UF College of Health & Human Performance
Department of Applied Physiology and Kinesiology
UNIVERSITY *of* FLORIDA

PHYSIOLOGY OF EXERCISE AND TRAINING

APK 3110C (COURSE #20934) ~ 3 HRS CREDIT ~ SPRING 2020

Updated: December 12, 2019

INSTRUCTOR: **Scott K. Powers**
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Email: spowers@hhp.ufl.edu
Preferred Method of Contact: email

OFFICE HOURS: Monday and Wednesdays: 11:30AM-12:30PM
Other hours by appointment.

MEETING TIME/LOCATION: FLG 265, MWF, 12:50PM-1:40PM

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 skeletal muscle plasticity, exercise in hot and cold environments, nutrition, and weight management.

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

REQUIRED AND RECOMMENDED MATERIALS: A textbook is not required. However, all lectures, study questions, and most (>90%) of the exam content will be based on material contained in the following textbook:

Powers, S. K. and Howley, E.T. (2018) *Exercise Physiology: theory and application to fitness and performance*, McGraw-Hill, New York. 10e

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

COURSE TEACHING ASSISTANTS (TA): This class is fortunate to have several outstanding undergraduate teaching assistants to provide learning support outside of the classroom setting. Specifically, each TA will host weekly office hours to address questions about course material and to assist students in learning specific exercise physiology concepts. Also, TA's will meet with interested students during their office hours to review previous exam results; this exercise is designed to assist students in better understand questions that were incorrectly answered on a previous exam. Finally, prior to each examination, TA's will schedule a review session to provide students an opportunity to ask questions about material that will be covered in each examination.

Teaching assistants for APK 3110c Spring 2020 include:

Office hours: Friday 1:55-2:55PM

TA office hours will be held in room 115 FLG

COURSE FORMAT: This course will meet three times a week for an informal lecture. In particular, this course 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 the concept behind the measurement of energy expenditure and to calculate 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. Further, missing classes will prevent the student from the opportunity to earn “extra points” during unannounced quizzes.

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 arrive to class on time but tardiness is acceptable when transportation or personal conflicts require the student to arrive to class later than the scheduled time.
Labtop computers and tablet devices for note taking are welcome in class. However, talking aloud in class, surfing the web, email, facebook posts or related behaviors are not permitted during class time. Upon arrival to class, **please silence your cell phone** or other personal communication devices.

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 requesting accommodation for disabilities must first register with the Dean of Students Office (http://www.dso.ufl.edu/drc/). The Dean of Students Office will provide documentation to the student who must then provide this documentation to the instructor when requesting accommodation. You must submit this documentation prior to submitting assignments or taking the quizzes or exams. Accommodations are not retroactive, therefore, students should contact the office as soon as possible in the term for which they are seeking accommodations."

COURSE EVALUATIONS: Students in this class are participating in GatorEvals. This evaluation system is designed to be more informative to instructors so that teaching effectiveness is enhanced and to be more seamlessly linked to UF's CANVAS learning management system. Students can complete their evaluations through the email they receive from GatorEvals, in their Canvas course menu

under GatorEvals, or via https://ufl.bluera.com/ufl/ . Thank you for serving as a partner in this important effort.

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 opti on 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.

In addition to the points earned from four regular exams, students will also have the opportunity to earn extra credit points by completion of six homework assignments during the course of the semester. These homework assignments will be posted on canvas at regular intervals during the semester. Each assignment will be worth 1.0 points each.

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 and Howley, Exercise Physiology, 10e). Please note that the 10th edition of this book contains significant new material that cannot be found in the 9th 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 10th 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 6 homework assignments (worth 1.0 points each). These homework assignments are NOT mandatory and completion is voluntary. These assignments will be posted on the course website on canvas and the date of posting will be announced in class. The due date of the assignment to get full credit will provided in the announcement. Successful completion of each homework project will result in the addition of 1 point 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 (6) (Extra credit)	0.5 pt each = 3 pts	0%

Total possible points = 103

GRADING SCALE: Note that lecture exam scores, quiz grades, and homework grades will be posted on the canvas course website typically within 72 hours after the date of the exam. Final grades in the class will be determined by the total points earned during the course of 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	Points Needed to Earn Each Letter Grade	GPA Impact of Each Letter Grade
A	≥ 90	4.0
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 2019 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	Chapter questions	Study questions
1/6	Course introduction & History of exercise physiology, searching literature, and science metrics	0	none
1/8	Common measurements-exercise physiology	1	1-9
1/10	Control of internal environment	2	1-8
1/13	Bioenergetics	3	1-17
1/15	Bioenergetics	3	1-17
1/17	Bioenergetics		
1/20	Holiday-no class		
1/22	Bioenergetics	3	1-17
1/24	Exercise metabolism	4	1-11
1/27	Exercise metabolism	4	1-11
1/29	Exercise metabolism	4	1-11
1/31	Cell signaling and hormonal response	5	2-10
2/3	Cell signaling and hormonal response	5	2-10
2/5	Cell signaling/review for exam	7/8	Chap7;11,15
2/7	Exam 1	0, 1,2,3,4,5	1-8
2/10	Nervous System	7,9	Chap7;11,15 Chap8;1-8
2/12	Skeletal muscle-exercise	8	1-8
2/14	Out of class homework-No class		
2/17	Skeletal muscle-exercise	8	1-8
2/7	Skeletal muscle-exercise	8	1-8
2/19	Cardiovascular function-exercise	9	1-10
2/21	Cardiovascular function-exercise	9	1-10
2/24	Cardiovascular function-exercise/review exam	9	1-10
2/26	Cardiovascular function-exercise/review exam	7,8,9	
2/28	Exam 2		

Date	Topic	Chapter	Study questions
3/9	Respiratory system and exercise	10	1-12
3/11	Respiratory system and exercise	10	1-12
3/13	Respiratory system and exercise	10	1-12
3/16	Acid-base balance	11	1-7
3/18	Temperature regulation	12	1-22
3/20	Temperature regulation	12	1-22
3/23	Temperature regulation	12	1-22
3/25	Review for exam 3		
3/27	Exam 3	10,11,12	
3/30	Training adaptation	13	2-12
4/1	Training adaptation	13	2-12
4/3	Training adaptation	13	2-12
4/6	Training adaptation	13	2-12
4/8	Training adaptation	13	2-12

Date	Topic	Chapter	Study questions
4/13	Nutrition and body composition	18+ Class Notes	Provided on Course website
4/15	Nutrition and body composition	18+ Class Notes	Provided on Course website
4/17	Nutrition and body composition	18+ Class Notes	Provided on Course website
4/22	Nutrition and body composition		
4/22	Exam 4	13,18	

Exam 1 will cover chapters 1-5
Exam 2 will cover chapters 7,8,9
Exam 3 will cover chapters 10,11,12
Exam 4 will cover chapters 13,18

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