



College of Life Sciences

Department of Exercise Sciences



Physiology of Exercise – EXSC 463

Pat Vehrs, Ph.D.

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Required Book Physiology of Exercise
 An Incremental Approach

Pat Vehrs, Ph.D.

Available in the BYU Bookstore

Note: This syllabus is included in the required textbook. This syllabus represents the current information for the class. If you have an older edition of the required book, the syllabus contained in the book may be different.

Fall Semester 2010

ABOUT THE CLASS

HOW TO REACH ME

My office is in 116-B in the Richards Building. I have an “open door” policy, which means I am available to meet with you any time my office door is open. You can also make an appointment to meet with me, or come to my office during my normally scheduled office hours. I can be reached by phone at 422-1626 or by email at pat_vehrs@byu.edu.

CLASS VALUES

I would like to share some of my thoughts and values that pertain to this class and affect the way that I teach.

- My goal as a teacher is not to merely pour information into your mind, but to inspire you to think about, feel about, and then do something about what you learn.
- The reason the gospel is so important is that it teaches us things that are true, making it possible for us to live by a set of ideals that reflect our divine nature. The gospel helps us form core values and beliefs that guide our choices (and our learning). You can read some of our shared educational values in the BYU Mission Statement and the Aims of a BYU Education at <http://ge.byu.edu> click *Administration* and then *The Value of a General Education*.
- All of the things that we learn, receive, and give –in and out of the classroom–while attending BYU makes up our “BYU experience.” Each experience is not isolated and independent of another, but integrated for our good (DC 122:7) in such a way that testifies that Heavenly Father knows each of us individually. One way of expressing our gratitude for His love for us is to take the time to reflect on how this class contributes to our entire learning experience.
- The revelation given to Joseph Smith (DC 88:119-126) to build the Kirtland temple described the first temple in the latter-days, among other things, as a house of learning. I would suggest that during class time, the classroom is our “house of learning,” where we can all be instructed and edified. Students come to class with a wide variety of experiences and an equally wide variety of expectations. I also have a unique set of experiences and values that influence my teaching. This presents obstacles to effective teaching and making our classroom a house of learning. Inviting the Spirit of the Lord into the classroom overcomes all obstacles and bridges all gaps so we can understand one another, learn from one another, and benefit from each class.
- Since we are all here to build the kingdom of God, we can each add to the spirit of teaching and learning in this class and across campus. We can, according to President Hinckley, “try a little harder” and “do a little better” to invite the Spirit into the classroom. If we also follow the counsel of President Uchtdorf and “lift where we stand” our learning will be motivated by higher ideals rather than misguided by selfishness, pride, ease, and the honors of men.
- We are not expected to actually be perfect as Christ was, but we ought to be developing Christ-like attributes. Our choices, reflected in our words and actions, are outward manifestations of an inward commitment. Our attitudes about learning, in my opinion, are also a reflection of our willingness to become as He is. We can become like Christ by taking upon us His name. This will affect the way we think about this class, prepare for class and exams, and how we treat one another.
- We are advocates of lifelong learning because continuing to learn helps us become responsible citizens and valued employees, contribute to society, serve others, raise righteous families, and prepare for exaltation. Ultimately our learning experiences change the way we think and act and bring us closer to Christ.

