

PHYSIOLOGY OF EXERCISE AND TRAINING

APK 3110C (COURSE #21071) 3 HRS CREDIT ~ SPRING 2020

Updated: August 26, 2020

INSTRUCTOR:

Scott K. Powers

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Preferred Method of Contact: email

OFFICE HOURS: Monday and Wednesday: 1:30PM-2:30PM

Other hours by appointment.

MEETING TIME/LOCATION: FLG 0285, MWF, 3:00PM-3:50PM

COURSE DESCRIPTION: Survey in exercise physiology that provides an overview of the acute and chronic responses to exercise. Particular attention is placed on understanding muscle bioenergetics and metabolism as well as the cardiopulmonary responses to exercise. Special topics include exercise testing, training technologies, and exercise in hot and cold environments.

PREREQUISITE KNOWLEDGE AND SKILLS: APK 2105C (C grade or better) along with junior standing or above

REQUIRED AND RECOMMENDED MATERIALS: Purchase of a textbook is not required; however, I recommend that students read a suggested textbook as lectures, study questions, and most (>95%) of the exam content will be based on material contained in the following textbook:

Powers, S. K. Howley, E.T. and Quindry, J. (2021) *Exercise Physiology: theory and application to fitness and performance*, McGraw-Hill, New York. 11e

Students: Please note that this course will be participating in the UF All Access program and therefore, you can purchase both print and electronic copies of the text at a discounted price.

Login and Opt-In to gain access to your required course materials - UF All Access will provide you with your required materials digitally at a reduced price and the charges will post directly to your student account, allowing any available Financial Aid funds to cover the cost of your materials. This option will be available starting 1 week prior to the first day of classes and ending 3 weeks after the first day of class."

Copies of the lecture slides will be posted on the course website (on Canvas) prior to each lecture.

COURSE TEACHING ASSISTANTS (TA): This class is fortunate to have an outstanding undergraduate teaching assistant to provide learning support outside of the classroom setting. Specifically, your TA will host "virtual" weekly office hours to address questions about course material and to assist students in learning specific exercise physiology concepts. Finally, prior to each examination, your TA will schedule a review session to provide students an opportunity to ask questions about material that will be covered in each examination.

Teaching assistant for APK 3110c Fall 2020 include:

Carley Folsom-Office hours TBD carley.folson@ufl.edu

Kaitlin Fogarty- Office hours TBD k.forgarty@ufl.edu

Isabel Lteif- Office hours TBD ilteif@ufl.edu

Addison Butler-Office hours TBD addison.butler@ufl.edu

TA office hours will be held virtually via zoom meeting

COURSE FORMAT: This course will meet three times a week for an informal zoom video lecture/discussion. Specifically, our class discussion will focus on an integrative approach toward understanding exercise physiology and incorporate a problem-based learning method that will emphasize the importance of critical thinking skills. Questions are encouraged at any time during the lecture.

COURSE LEARNING OBJECTIVES: Following completion of this course, you should be able to do the following:

- Discuss techniques to measure energy expenditure and describe the process of calculating both work and power during exercise
- Define the terms homeostasis and steady state and explain the design and operation of biological control systems
- Describe and explain biochemical pathways involved in ATP production in skeletal muscle during exercise of varying intensities
- Discuss the factors that regulate fuel selection during exercise
- Define the lactate threshold and discuss the potential mechanisms responsible for the rise in blood lactate concentration during exercise
- Describe the hormone-receptor interaction and discuss the major hormones that influence fuel selection during exercise
- Discuss the structure and function of somatic motor and autonomic nervous system during exercise
- List and discuss the function of key muscle proprioceptors
- Describe the structure and contractile function of skeletal muscle fibers and satellite cells
- Discuss the biochemical and contractile properties of the different skeletal muscle fiber types
- Outline the structure and function of the circulatory system during exercise
- Discuss the regulation of cardiac output, stroke volume, blood pressure, and blood distribution during exercise
- Describe the control and function of the respiratory system during exercise
- Define the terms acid, base, and pH; Explain how the body regulates acid-base balance during exercise
- Discuss how the body regulates temperature during exercise in both hot and cold environments
- Explain the physiological adaptations that occur in response to endurance exercise training
- Discuss the signaling events that lead to endurance exercise training-induced adaptations in skeletal muscle
- Describe the role that the nervous system and fiber hypertrophy plays in adaptation to resistance exercise training
- Discuss the signaling pathways that regulate resistance training-induced skeletal muscle hypertrophy
- Explain how concurrent resistance and endurance exercise training impacts signaling pathways involved skeletal muscle hypertrophy

