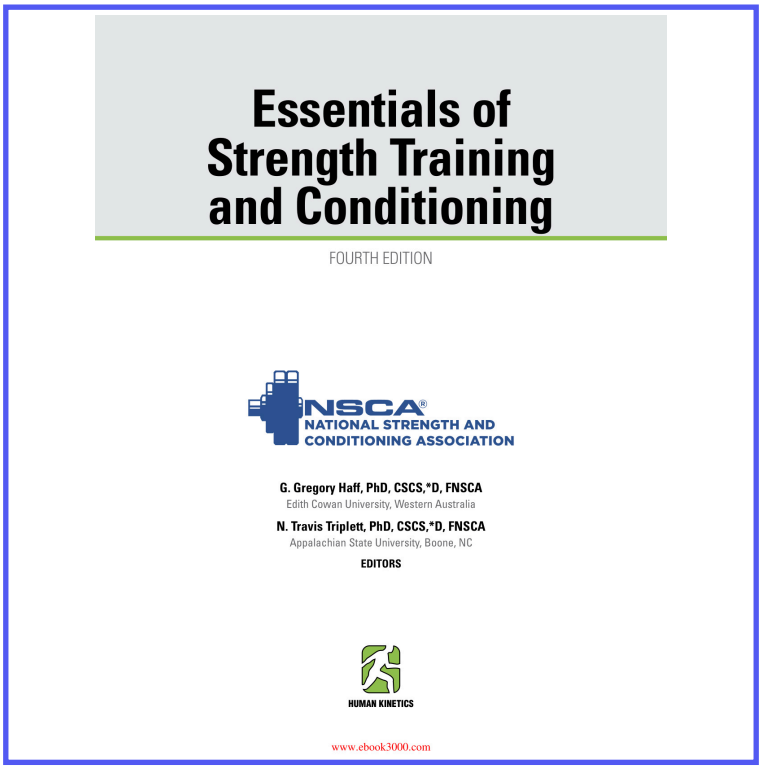


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PREFACE

In 1994, the first edition of *Essentials of Strength Training and Conditioning* was published. After a second edition (in 2000) and sales of over 100,000 books, an expanded and updated third edition was published in 2008. This newest edition continues the tradition as the most comprehensive reference available for strength and conditioning professionals. In this text, 30 expert contributors further explore the scientific principles, concepts, and theories of strength training and conditioning and their applications to athletic performance.

The first edition grew out of an awareness that there was not a book about strength training and conditioning that captured the views of leading professionals in anatomy, biochemistry, biomechanics, endocrinology, nutrition, exercise physiology, psychology, and the other sciences and that related the principles from these disciplines to the design of safe and effective training programs. Also, the lack of relevant and well-conducted research studies had hindered earlier efforts to create an all-inclusive resource. Once it was finally developed, *Essentials of Strength Training and Conditioning* quickly became the definitive textbook on the subject.

The second edition, released six years later, was more than a simple freshening of the content; it was an overhaul of the scope and application of the first edition. Throughout the text and in the additional 100-plus pages, the chapter contributors used updated, relevant, and conclusive research and concepts to turn scientific information into information on performance. Many learning tools were added, such as chapter objectives, key points, application boxes, and sample resistance training programs for three different sports. These enhancements, plus the addition of a full-color interior and hundreds of color photographs, made the second edition truly exceptional.

The third edition, released eight years after the second edition, offered restructured chapters and expansions of other chapters complete with new photographs and updated terminology. In addition, the artwork was modernized and instructor and student resources were created to help keep this text the primary resource for the study and instruction of strength and conditioning.

Updates to the Fourth Edition

This fourth edition expands on the earlier editions and applies the most current research and information in a logical format that reaffirms *Essentials of Strength Training and Conditioning* as the most prominent resource for students preparing for careers in strength and conditioning and for sport science professionals involved in training athletes. The primary enhancements are as follows:

- Online videos featuring 21 resistance training exercises demonstrate proper exercise form for classroom and practical use.
- Updated research—specifically in the areas of high-intensity interval training, overtraining, agility and change of direction, nutrition for health and performance, and periodization—helps readers better understand these popular trends in the industry.
- A new chapter with instructions and photos presents techniques for exercises using alternative modes and nontraditional implements.
- Ten additional tests, including tests for maximum strength, power, and aerobic capacity, along with new flexibility exercises, resistance training exercises, plyometric exercises, and speed and agility drills, help professionals design programs that reflect current guidelines.