- Our bodies are an integral part of the plan of salvation. Having a physical body allows us to have the necessary experiences here on this earth that enable us to return to our heavenly parents. We must treat our bodies as the temples they are. As we learn about our bodies and nurture them with adequate sleep, nutritious food and regular physical activity and exercise, we can lead meaningful, productive lives and serve others.
- We are advocates of regular physical activity and exercise, wholesome family recreation, and healthy lifestyles. Physical activity is a choice. Our choice to be physically active (or not) will have an impact (directly or indirectly) on our temporal and eternal well being. Much like our knowledge about the gospel, I suspect that we may be asked to account for how we have used the knowledge we have obtained (about the importance of healthy lifestyle choices) to increase our own capacity and to help others.
- Because I value learning and places of learning, I encourage attending and participating in class, good note taking skills and study habits, critical thinking and problem solving, independent study, taking responsibility for what you get out of class, and honest evaluations of your efforts.
- I value traditional methods of teaching. Technologies are available that support creative teaching, but I am not convinced that they improve learning. I am of the opinion that many technologies distract from meaningful human interactions and engaged, thought-provoking learning. I do not use most of the available technologies in class, but instead rely on the more traditional methods.
- I value being prepared for class so I have regular quizzes to review material.
- I recognize that students have different learning style and test-taking preferences. Therefore, unit exams can be taken either in class or in the Testing Center. Testing policies will be strictly adhered to.
- Because God knows and comprehends all things, we will include Him in our learning. I begin each class with a prayer, encourage devotional attendance, and invite the sharing of personal testimony when the spirit directs.
- I am here to teach rather than become rich off BYU. I have been promised that I will always have all that I need. I believe that you should not have to spend your (or your parent's) fortune on your education. Therein lies the reason for writing and providing the text for this class.
- My teaching is a work in progress so I have set goals for improving my teaching. To become a better teacher I too must always be learning. I am not exempt from being teachable and learning in my own class. From students, I have learned to be more observant of the "one" and more open minded to different ways of thinking and various style of learning. I have learned to accept well-intended constructive feed back about the class and my teaching. Nevertheless, I remain somewhat intolerant of criticism from those who are quick to blame teachers before evaluating their own attitudes about learning.

WHAT YOU CAN EXPECT OF ME

- I will continue to improve my teaching based on my experiences in teaching this class.
- I will have a lecture prepared for each class. I will prepare for class each day through prayer and scripture study. I will begin each class with a prayer and follow the promptings of the Spirit in facilitating class discussion.
- I will remain current in my knowledge of exercise physiology in the context of the topics that I teach in class.
- I will use the class time in the most efficient way that I can and follow the class schedule.
- I will encourage discussion, questions, critical thinking, and sharing of personal experiences as they pertain to the topic of discussion.

- When appropriate, I will dedicate time in class for students to express thoughts and feelings about significant personal or world events that affect our lives.
- I will accommodate students with special needs and circumstances.
- Although it may seem redundant and boring to some, I have adopted the principle of “no student left behind” by beginning each class with a review of the previous lecture and end each class with a summary of that days lecture.
- I will be available during office hours and by appointment for study help and career and educational advisement.
- I will be approachable to discuss problems that arise in class, personal needs, or things that are hindering your learning experience.
- I will not use PowerPoint or other technologies that, in my opinion do not enhance learning and involvement of the class. I will not let technology interfere with the learning experience.
- I will not base my teaching style on entertainment.

WHAT I EXPECT OF YOU

You are responsible for your own education, your investment in this class, and balancing the demands of student life. The expectations that I have are based on principle rather than governing the details of your life. I expect that

- you will come prepared for class, being open minded to reviewing old things, learning new things, and engaging in thoughtful discussions.
- you will be respectful to the needs of other students in the class and respect the progress of the class as a whole.
- if you have a conflict with my style of teaching (or me personally) that you will discuss it with me personally.
- you will be accountable for attitudes and choices that affect your education, such as attendance, taking quizzes and exams, preparing for class, involvement in the class, study habits, social life, communicating with me about personal circumstances or needs, abiding by the honor code, and honoring your ecclesiastical endorsement.

EXPECTED LEARNING OUTCOMES

This class will help students meet the Expected Learning Outcomes for their specific major. These are available online at https://learningoutcomes.byu.edu/wiki/index.php/Exercise_Sciences

Students graduating with a BS degree in Exercise Science will have demonstrated a mastery of the exercise sciences that will allow them to succeed in graduate studies in the exercise sciences or health care professions, or as entry level employees. It is expected that Exercise Science students will develop a passion for learning about the human body and have a greater appreciation for its development, function, and divine nature. It is expected that graduates of this program will:

- Demonstrate a sound foundational knowledge and understanding of the principles of biology, chemistry, physics, and nutrition, and an advanced understanding of human anatomy and physiology as they relate to responses and adaptations to physical activity and exercise.
- Understand the importance and influence of physical activity and exercise on health and be an advocate of physically active lifestyles as a means to improve quality of life and reduce the risk and prevalence of lifestyle related diseases.
- Demonstrate basic laboratory skills pertaining to assessments, laboratory methods, sound experimental and analytical practices, data acquisition and reporting in the exercise sciences.
- Demonstrate requisite skills and abilities to gain meaningful employment in exercise science related areas or pursue graduate studies in an exercise science related area or one of the health care professions.