COURSE AND UNIVERSITY POLICIES:

ATTENDANCE POLICY: Class attendance is not mandatory and there are no points associated with attendance. However, missing class will likely have a negative impact on learning and therefore, could negatively influence your exam scores and final grade in the course.

COMMUNICATION WITH INSTRUCTOR: The best way to communicate with your instructor is face-to-face before or after class. Outside of class, please contact your instructor by email (spowers@hhp.ufl.edu) to schedule a time to meet. Please do not use the email address in e-learning. You are responsible for checking course postings on eLearning (CANVAS).

PERSONAL CONDUCT POLICY: Students are expected to exhibit behaviors that reflect highly upon themselves and our University. Moreover, students are expected to join the lecture on time but tardiness is acceptable when personal conflicts require the student to enter the zoom lecture later than the scheduled time.

Laptop computers and tablet devices for note taking are welcome for use during the course. Upon entry into the virtual lecture, **please silence your cell phone**, or mute your microphone.

Failure to adhere to the UF Honor Code will result in disciplinary action by the university. UF students are bound by The Honor Pledge which states, "We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honor and integrity by abiding by the Honor Code. On all work submitted for credit by students at the University of Florida, the following pledge is either required or implied: "On my honor, I have neither given nor received unauthorized aid in doing this assignment." The Honor Code (<http://www.dso.ufl.edu/sccr/process/student-conduct-honor-code/>) specifies a number of behaviors that are in violation of this code and the possible sanctions. Furthermore, you are obliged to report any condition that facilitates academic misconduct to appropriate personnel. If you have any questions or concerns, please consult the instructor or TA in this class.

EXAM MAKE-UP POLICY: Make-up exams will be available for students that cannot take exams during the assigned period due to health problems or an emergency. Documentation of the illness or emergency will be required. Please contact instructor in advance for approval of make-up exams. Requirements for class attendance and make-up exams, assignments, and other work in this

course are consistent with university policies that can be found in the online catalog at: <https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx>.”

ACCOMMODATING STUDENTS WITH DISABILITIES: Students with disabilities who experience learning barriers and would like to request academic accommodations should connect with the Disability Resource Center by visiting their Get Started page at <https://disability.ufl.edu/students/get-started/>. It is important for students to share their accommodation letter with their instructor and discuss their access needs, as early as possible in the semester.

COURSE EVALUATIONS: Students are expected to provide professional and respectful feedback on the quality of instruction in this course by completing course evaluations online via GatorEvals. Guidance on how to give feedback in a professional and respectful manner is available at <https://gatorevals.aa.ufl.edu/students/>. Students will be notified when the evaluation period opens and can complete evaluations through the email they receive from GatorEvals, in their Canvas course menu under GatorEvals, or via <https://ufl.bluera.com/ufl/>. Summaries of course evaluation results are available to students at <https://gatorevals.aa.ufl.edu/public-results/>.

PRIVACY: For online course with recorded materials a statement informing students of privacy related issues such as:

Our class sessions may be audio visually recorded for students in the class to refer back and for enrolled students who are unable to attend live. Students who participate with their camera engaged or utilize a profile image are agreeing to have their video or image recorded. If you are unwilling to consent to have your profile or video image recorded, be sure to keep your camera off and do not use a profile image. Likewise, students who un-mute during class and participate orally are agreeing to have their voices recorded. If you are not willing to consent to have your voice recorded during class, you will need to keep your mute button activated and communicate exclusively using the "chat" feature, which allows students to type questions and comments live. The chat will not be recorded or shared. As in all courses, unauthorized recording and unauthorized sharing of recorded materials is prohibited.