These enhancements, plus an expanded ancillary package for instructors including a new, robust collection of more than 60 instructor videos demonstrating resistance training, plyometric exercises, and alternative mode exercises, brings practical content to the classroom. Working along with the instructor guide and presentation package, a test package has been added to assist instructors in evaluating students' understanding of key concepts.

Each chapter begins with objectives and includes key points to guide the reader along the way. Key terms are boldfaced and listed at the end of the chapter. Chapters

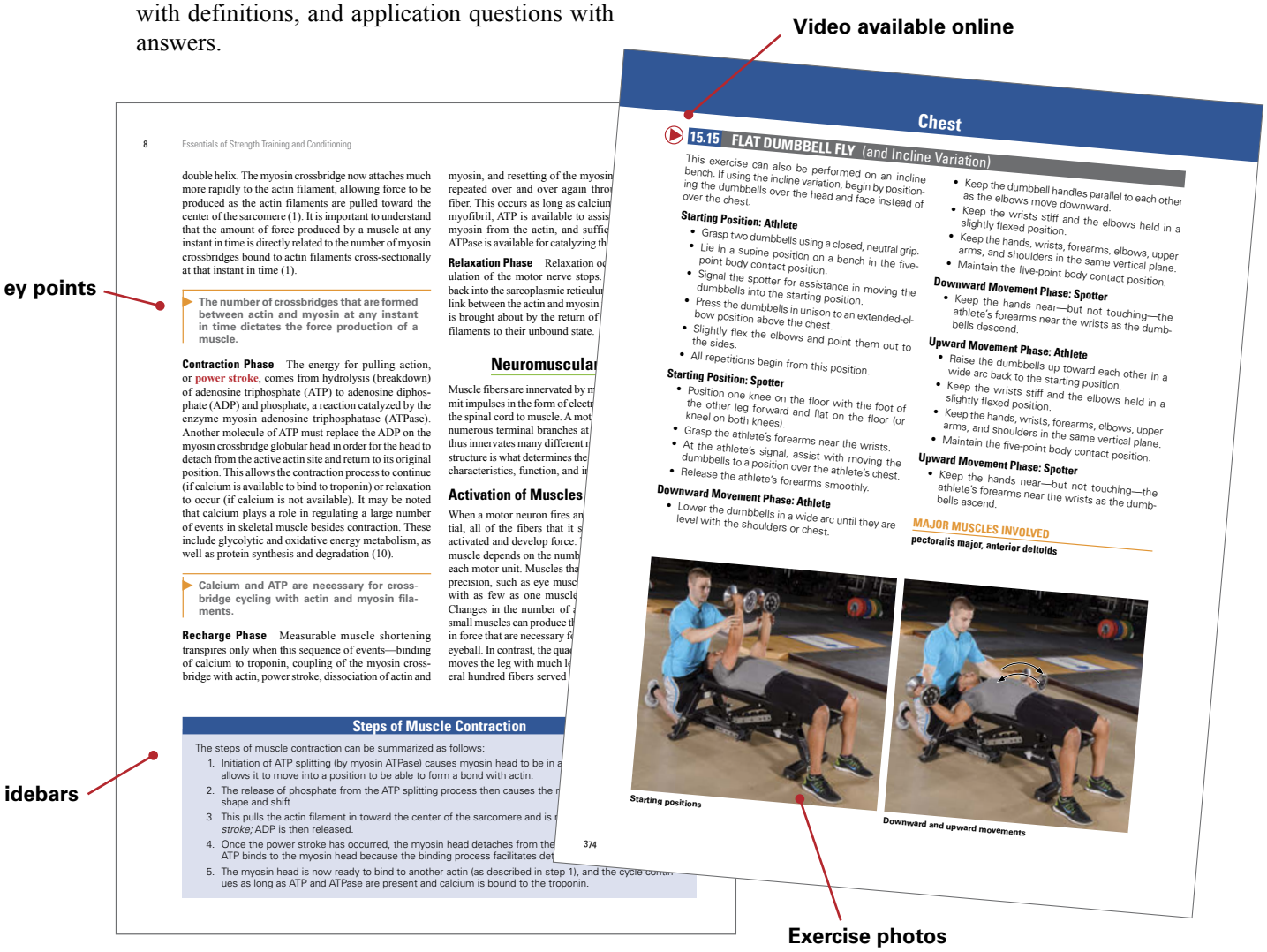
include sidebars that apply the content, and later chapters include sample resistance training programs for three different sports. Detailed instructions and photos are provided for testing, stretching, resistance training, alternative modes, plyometrics, agility training, and aerobic endurance exercise. Finally, chapters end with multiple-choice study questions, with an answer key at the end of the book.