WHAT YOU SHOULD ALREADY KNOW

Prior to this class, you should have already taken, as a minimum, a course in human physiology. Course work in human anatomy; math; biology; general, organic and biochemistry; and physics is also beneficial in that they strengthen the study of exercise physiology.

WHAT YOU WILL LEARN IN THIS COURSE

You will gain a greater appreciation for how the human body functions during the increased metabolic demands of exercise. During this course you will study the nervous, muscle, cardiovascular, pulmonary, and metabolic systems and their integration. This course takes an incremental approach to the study of exercise physiology. By the end of this course, you should be able to describe

- the function of sympathetic, parasympathetic, and somatic motor neurons, including differences in structure, neurotransmitters, receptors and efferent organs.
 - the depolarization of skeletal muscle beginning at the spinal cord and ending with the contraction of the muscle fiber.
 - the physiological and functional differences between the three skeletal muscle fiber types.
 - the normal anatomy and physiology of the heart, blood, and blood vessels. Describe the normal function of the cardiovascular system at rest and during exercise.
 - the transportation and diffusion of O₂ and CO₂ through the pulmonary and systemic circuits at rest and during exercise.
 - the substrates used, amount and rate of ATP resynthesized, metabolic end products, and control of anaerobic and aerobic metabolic pathways.
 - the interaction of the nervous, muscle, cardiovascular, pulmonary, and metabolic systems at rest and during exercise.
- the responses to acute bouts of exercise and the mechanisms of the observed response, and the physiological adaptations which occur as a result of physical conditioning.
 - the physiological rationale for applying the eight principles of physical conditioning to improve health, fitness, and performance.

HELPFUL IDEAS FOR LEARNING

- Be honest in your learning process. Be willing to evaluate your academic performance. Does something need to change? What can I do differently or better? What sacrifices do I need to make? What do I need to do to become what I want to become?
- Your studies can be edifying (see DC 50: 22). Invite the spirit into your learning process. "Inquire" (see DC 6:11, 14; 1 Ne 15:7-8 and DC 121:26) for without some form of inquiry, we may be as those whom Paul spoke of (2 Tim 3:6), that learn but never come to a knowledge of the truth.
- Use the figures, tables, & graphs in the book to help understand the material. If you are a visual learner, re-draw graphs and figures. Many of the figures in the book are "concept-based" figures. Explain the concepts represented by the figure.
- When you exercise, try to explain to yourself how the physiological systems we have discussed in class are functioning at the time. Be comprehensive and detailed in your explanation.
- Use group reviews and study groups. When there is a disagreement, search for the correct explanation. Ask questions in class to clarify.
- Take notes in class. Review your notes after each class and make appropriate corrections. Review your notes before coming to the next class. As you read the book or as material is discussed in class, add to your notes to make them complete. At the end of each week, organize and rewrite your notes, eliminating repetition or inconsistencies.

- Keep a class or learning journal. Elder Richard G. Scott taught that, "Powerful spiritual direction in your life can be overcome or forced into the background unless you provide a way to retain it. Knowledge carefully recorded is knowledge available in time of need" (November 1993 Ensign). Elder Scott also taught (November, 2009 Ensign) steps to acquiring spiritual knowledge that can be applied to this class. When we receive impressions, write them down, then ponder the thoughts and feelings to see if you accurately expressed them in writing. Study their meaning and applications. Pray, reviewing what you thought you learned by the Spirit. Give thanks and then ask, "Is there yet more to be given?" and "Is there more I should know?"
- Aim high. Elder Russell T. Osguthorpe taught to reach a little higher than we think is possible. If we rely on the Lord, He will help us do something we thought was impossible (November 2009 Ensign).
- President Henry B. Eyring counseled to find a question that you can ask yourself frequently about your education (November 2007 Ensign).

