6)</li> <li>• Rest Interval (Table 12.7)</li> <li>• Training Volume (Table 12.9)</li> <li>• Training Frequency</li> <li>• Training Duration</li> <li>• Exercise Selection (Table 12.11)</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| <p>Periodization and the OPT Model</p> <ul style="list-style-type: none"> <li>• Training Plan                             <ul style="list-style-type: none"> <li>○ Annual Plan</li> <li>○ Monthly Plan</li> <li>○ Weekly Plan</li> <li>○ Undulating Periodization</li> </ul> </li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| <p>The OPT Model**</p> <ul style="list-style-type: none"> <li>• Stabilization Level                             <ul style="list-style-type: none"> <li>○ Phase 1. Stabilization Endurance Training (Table 12.14)</li> </ul> </li> <li>• Strength Level                             <ul style="list-style-type: none"> <li>○ Phase 2. Strength Endurance Training (Table 12.17)</li> <li>○ Phase 3. Hypertrophy Training (Table 12.19)</li> <li>○ Phase 4. Maximal Strength Training (Table 12.21)</li> </ul> </li> <li>• Power Level                             <ul style="list-style-type: none"> <li>○ Phase 5. Power Training (Table 12.23)</li> <li>○ Phase 6. Maximal Power Training (Table 12.25)</li> </ul> </li> </ul> <p>**It is important to learn the rationale and purpose for each phase of the OPT Model<br/>**It is important to learn the acute variables (sets, reps, etc) for each phase of the OPT Model</p> |



### Chapter 13 Current Concepts in Injury Prevention

Very specific injuries, such as ankle sprains, anterior cruciate ligament (ACL) injuries, low-back pain, and shoulder pain create an enormous challenge to athletes and training professionals alike. Athletes in sports that require cutting and jumping are particularly affected by injuries due to overtraining, poor neuromuscular control, arthrokinetic dysfunction, or improper biomechanics. The number of injuries to areas such as the foot and ankle, knees, hips, low back, and shoulders, are staggering and necessitate a comprehensive programming strategy to help prevent injury or help to recondition athletes once an injury has occurred. This chapter will review common injuries that occur in athletics and provide general guidelines for prevention and reconditioning.

| Current Concepts in Injury Prevention                                                                                                                                                                                                                                                                                                                                                        |
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| <p><b>Foot Injuries</b></p> <ul style="list-style-type: none"> <li>• Epidemiology of Common Foot Injuries</li> <li>• Common Foot Injuries in Physical Activity                             <ul style="list-style-type: none"> <li>○ Achilles Tendonitis</li> <li>○ Plantar Fasciitis</li> <li>○ Metatarsal Stress Fracture</li> </ul> </li> <li>• Foot Injury Prevention Strategy</li> </ul> |
| <p><b>Ankle Injuries</b></p> <ul style="list-style-type: none"> <li>• Epidemiology of Ankle Sprains</li> <li>• Common Ankle Injuries                             <ul style="list-style-type: none"> <li>○ Lateral Ankle Sprains</li> <li>○ Medial Ankle Sprains</li> <li>○ High Ankle Sprains</li> </ul> </li> <li>• Lateral Ankle Sprain Injury Prevention</li> </ul>                       |
| <p><b>Knee Injuries</b></p> <ul style="list-style-type: none"> <li>• Knee Injury Epidemiology</li> <li>• Causes of PFP and ACL Injury                             <ul style="list-style-type: none"> <li>○ Patellofemoral Syndrome</li> <li>○ ACL Injuries</li> </ul> </li> <li>• PFP and ACL Injury Prevention</li> </ul>                                                                   |
| <p><b>Low Back Injuries</b></p> <ul style="list-style-type: none"> <li>• Low Back Injury Epidemiology</li> <li>• Low Back Injuries and Etiology                             <ul style="list-style-type: none"> <li>○ Disc Injury</li> <li>○ Muscle Strain, Ligament Sprain</li> <li>○ Sacroiliac Joint Dysfunction</li> </ul> </li> <li>• Low Back Injury Prevention Strategies</li> </ul>   |
| <p><b>Shoulder Injuries</b></p> <ul style="list-style-type: none"> <li>• Epidemiology of Shoulder Pain</li> <li>• Common Shoulder Injuries                             <ul style="list-style-type: none"> <li>○ Shoulder Impingement</li> <li>○ Shoulder Instability</li> </ul> </li> <li>• Shoulder Injury Prevention Strategies</li> </ul>                                                 |



**Chapter 14 Performance Nutrition**

Performance nutrition is described as a combination of strategies to enhance physical and athletic performance through specific food and nutrient choices, timing, and quantities. Decades of research have shown us an exciting field of practice where one can improve strength, power, and endurance when these strategies are employed. More specifically, performance nutrition can delay fatigue, enhance the anabolic effect of strength training, promote the regeneration of energy stores, stabilize the immune function while training, and improve cognitive performance factors such as hand-eye coordination, concentration, and focus.