Instructor Resources

In addition to the updated content, this edition includes newly created instructor resources:

- *Instructor Video.* The instructor video includes video of correct technique for 61 resistance training, alternative, and plyometric exercises. These can be used for demonstration, lecture, and discussion.
- *Instructor Guide.* The instructor guide contains a course description, a sample semester schedule, chapter objectives, chapter outlines, key terms with definitions, and application questions with answers.
- *Presentation Package and Image Bank.* This comprehensive resource, delivered in Microsoft PowerPoint, offers instructors a presentation package containing over 1,300 slides to help augment lectures and class discussions. In addition to outlines and key points, the resource contains more than 600 figures, tables, and photos from the textbook, which can be used as an image bank by instructors who need to customize their presentations. Easy-to-follow instructions help guide instructors on how to reuse the images within their own PowerPoint templates.
- *Test Package.* The test package includes a bank of 240 multiple-choice questions, from which instructors can make their own tests and quizzes. Instructors can download Respondus or RTF files or files formatted for use in a learning management system.

These instructor resources can be found at www.HumanKinetics.com/EssentialsOfStrengthTrainingAndConditioning.



Student and Professional Resources

The web resource with online video includes video of 21 resistance training exercises for use in understanding and performing correct exercise technique. Lab activities are provided to give students hands-on practice with testing and evaluation. The fillable forms make completing and submitting lab assignments easy.

The web resource can be found at www.HumanKinetics.com/EssentialsOfStrengthTrainingAndConditioning.