ATTENDANCE POLICY

Be in class every day.

QUIZZES, EXAMS AND GRADING

Quizzes and exams cover material from the lectures and textbook. During the semester, there are usually 3 or 4 scheduled unit exams and 10 to 15 announced quizzes. To accommodate student preferences, unit exams can be taken during the scheduled class time (50 min) or at the Testing Center any time during the scheduled two-day period. Exams cannot be taken early or late in the Testing Center. You can only take an exam early or late due to illness, a sincere commitment to athletics, performing groups, the university, community, or family. Taking an exam (or quiz) early or late must be prearranged. Exams taken early or late are taken in the SFH Learning Resource Center (194 SFH). Exams taken late must be taken before or during the class period during which exams will be reviewed.

All quizzes are announced. Most quizzes are available on Blackboard. All Blackboard quizzes must be completed before 10 am on the day of the next class period. On-line quizzes must be completed once they are started and can only be taken once. There are no make-ups for missed or incomplete on-line quizzes. The sum of the on-line quizzes will count for 25% of your final grade. Some quizzes will be taken during class time. If you attend class on the day of an in-class quiz, you will be expected to take the quiz. Missed in-class quizzes can only be made up before or during the next class period. In-class quizzes taken late will be given half-credit. In-class quiz scores will be included in the total pool of points just as exam scores.

Any missed quiz will receive a grade of zero (0). The one in-class quiz score that most adversely affects your grade will be dropped. No on-line quizzes will be dropped. I will excuse one in-class quiz for those who are absent from the university for an extended period of time due to a medical condition or a university approved activity (with documentation) and miss an in-class quiz and are unable to make it up prior to the next class period.

Quizzes and exams contain T/F; multiple choice; short answers; reproducing, labeling, or interpreting graphs and figures.

The final exam is a comprehensive exam given in class on the scheduled final exam day and time. Students are responsible for making sure they are available to take the exam during the scheduled time. Failing to take the final exam will result in a zero(0) grade for the final exam.

EXTRA CREDIT. Five (5) extra credit points are given to those students with two or fewer absences. University approved activities (with documentation) are excused. Five (5) extra credit points will be given to students who complete the on-line course evaluation before the deadline. Additional extra credit is available on in-class quizzes and exams. At the end of the semester, a maximum of 20 points of extra credit will be used in the computation of your final grade.

FINAL GRADES. Final grades are based on accumulated points from the unit exams, quizzes, final exam, extra credit, and any other assignments. The following grading scale will be strictly adhered to.

A =94%+ B+ =86%+ C+ =75%+ D+ =65%+
A- =89%+ B =82%+ C =71%+ D =61%+
B- =78%+ C- =68%+ D- =58%+

CLASS SCHEDULE

A class schedule will be distributed in class.

DRESS & GROOMING STANDARDS AND ACADEMIC HONESTY

Students are expected to adhere to the Dress & Grooming Standards & the Academic Honesty Policy as described in the Undergraduate Catalog. Violations will be dealt with on an individual basis according to recommended University policy. Your dress should adhere to the dress and grooming standards of the university and not distract other students in the class or your instructor.

PREVENTING SEXUAL HARASSMENT

Title IX of the Education Amendments of 1972 prohibits sex discrimination against any participant in an educational program or activity receiving federal funds. The act is intended to eliminate sex discrimination in education. Title IX covers discrimination in programs, admissions, activities, and student-to-student sexual harassment. BYU's policy against sexual harassment extends not only to employees of the university but to students as well. If you encounter unlawful sexual harassment or gender-based discrimination, please talk to your professor or contact the following offices:

- Equal Opportunity Office 422-5895
- Honor Code Office 422-2847

STUDENTS WITH DISABILITIES

Brigham Young University is committed to providing a working and learning atmosphere that reasonably accommodates qualified persons with disabilities. If you have a disability, which may impair your ability to complete this course successfully, please contact the University Accessibility Center (422-2767) or the Equal Opportunity Office (422-5895).