| Performance Nutrition                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
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| <p>Overview of the Field</p> <ul style="list-style-type: none"> <li>• Educational and Professional Requirements for the RD (Table 14.1)</li> <li>• Examples of Nutrition Topics for Sports Performance Professionals (Table 14.2)</li> </ul>                                                                                                                                                                                                                                                                        |
| <p>Macronutrients</p> <ul style="list-style-type: none"> <li>• Carbohydrates (Table 14.3)</li> <li>• Protein                             <ul style="list-style-type: none"> <li>○ Gluconeogenesis</li> <li>○ Whey Protein</li> <li>○ Casein</li> </ul> </li> <li>• Fats                             <ul style="list-style-type: none"> <li>○ Eiconasoid</li> </ul> </li> </ul> <p>Micronutrients</p> <ul style="list-style-type: none"> <li>• Vitamins and Minerals (Table 14.4)</li> <li>• Antioxidants</li> </ul> |
| <p>Energy Balance</p> <ul style="list-style-type: none"> <li>• Daily Energy Balance</li> <li>• Interday Energy Balance</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                   |
| <p>Nutrient Timing</p> <ul style="list-style-type: none"> <li>• Fueling Before and After Exercise</li> <li>• Muscle and Energy Recovery</li> <li>• Muscle Building Strategies</li> </ul>                                                                                                                                                                                                                                                                                                                            |
| <p>Hydration and Fluid Status</p> <ul style="list-style-type: none"> <li>• Performance Effects</li> <li>• Fluid Recommendations (Table 14.5)</li> <li>• Hydration Assessment</li> <li>• Dehydration Signs and Symptoms</li> <li>• Exertional Hyponatremia</li> </ul>                                                                                                                                                                                                                                                |
| <p>Weight and Body Composition</p> <ul style="list-style-type: none"> <li>• Goals and Standards (Table 14.6)</li> <li>• Assessment Methods</li> <li>• Strategies for Altering Body Mass</li> </ul>                                                                                                                                                                                                                                                                                                                  |



### Chapter 15 Ergogenic Aids

There are many ways that athletes attempt to boost their performance and training capacity. Some purported ergogenic aids make sense, and some do not. It can be challenging for athletes, trainers, and coaches to sort out which aids are potentially safe and effective and which are primarily unreasonable marketing hype based on questionable science or pseudoscience. This chapter provides an overview of substances marketed primarily as dietary supplements that are promoted as potential ergogenic aids.

| Ergogenic Aids                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
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| <p>Generalized Concepts Related to Ergogenic Aids</p> <ul style="list-style-type: none"> <li>• Acute Effects on Exercise Performance</li> <li>• Chronic Effects on Training Adaptations</li> <li>• Conditional Ergogenic Effects</li> <li>• Specificity of Action</li> <li>• Nutritional Status Dependent Effects</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                    |
| <p>Nutritional Strategies as Ergogenic Aids</p> <ul style="list-style-type: none"> <li>• Protein and Amino Acid Supplementation (Table 15.1, 15.2) <ul style="list-style-type: none"> <li>○ Arginine</li> <li>○ Aspartate</li> <li>○ Branched Chain Amino Acids</li> <li>○ Glutamine</li> <li>○ Lysine</li> <li>○ Amino Acid Mixtures</li> </ul> </li> <li>• Vitamins <ul style="list-style-type: none"> <li>○ Vitamin A</li> <li>○ Vitamin D</li> </ul> </li> <li>• Mineral Elements <ul style="list-style-type: none"> <li>○ Iron</li> <li>○ Zinc</li> <li>○ Sodium</li> <li>○ Calcium <ul style="list-style-type: none"> <li>▪ Amenorrheic Athletes/ Female Athlete Triad</li> </ul> </li> </ul> </li> </ul> |
| <p>Non-nutrient Ergogenic Aids</p> <ul style="list-style-type: none"> <li>• Stimulants (caffeine)</li> <li>• Banned Stimulates</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| <p>Anabolic and Anticatabolic Substances</p> <ul style="list-style-type: none"> <li>• Creatine Supplementation</li> <li>• Anticatabolic Substances</li> <li>• Prohormones</li> <li>• Androgenic Anabolic Steroids (Table 15.3)</li> <li>• Blood Doping</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| <p>Ethical and Legal Issues with Ergogenic Aids</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |



**Chapter 16 Performance Psychology: Integrating Physical and Mental Training**

This chapter will explore mental skill strategies that appropriately trained Sports Performance Professionals can use to integrate mental training within the framework of physical development. These strategies have been linked to increasing the likelihood of performers to experience the state of “no mind.” One of the objectives of this chapter is to assist you, the Sports Performance Professional, in your quest to increase your athlete’s performance objectives, especially during the most critical moments in sport and in life.

| <b>Performance Psychology: Integrating Physical and Mental Training</b>                                                                                                                                                                                                                                                                             |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Performance Psychology <ul style="list-style-type: none"><li>• Using What’s Already There</li><li>• No Mind and Flow</li></ul>                                                                                                                                                                                                                      |
| Integrated Physical and Mental Training <ul style="list-style-type: none"><li>• Settling-In Here</li><li>• Fight or Flight (Figure 16.2)</li><li>• The Winds of Progress</li><li>• Fine Tuning Intensity<ul style="list-style-type: none"><li>○ Inverted U Hypothesis</li><li>○ Self-talk</li><li>○ Breathing</li><li>○ Imagery</li></ul></li></ul> |