Contents

Contributors **vii** sq Contributors to Previous Editions **viii** sq Preface **ix**Acknowledgments **xii** sq Credits **xiii**

Section	Concepts and Applications of the Exercise Sciences 1
CHAPTER 1	Structure and Function of the Muscular, Neuromuscular, Cardiovascular, and Respiratory Systems
Muscular System 4 sa Conclusion 19 sa Lea	Neuromuscular System 8 m Cardiovascular System 13 m Respiratory System 17 m rning Aids 19
CHAPTER 2	Bioenergetics of Exercise and Training
Limiting Factors in Exe	22 m Biological Energy Systems 23 m Substrate Depletion and Repletion 33 m Bioenergetic rcise Performance 34 m Oxygen Uptake and the Aerobic and Anaerobic Contributions to olic Specificity of Training 36 m Conclusion 38 m Learning Aids 38
CHAPTER 3	Endocrine Responses to Resistance Exercise
Receptors in Mediating Resistance Exercise a in Peripheral Blood 51	d Secretion of Hormones 42 m Muscle as the Target for Hormone Interactions 43 m Role of g Hormonal Changes 45 m Steroid Hormones Versus Polypeptide Hormones 47 m Heavy and Hormonal Increases 49 m Mechanisms of Hormonal Interactions 50 m Hormonal Changes Adaptations in the Endocrine System 52 m Primary Anabolic Hormones 52 m Adrenal r Hormonal Considerations 63 m Conclusion 64 m Learning Aids 64
CHAPTER 4	Biomechanics of Resistance Exercise
Musculoskeletal Syste ■ Joint Biomechanics: Conclusion 90 ■ Lea	m 66 m Human Strength and Power 73 m Sources of Resistance to Muscle Contraction 79 Concerns in Resistance Training 84 m Movement Analysis and Exercise Prescription 87 m rning Aids 90
CHAPTER 5	Adaptations to Anaerobic Training Programs
and Adaptations to An	■ Muscular Adaptations 99 ■ Connective Tissue Adaptations 103 ■ Endocrine Responses aerobic Training 108 ■ Cardiovascular and Respiratory Responses to Acute Exercise 110 ■ c and Anaerobic Modes of Training 112 ■ Overtraining 114 ■ Detraining 116 ■ Conclusion 118

■ Learning Aids 118

CHAPTER 6	Adaptations to Aerobic Endurance Training Programs 121 Ann Swank, PhD
Endurance Programs	erobic Exercise 122 © Chronic Adaptations to Aerobic Exercise 127 © Designing Aerobic for Optimizing Adaptations 131 © External Influences on the Cardiorespiratory Response 134 © Learning Adaptations to Aerobic Endurance Training 136 © Conclusion 139 © Learning Aids 139
CHAPTER 7	Age- and Sex-Related Differences and Their Implications for Resistance Exercise
Children 142 m Fema	ale Athletes 151 M Older Adults 153 M Conclusion 157 M Learning Aids 158
CHAPTER 8	Psychology of Athletic Preparation and Performance 159 Bradley D. Hatfield, PhD, and Evan B. Brody, PhD
Ideal Performance S	cepts in Sport Psychology 160 m How the Mind Affects the Athlete's Physical Performance 164 State 165 m Motivational Phenomena 166 m Influence of Arousal on Performance 168 m Mental cal Resources: Controlling Psychological Processes 170 m Conclusion 177 m Learning Aids 177
CHAPTER 9	Performance-Enhancing Substances
Types of Performance Learning Aids 200	-Enhancing Substances 180 B Hormones 183 Dietary Supplements 191 December 2015 Conclusion 199
CHAPTER 10	Nutritional Factors in Health and Performance201 Kristin Reimers, PhD
Fluid and Electrolyte	202 m How to Evaluate the Adequacy of the Diet 203 m Macronutrients 206 m Micronutrients 214 es 217 m Precompetition and Postexercise Nutrition 220 m Weight and Body Composition 222 norexia Nervosa and Bulimia Nervosa 225 m Obesity 230 m Conclusion 232 m Learning
2 Section	Testing and Evaluation 235
data in all the set. Talkhill annua continues is continued as the set of the	200
CHAPTER 11	Principles of Test Selection and Administration
	38 Testing Terminology 238 Evaluation of Test Quality 239 Test Selection 241 Conclusion 246 Learning Aids 246
CHAPTER 12	Administration, Scoring, and Interpretation of Selected Tests
Measuring Parameters Statistical Evaluation of	s of Athletic Performance 250 Selected Test Protocols and Scoring Data 253 for Test Data 271 Conclusion 273 Learning Aids 273