Reasonable academic accommodations and services are coordinated with the student and instructor by the University Accessibility Center. If you need assistance or if you feel you have been unlawfully discriminated against on the basis of disability, you may seek resolution through established grievance policy and procedures.

ABOUT THE BOOK

This book was written to reduce the cost of text books to students. This book is written with the intent of providing necessary content without the bells and whistles of most other high priced text books. Some of my personal philosophies are reflected in the book in the following ways:

- The book intentionally omits details of current research, but instead focuses on accepted and essential concepts and principles as they pertain to exercise physiology. It is the responsibility of the instructor to share current research and new information as he or she deems appropriate.
- Many of the graphics in the book are concept based, meaning they are designed to teach principles and concepts rather than give exact details. This facilitates learning of key concepts.
- The book is organized into "units" that represent the physiological systems or other topics that we will study. An introduction to each unit includes unit objectives, key terms, and a building your vocabulary list. These are included at the beginning of each unit rather than each chapter.
- Each unit includes several chapters. The chapters are intentionally short, representing material that can be read quickly and easily. Each chapter builds on information from previous chapters. This approach allows the student to develop a knowledge of exercise physiology in a logical and sequential pattern. Questions at the end of each chapter help the student check their mastery of the information.

- Many exercise physiology texts present energy production first, emphasizing the fact that an understanding of energy production is at the core of exercise physiology. Although this is true, the incremental approach of this book is to present the nervous, muscle, and cardiorespiratory systems first, followed by energy production. Teaching energy production last helps students gain a greater functional understanding of metabolism and the integration of the physiological systems to produce energy to do work.

The introduction to each unit includes the following sections.

UNIT OBJECTIVES. Each unit has specific learning objectives listed at the beginning of each unit. The objectives are general descriptions of what you will learn after studying the chapters in the unit.

KEY TERMS. This is a list of the most important terms that you need to know. Terms are **bolded** and defined the first time they appear in the chapters.

BUILDING YOUR VOCABULARY. This is a list of word parts (prefixes, suffixes, or roots) and their meanings, included to help understand new terminology.

SELECTED READINGS. This is a non-comprehensive list of readings from classic and current literature that would increase the depth and breadth of understanding if desired.

Each chapter begins with the following sections:

REVIEW. This section includes a brief summary of important information from previous chapters that are important to the incremental approach to this book. Review previous chapters, if needed, to better understand the current chapter.

CHAPTER PREVIEW AND OUTLINE. This section briefly tells what you will be reading about in the chapter.

CONSIDER THIS. This is a list of questions which focus on the key points of the chapter and provide a framework for your study. Use these questions to guide your study and application.

Each chapter ends with the following sections.

SUMMARY OF KEY POINTS. This is a list of important key points from the chapter. After reading the chapter, review these statements to ensure you understand these main points.

CHECK YOUR MASTERY. This is a set of questions designed to help you self-check your mastery of the chapter material while you study and prepare for class, quizzes, and exams.

CRITICAL THINKING QUESTIONS. These questions encourage synthesis and application of information to solve problems.

IDEAS FOR STUDYING THIS BOOK

- Read the Unit Learning Objectives at the beginning of each Unit. When studying, review the objectives to assure that you can meet each objective.
- Review the vocabulary list in the introduction to each unit to make sure you are familiar with and can define new terminology.
- As you begin to read each chapter, read the questions in the *Consider This* section.
- Read the book with the intent to understand rather than to memorize. Read the assigned chapter three times. The first time, quickly read the whole chapter to capture an overall feel for the content. The second time, read blocks of text (e.g., heading to heading), looking for key concepts. The third time, read only the parts of the chapter that include material that is still difficult to understand.
- After reading each chapter, review the *Summary of Key Points*. If needed, reread the appropriate portions of the chapter.
- Read and answer the *Check Your Mastery* and *Critical Thinking* questions at the end of each chapter.