

## ADVANCED EXERCISE PHYSIOLOGY

APK4112 - 3 CREDITS - SPRING 2020

**INSTRUCTOR:** **Name and credentials**  
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Preferred Method of Contact: email or in person

**OFFICE HOURS:** office hours Fridays at 10 am or by appointment

**MEETING TIME/LOCATION:** T | Period 1 (7:25 AM - 8:15 AM), Room: FLG 0245  
R | Period 1 - 2 (7:25 AM - 9:20 AM), Room: FLG 0210

**COURSE DESCRIPTION:** This advanced course provides a detailed understanding of acute and chronic responses to exercise. Particular attention is placed upon understanding the physiological responses to exercise at both a systems and cellular level. Emphasis is placed on muscle contractile properties, muscle bioenergetics and the endocrine responses to exercise.

**PREREQUISITE KNOWLEDGE AND SKILLS:** APK 3110C with minimum grade of C.

**REQUIRED AND RECOMMENDED MATERIALS:** The instructor will post lecture slides, videos, and reading material as appropriate on Canvas. The student does not need to identify additional resources to complement the material provided or solve problems posed in the course.

Lecture notes and materials posted on the class website are the property of the instructor or the publishers of the material. They are posted solely for students in this course, for educational purposes, and to facilitate note-taking and studying. No part of the materials may be re-distributed, reproduced, or used for any purpose other than note-taking and studying.

Textbook: A custom e-book titled 'University of Florida custom e-book Advanced Exercise Physiology' (ISBN 9781492563136) is required for the course. Students can purchase the e-book through UF bookstore or the publisher's website (Human Kinetics: <http://www.humankinetics.com/products/all-products/University-of-Florida-Custom-eBook-Advanced-Exercise-Physiology>).

There will be reading assignments from the book's chapters and other sources as needed. Topics covered in the reading assignments will be in exams or quizzes even if not covered in lecture or discussions. Questions on reading topics not covered in lecture or discussions will be general and

assess the students' ability to define and describe concepts in bioenergetics and exercise physiology. Questions on topics covered in lectures or class discussions will involve in-depth concepts and problem solving.

Suggested book on introductory material for review of basic concepts: Powers, S. and E. Howley. Exercise Physiology: theory and application to fitness and performance. McGraw Hill. 9th edition. ISBN-13: 978-0073523538.

**COURSE FORMAT:** The course includes two classroom meetings per week. One day of the week will be dedicated to live lectures, the other day the class will meet for a quiz followed by active learning. Active learning sessions include discussion of questions and presentation of concepts or solving applied problems related to physiology.

#### **COURSE LEARNING OBJECTIVES:**

By the end of this course, students should be able to:

- Define, describe, and illustrate basic and advanced bioenergetics and physiological processes involved in the regulation of metabolism, skeletal muscle contraction and fatigue, blood flow and blood pressure, and breathing.
- Explain the integration of multiple systems in response to exercise and solve problems in that context
- Interpret and propose explanations for the metabolic, muscle, and cardiovascular responses to exercise in health, disease, and environmental challenges
- Defend and critique material or ideas related to bioenergetics, performance, and integrative exercise physiology

#### **COURSE AND UNIVERSITY POLICIES:**

**ATTENDANCE POLICY:** Make every effort to attend all class meetings. Missing classes will likely have an impact on participation grade. The rubric for participation points is included below under 'GRADING'. Students called for participation in lectures or discussion sessions and not present will receive a zero for participation. Students who receive a zero in participation for unexcused absence will not be able to earn full credit for participation. Students who need to miss a class should communicate and discuss with the instructor, in advance of missing a class, to avoid penalties on participation.

**PERSONAL CONDUCT POLICY:** Students are expected to exhibit behaviors that reflect highly upon themselves and our University. **Audio or video recordings** of any part of this course or activities in class are **not allowed without written consent by the instructor**. Any material recorded shall be used solely by students in the course. Recorded material from the class cannot be published, shared with others not taking the course, or made publicly available online in any circumstance. **The use of cell phones (and the like) is strictly prohibited during lectures, discussions, and exams.** Any cell phone used during a lecture or discussion will be considered a violation of the course policies and will result in a zero on participation points for the module.