Section	Exercise Techniques 293	
CHAPTER 13	Warm-Up and Stretching	
	ibility 297 resort Types of Stretching 299 resonance Conclusion 306 resorted Stretching Techniques 307 resonance 319 resonance Learning Aids 324	
CHAPTER 14	Resistance Training and Spotting Techniques325 Roger W. Earle, MA, and Thomas R. Baechle, EdD	
Exercise Technique Fundamentals 326 A Spotting Free Weight Exercises 329 Conclusion 332 A Resistance Training Exercises 332 A Learning Aids 376		
4 Section	Program Design 377	
PART I	Anaerobic Exercise Prescription	
CHAPTER 15	Resistance Training	
	s 382 Step 2: Exercise Selection 386 Step 3: Training Frequency 389 Step 4: Exercise Training Load and Repetitions 392 Step 6: Volume 405 Step 7: Rest Periods 408 Arning Aids 411	
CHAPTER 16	Plyometric Training	
	and Physiology 414 ® Plyometric Program Design 417 ¼ Age Considerations 422 ¾ Forms of Exercise 423 ® Safety Considerations 423 ® Conclusion 426 ® Plyometric Drills 427	
CHAPTER 17	Speed, Agility, and Speed-Endurance Development	
	459 ■ Running Speed 462 ■ Agility 469 ■ Methods of Developing Speed and Agility 473 ■ Conclusion 484 ■ Learning Aids 484	
PART II	Aerobic Exercise Prescription	
CHAPTER 18	Aerobic Endurance Exercise Training	
Factors Related to Aerobic Endurance Performance 490 • Designing an Aerobic Endurance Program 491 • Types of Aerobic Endurance Training Programs 497 • Application of Program Design to Training Seasons 500 • Special Issues Related to Aerobic Endurance Training 501 • Conclusion 503 • Learning Aids 503		

PART III	Applying Exercise Prescription Principles
CHAPTER 19	Periodization
Seasons to the Periodi	Stress 508 Periodization Cycles 509 Periodization Periods 509 Applying Sport Zation Periods 513 Undulating (Nonlinear) Versus Linear Periodization Models 514 Conclusion 518 Learning Aids 522
CHAPTER 20	Rehabilitation and Reconditioning
Sports Medicine Team Strategies 530 № Cor	524 ■ Types of Injury 526 ■ Tissue Healing 529 ■ Rehabilitation and Reconditioning aclusion 538 ■ Learning Aids 538
5	
Section	Organization and Administration 541
CHAPTER 21	Facility Organization and Risk Management543 Michael Greenwood, PhD, and Lori Greenwood, PhD
Athletic Program Need the Strength and Cond	ew Facility Design 544 Existing Strength and Conditioning Facilities 546 Assessing ds 546 Designing the Strength and Conditioning Facility 547 Arranging Equipment in ditioning Facility 550 Maintaining and Cleaning Surfaces 552 Maintaining and Cleaning Cheduling the Strength and Conditioning Facility 553 Litigation Issues 554 Conclusion 557
CHAPTER 22	Developing a Policies and Procedures Manual569 Boyd Epley, MEd, and John Taylor, MS
Mission Statement and Strength and Condition Learning Aids 588	Program Goals 570 Program Objectives 571 Job Titles, Descriptions, and Duties of the ning Staff 571 Staff Policies and Activities 574 Facility Administration 579 Conclusion 587

Answers to Study Questions **589** ■ References **591**Index **631** ■ About the Editors **641**