GETTING HELP:

Students requiring assistance with health and/or wellness or students seeking academic help can use the following sources:

Health and Wellness

- U Matter, We Care: If you or a friend is in distress, please contact umatter@ufl.edu or 352 392-1575

- Counseling and Wellness Center: <https://counseling.ufl.edu/>, 352-392-1575
- Sexual Assault Recovery Services (SARS) - Student Health Care Center, 392-1161
- University Police Department, 392-1111 (or 9-1-1 for emergencies)
<http://www.police.ufl.edu/>

Academic Resources

- E-learning technical support, 352-392-4357 (select option 2) or e-mail to Learning-support@ufl.edu. <https://lss.at.ufl.edu/help.shtml>
- Career Connections Center, Reitz Union, 392-1601. Career assistance and counseling. <https://career.ufl.edu/>
- Library Support, <http://cms.uflib.ufl.edu/ask>. Various ways to receive assistance with respect to using the libraries or finding resources.
- Teaching Center, Broward Hall, 392-2010 or 392-6420. General study skills and tutoring. <http://teachingcenter.ufl.edu/>
- Writing Studio, 302 Tigert Hall, 846-1138. Help brainstorming, formatting, and writing papers. <http://writing.ufl.edu/writing-studio/>
- Student Complaints On-Campus: <https://sccr.dso.ufl.edu/policies/student-honor-code-student-conduct-code/> On-Line Students Complaints: <http://distance.ufl.edu/student-complaint-process/>

GRADING:

Grading-big picture: Students will be evaluated based on grades from four lecture examinations worth 25 points each (4 X 25 points = 100 points total). Exams will consist of multiple choice and/or true-false questions. Please bring pre-sharpened pencils to exams. Exams will be administered during the regular class period using honorlock.

In addition to the points earned from four regular exams, students will also have an opportunity to earn extra credit points by completion of thirteen homework assignments during the semester. Each homework assignment (associated with each chapter of the textbook) will be posted on canvas at regular intervals during the semester. Successful completion of one homework assignment will be worth 0.285 points. Therefore, there is an opportunity to earn 4.0 extra credit points that will be added to the point total earned from lecture exams (i.e., 14 homework assignments X 0.285 pts = 4 pts).

Details of exam content and homework assignments follow.

Lecture exams: More than 90% of the exam content will come directly from the recommended textbook (Powers, Howley, Quindry Exercise Physiology, 11e). Note that the 11th edition of this book contains significant new material (i.e., four new chapters and many updates) that is NOT contained in the 10th edition of the book. In addition to material from the textbook, selected lectures will contain “new” information found in scientific publications. **If you plan to purchase the 11th edition of the textbook, please consider an electronic edition of the book that also contains the “connect” package. The “E” edition of the text will save you a significant amount of money and the connect package contains learning tools that will assist you in mastering the material.**

Each of the four lecture exams will consist of 50 questions worth 0.5 points per question.

Homework for extra points: During the semester, you will have the opportunity to earn extra points by completing 14 homework assignments (worth 0.285 points each). These homework assignments are NOT required and therefore, completion is voluntary. These assignments will be posted on the course website (canvas) and will correspond with each chapter covered in the recommended textbook. The due date of the assignment to get full credit will be provided in the announcement. Successful completion of each homework project will result in the addition of 0.285 points to your total point total.

Grades will be assigned based on points earned in the course. The relative point value of the four examinations and four quizzes are as follows:

Evaluation Components (number of each)	Points Per Component	Approximate % of Total Grade
Lecture Exams (4)	25 pts each = 100 pts	100%
Homework (13 assignments) (Extra credit)	Total of 4 extra points possible-will be added on top of exam grades	Home work provides bonus points-failure to complete homework does not negatively impact your final point total

Total possible points in course = 104

GRADING SCALE: Note that lecture exam scores and homework grades will be posted on the canvas course website typically within 48-96 hours after the date of the exam. Final grades in the class will be determined by the total points earned during the semester. Final point totals that are not whole numbers will be handled in the following way. Any point total with a fraction of another point will be rounded up if the fraction reaches 0.5 points or higher. More detailed information regarding current UF grading policies can be found here: <https://catalog.ufl.edu/UGRD/academic-regulations/grades-grading-policies/>.

Please note that any requests for additional extra credit or special exceptions to these grading policies will be interpreted as an honor code violation (i.e., asking for preferential treatment) and will be handled accordingly.