Laptop computers and tablet devices are welcome in class as long as used for class-related work. Surfing the web, checking email, making social media posts, or anything of that nature will result in zero for participation in the module. Please contact the UF Computing Help Desk and e-Learning Support Services ([www.helpdesk.ufl.edu/](http://www.helpdesk.ufl.edu/)) if you have any technical issues with Canvas or your email.

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 obligated 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. *Violations of the Honor Code are not tolerated. Violations will be reported to the Dean of Students Office for consideration of disciplinary action.*

**EXAM MAKE-UP POLICY:** Students who are ill or have an emergency that prevents from taking the exam during the time available are responsible for contacting the instructor as soon as possible. Students who have occasional extra-curricular or academic activities that conflict with exams or quizzes should contact the instructor in advance to setup a make-up assessment. Unexcused absences/availability for exams will result in a zero on the exam. Make-up exams are offered at reasonable times and location in agreement with the instructor. Students must make-up quizzes from each module within one week of the end of the module, unless impeded by extenuating circumstances. “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.

## STUDENT IDENTIFICATION AND INSTRUCTOR INTERACTIONS

It is important to the learning environment that you feel welcome and safe in this class; and that you are comfortable participating in class discussions and communicating with me on any issues related to the class. If your preferred name is not the name listed on the official UF roll, please let me know as soon as possible by e-mail or otherwise. I would like to acknowledge your preferred name, and pronouns that reflect your identity. Please let me know how you would like to be addressed in class, if your name and pronouns are not reflected by your UF-rostered name. I welcome you to the class and look forward to a rewarding learning adventure together.

You may also change your "Display Name" in Canvas. Canvas uses the "Display Name" as set in myUFL. The Display Name is what you want people to see in the UF Directory, such as "Ally" instead of "Allison." To update your display name, go to [one.ufl.edu](http://one.ufl.edu), click on the dropdown at the top right, and select "Directory Profile." Click "Edit" on the right of the name panel, uncheck "Use my legal name" under "Display Name," update how you wish your name to be displayed, and click "Submit" at the bottom. This change may take up to 24 hours to appear in Canvas. This does not change your legal name for official UF records.

## GETTING HELP:

### Health and Wellness

- U Matter, We Care: If you or a friend is in distress, please contact [umatter@ufl.edu](mailto: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](mailto: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:

Students in the course will be assessed through quizzes in class, exams, and participation in discussion session. Quizzes are administered weekly. There are three exams in the course (one per module). Discussion sessions for participation are held weekly.

**Quizzes (35% final grade)** – There will be quizzes administered in class using Canvas. The quiz addresses a topic that has been presented through video lectures, slides in class, and assigned reading. These quizzes are generally at the beginning of the class, but might also happen in the middle or at the end of class. The quiz will consist of short-questions or simple problem-solving exercises. Students will take the quiz individually and any type of collaboration with other students, opening of non-quiz related website, or checking material from self or other during the quiz is prohibited. There will be 1-10 questions per quiz. The quiz with lowest grade in the entire course will be ‘dropped’ and not included in the final quiz grade.

**Exams (45% of final grade)** – Exams will be at the end of a module (three exams, one per module). Each exam will contain 20 to 25 questions and will last 50-75 min. Exams will be based on reading assignments and content covered in discussions and lectures. Questions will be multiple choice and true/false. Students will take exams in the same room where weekly class meetings are held. The exam will be in groups of 2-3 students. Students can collaborate within their groups, but communication with other groups or checking course-related material on the web or any notes is prohibited. Each student will complete their own exam and should submit their individual answers independently. In case of disagreement, students can answer questions differently from the group in their individual submission.

**Participation (20% final grade)** – This will be determined based on the student’s preparedness assessed by quality and correctness of submission of hand-written answers and drawings to discussion questions, involvement in class activities or lectures, and contribution in classroom discussions. Students are required to participate through presentation of a lecture slide, providing answers on the board, and discussion of applied questions in front of class. Students need to participate at least once in each module to receive all points. Students can be called for further participation in each module, after earning full points, at the discretion of the instructor. The instructor will select a student to participate, but students can also volunteer to participate. There are no pre-arrangements of questions or topics for specific students. Students should be prepared to present all slides, answer all questions, and discuss all problems assigned for the day.