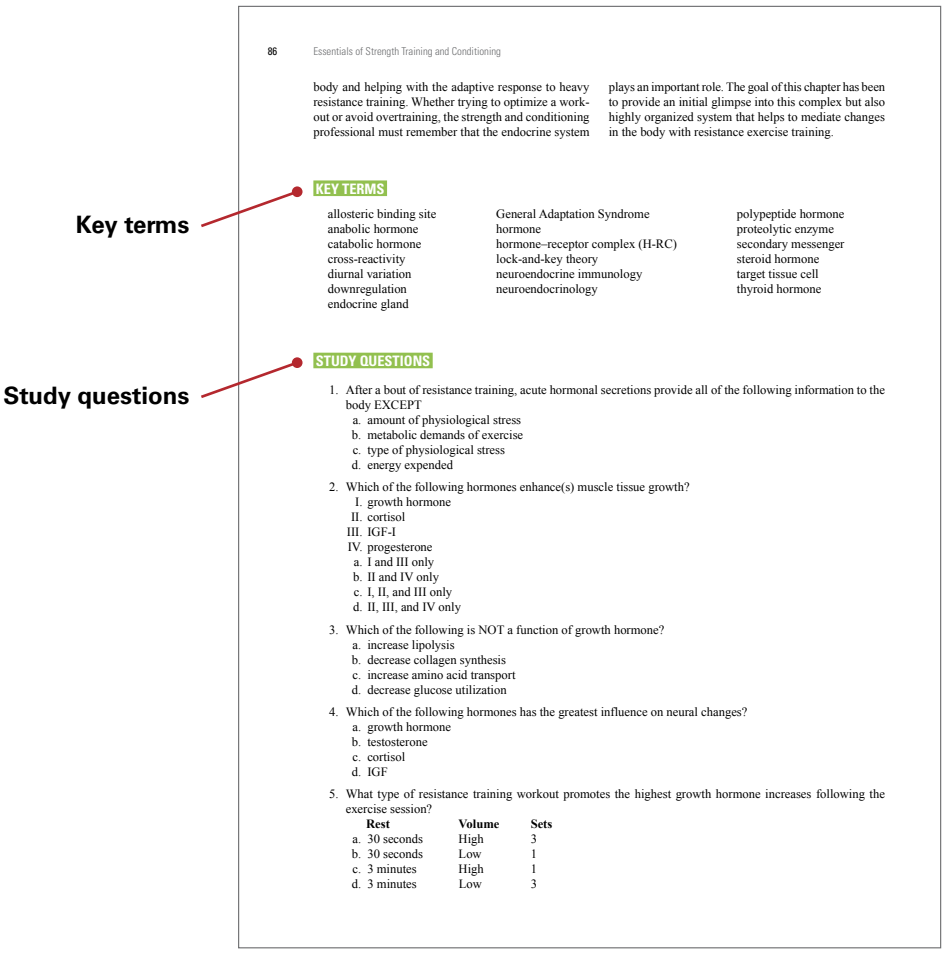
Certification Exams

Essentials of Strength Training and Conditioning is the primary resource for individuals preparing for the National Strength and Conditioning Association's Certified Strength and Conditioning Specialist (CSCS) certification exam.

As a worldwide authority on strength and conditioning, the National Strength and Conditioning Association (NSCA) supports and disseminates research-based knowledge and its practical application to improve athletic performance and fitness. With over 30,000 members in more than 50 countries, the NSCA has established itself as an international clearinghouse for strength and conditioning research, theories, and practices.

The CSCS and NSCA-CPT were the first certifications of their kind to be nationally accredited by the National Commission for Certifying Agencies, a nongovernmental, nonprofit agency in Washington, DC, that sets national standards for certifying agencies. To date, more than 40,000 professionals residing in 75 countries hold one or more NSCA certifications.

Whether used for learning the essentials of strength training and conditioning, for preparing for a certification exam, or as a reference by professionals, *Essentials of Strength Training and Conditioning, Fourth Edition,* will help practitioners and the scientific community better understand how to develop and administer safe and effective strength training and conditioning programs.



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body and helping with the adaptive response to heavy resistance training. Whether trying to optimize a workout or avoid overtraining, the strength and conditioning professional must remember that the endocrine system plays an important role. The goal of this chapter has been to provide an initial glimpse into this complex but also highly organized system that helps to mediate changes in the body with resistance exercise training.

KEY TERMS

allosteric binding site
anabolic hormone
catabolic hormone
cross-reactivity
diurnal variation
downregulation
endocrine gland
General Adaptation Syndrome
hormone
hormone–receptor complex (H-RC)
lock-and-key theory
neuroendocrine immunology
neuroendocrinology
polypeptide hormone
proteolytic enzyme
secondary messenger
steroid hormone
target tissue cell
thyroid hormone

STUDY QUESTIONS

1. After a bout of resistance training, acute hormonal secretions provide all of the following information to the body EXCEPT
   a. amount of physiological stress
   b. metabolic demands of exercise
   c. type of physiological stress
   d. energy expended
2. Which of the following hormones enhance(s) muscle tissue growth?
   I. growth hormone
   II. cortisol
   III. IGF-I
   IV. progesterone
   a. I and III only
   b. II and IV only
   c. I, II, and III only
   d. II, III, and IV only
3. Which of the following is NOT a function of growth hormone?
   a. increase lipolysis
   b. decrease collagen synthesis
   c. increase amino acid transport
   d. decrease glucose utilization
4. Which of the following hormones has the greatest influence on neural changes?
   a. growth hormone
   b. testosterone
   c. cortisol
   d. IGF
5. What type of resistance training workout promotes the highest growth hormone increases following the exercise session?

	Rest	Volume	Sets
a.	30 seconds	High	3
b.	30 seconds	Low	1
c.	3 minutes	High	1
d.	3 minutes	Low	3

Key terms

Study questions

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ACCESSING THE LAB ACTIVITIES

The lab activities are accessed through the web resource.

Individuals who purchase a new print book will receive access to the web resource via a key code.

The web resource can be accessed at www.HumanKinetics.com/EssentialsOfStrengthTrainingAndConditioning. Following is a list of the lab activities.