The letter grading scale for the course is as follows:

Letter Grade	Total points Needed to Earn Each Letter Grade	GPA Impact of Each Letter Grade
A	≥ 93	4.0
A-	90-93	3.67
B+	87-89.99	3.33
B	80-86.99	3.0
C+	77-79.99	2.33
C	70-76.99	2.0
D+	67-69.99	1.33
D	60-66.99	1.0
E	<59.99	0

WEEKLY COURSE SCHEDULE:

Tentative Exercise Physiology-Fall 2020 lecture schedule*

*Note that the lecture schedule is subject to change. Changes will be announced in class and online during the e-Learning website.

January-March

Date	Topic	Texbook Chapter	Study questions
8/31	Course introduction & History of exercise physiology, searching literature, and science metrics	0	1,3,4,6-10
9/2	Common measurements-exercise physiology	1	1-9
9/4	Control of internal environment	2	1-9
9/7	Holiday-no class		
9/9	Bioenergetics	3	1-17
9/11	Bioenergetics	3	1-17
9/14	Bioenergetics		1-17
9/16	Exercise metabolism	4	1-11
9/18	Exercise metabolism	4	1-11
9/21	Exercise metabolism	4	1-11
9/23	Cell signaling and hormonal response	5	2-10
9/25	Cell signaling and hormonal response	5	2-10
9/28	Cell signaling/review for exam		2-10
9/30	Exam 1	0, 1,2,3,4,5	Chapters 0-5
10/2	Nervous system	7	10-17
10/5	Nervous System	7	10-17
10/7	Skeletal muscle-exercise	8	1-8,10
10/9	Skeletal muscle-exercise	8	1-8,10
10/12	Skeletal muscle-exercise	8	1-8, 10
10/14	Skeletal muscle-exercise	8	1-8, 10
10/16	Cardiovascular function-exercise	9	1-10
10/19	Cardiovascular function-exercise	9	1-10
10/21	Cardiovascular function-exercise	9	1-10
10/23	Cardiovascular function-exercise/review exam	7,8,9	
10/26	Exam 2		

Date	Topic	Chapter	Study questions
10/28	Respiratory system and exercise	10	1-12
10/30	Respiratory system and exercise	10	1-12
11/2	Respiratory system and exercise	10	1-12
11/4	Respiratory system/Immune	10	1-12
11/6	Exercise and Immune System	6	1-8
11/9	Temperature regulation	12	1-14
11/11	Temperature regulation	12	1-14
11/13	Temperature/Review for exam 3	12	1-14
11/16	Exam 3	10,11,12	
11/18	Training adaptation-aerobic	13	1-18
11/13	Training adaptation-aerobic	13	1-18
11/16	Training adaptation-anaerobic	13	1-18
11/18	Training adaptation-strength	14	1-11
11/20	Training adaptation-strength	14	1-11
11/23	Nutrition and body composition	18	1-25

Date	Topic	Chapter	Study questions
11/25 & 11/27	Thanksgiving holiday-no class		
11/30	Nutrition and body composition	18	1-25
12/2	Nutrition and body composition	18	1-25
12/4	Nutrition and body composition	18	1-25
12/7	Nutrition and body composition/review for exam 4		1-25
12/9	Exam 4	13,14,18	

Exam 1 will cover chapters 0-5
Exam 2 will cover chapters 7,8,9
Exam 3 will cover chapters 10,6,12
Exam 4 will cover chapters 13,14,18

SUCCESS AND STUDY TIPS:

Success in any university course requires dedication and hard work on the part of the student. Attending class regularly and studying on a daily basis is essential to excel in learning exercise physiology. Here are 8 tips for learning exercise physiology:

1. Learn the vocabulary of exercise physiology
2. Don't just memorize-learn concepts and principles of exercise physiology
3. Read the chapter before class
4. Go to class and focus on key points presented in the lecture
5. Ask questions of the instructor if you don't understand a concept presented during the lecture
6. Study daily-start small and learn sections of material in the text (don't get overwhelmed by reading the entire chapter)
7. Review material in small section over and over again-start with a blank sheet of paper and draw and/or write out the answers to study questions assigned for each chapter
8. Develop problem solving skills and improve your critical thinking about exercise physiology concepts