Lab 1: Anaerobic Capacity Testing

300-Yard (274 m) Shuttle Run

Lab 2: Aerobic Capacity Testing

1.5-Mile (2.4 km) Run

12-Minute Run

Lab 3: Anthropometry and Body Composition

Skinfold Measurements

Lab 4: Exercise Testing for Athletes

Test Selection and Order

Lab 5: Techniques of Exercise

Flexibility Exercise Techniques

Lab 6: Techniques of Exercise

Resistance Exercise and Spotting Guidelines

Lab 7: Muscular Strength and Power Testing

Vertical Jump Test

Standing Long Jump Test

1RM Bench Press

1RM Back Squat

Lab 8: Techniques of Exercise

Plyometric Exercise Techniques

Lab 9: Speed and Agility Technique and Testing

T-Test

Hexagon Test

Pro Agility Test

40-Yard (37 m) Sprint

Lab 10: Muscular Endurance Testing

Push-Up Test

YMCA Bench Press Test

Partial Curl-Up Test

Lab 11: Facility Layout Design

Facility Floor Plan

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ACKNOWLEDGMENTS

The development of the fourth edition of the NSCA's *Essentials of Strength Training and Conditioning* was a massive undertaking that would not have been possible without the contributions of a vast number of people. The historic development of this iconic text has served as our guiding principle, and the hard work of the numerous authors who contributed to the three previous editions has established a strong foundation for this text. Therefore, we thank the previous editors, Thomas Baechle and Roger Earle, for their foresight over twenty years ago that has led us to where we are today and for their passionate work on all of the previous editions. This edition would not have been possible without the continued contribution of Roger Earle, who has gone beyond his role as a Human Kinetics representative. He is a true friend who has helped with many aspects of this book and our writing careers.

We would also like to thank Keith Cinea and Carwyn Sharp for their help throughout the process. These individuals have represented the NSCA well and positioned the science that underpins our profession as the standard that determines the content of this text. Because it is a key resource for current and future strength and conditioning professionals, it was essential for us to ensure that this text holds true to the NSCA mission of translating science into practice, and both Keith and Carwyn are ambassadors of this philosophy. Thanks also to the multitude of individuals at Human Kinetics who were essential to completing every phase of the publication of this book, from copyediting to graphic design. Probably the most important note of thanks goes to Chris Drews and Karla Walsh, our developmental editor and managing editor, who helped two novice book editors in countless ways. Without Chris and Karla, we would have probably been lost in the process.

G. Gregory Haff, PhD, CSCS,*D, FNSCA

To my coeditor and long-time friend, Travis Triplett: I could think of no one else I would want to edit a book of this magnitude with. Your kind heart and easygoing style is a perfect complement to my "bull in a china shop" methodology for processes like this. Thanks for always being one of my very best friends!

I have to thank my family. My wife Erin has sacrificed everything to allow me the ability to chase my dreams and undertake projects like this. Without her support I would merely be stuck under the heavy lifting bar of life. It is a blessing to have someone strong enough to spot you when times are tough, and for that I love you more than you know. For my father, Guy Haff—I doubt you ever thought that lifting weights would become my whole life's work when you took me to the West Morris YMCA at 11 years of age to teach me to lift. Without that I cannot imagine who I would be at this moment. Finally, I must dedicate my efforts to my mother, Sandra Haff. No matter where you are now, I hope you are still proud of the man I am and the man I strive to be each and every day. I miss you much, Mom, and I wish you were here to see all the great things that have happened.

N. Travis Triplett, PhD, CSCS,*D, FNSCA

I never dreamed that taking my first weight training class while at the university would have culminated in such a rewarding career in the field of strength and conditioning. It is difficult to thank every person who had a role in getting me to this point in my life and my career, which enabled me to enthusiastically embark on this project. I was fortunate to receive a strong foundation from my parents—I wish you could both be here to see that the example you set was followed. I also want to thank my brother and my circle of friends, who have always been supportive and have been there to brighten my day. Professionally, my two greatest influences have been Mike Stone and Bill Kraemer. I value your mentorship and friendship greatly. Numerous colleagues and former students around the world have contributed to my knowledge and success along the way, and I appreciate each and every one of you even if we don't see each other very often.

Finally, to my co-editor and good friend, Greg Haff: Who would have thought that sitting around at the lunch buffet as graduate students talking strength and conditioning would have led to this? I look forward to many more years of friendship and collaboration.

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