Students will receive participation points for presenting their understanding of concepts, complementing comments from other students, or responding questions from the instructor following the rubric outlined below. If the instructor calls a student who is absent, the student will receive a zero on participation unless the absence is justified according to UF policies as outlined above. In the event that lack of time limits the possibility for all students to participate, the instructor will rely on the hand-written answers and drawings submitted by the student to assign participation points.

At the end of each discussion session or lecture, students who participated should come meet the instructor to indicate how many points they consider their participation to be worth and secure their points. Ultimately, the instructor will make the final decision on participation points for each discussion.

The instructor will use the rubric in the table below to assign points based on participation in class and paper submissions

Excellent	10 pts	<ul style="list-style-type: none"> <li>- Defines, describes, and illustrates concepts</li> <li>- Explains, assesses and criticizes ideas</li> <li>- Demonstrates preparation and reading of assignments</li> </ul>
good	8 pts	<ul style="list-style-type: none"> <li>- Defines, describes, and illustrates concepts</li> <li>- Explains, assesses and criticizes ideas</li> <li>- Evidence of reading assignments, but not fully prepared</li> </ul>
reasonable	6 pts	<ul style="list-style-type: none"> <li>- Defines, describes, and illustrates concepts</li> <li>- Explains, assesses, or criticize some ideas</li> <li>- Evidence of incomplete reading of assignments and preparation</li> </ul>
basic	4 pts	<ul style="list-style-type: none"> <li>- Defines and describes some concepts</li> <li>- Explains but cannot assess and criticize ideas</li> <li>- Clearly unprepared and lacking evidence of reading assignments</li> </ul>
bare minimum	2 pts	<ul style="list-style-type: none"> <li>- Defines and describes some concepts</li> <li>- Unable to explain, assess, or criticize ideas</li> <li>- Clearly unprepared and lacking evidence of reading assignments</li> </ul>
unacceptable	0 pt	<ul style="list-style-type: none"> <li>- Refuses to engage in discussion or answer questions when asked</li> <li>- Engaged into inappropriate behaviors (using cell phone, social media, visiting irrelevant websites)</li> <li>- Not present or no submission of hand-written answers and drawings</li> </ul>

**Paper submissions:** The hand-written answers and drawings that the instructor will evaluate to assign participation points must be provide a comprehensive response, be neatly organized and legible, and include drawings and concise text explaining the concepts and rationale for each answer.

***Extra Credit*** - Students can earn up to 1 final grade point of extra credit in the course. Extra credit activities will involve quizzes, homework, or classroom assignment.

**GRADING SCALE:** Students take exams and quizzes using Canvas and scores are available immediately upon submission. Students should contact the instructor as soon as possible if they feel there is an error in the grading of individual questions or submission of final grades.

Final course grades will be assigned based on the table below. The grade achieved by the student and showing on Canvas is final. There is no rounding of grades in any circumstance. 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.

Letter Grade	Points (%)	Grade Point
A	94-100	4.00
A-	90-93.9	3.67
B+	85-89.9	3.33
B	80-84.9	3.00
B-	75-79.9	2.67
C+	70-74.9	2.33
C	65-69.9	2.00
C-	60-64.9	1.67
D+	55-59.9	1.33
D	50-54.9	1.00
I	0-49.9	0.00

More detailed information regarding current UF grading policies can be found here:  
<https://catalog.ufl.edu/UGRD/academic-regulations/grades-grading-policies/>.

## WEEKLY COURSE SCHEDULE:

The course includes three modules: I) Energetics, Metabolism, and Endocrine Exercise Physiology; II) Skeletal Muscle Excitation, Contraction, and Fatigue; and III) Cardiovascular and Hemodynamics Regulation. The modules emphasize exercise and physiological responses to environmental challenges in health and disease.

### Module 1

- Topic 1 – Enzyme Kinetics
- Topic 2 – Energy Systems and Bioenergetics
- Topic 3 – Glucose Uptake
- Topic 4 – Glycogen Metabolism
- Topic 5 – Glycolysis
- Topic 6 – Pyruvate and Lactate Metabolism
- Topic 7 – Lipolysis
- Topic 8 – Citric Acid Cycle and Oxidative Phosphorylation

### Module 2

- Topic 1 – Skeletal Muscle, Macro, Micro, and Molecular Structure
- Topic 2 – Sarcomere and SR Structure-Function
- Topic 3 – Neuromuscular Junction, Neuromuscular Transmission, and EC Coupling
- Topic 4 – Calcium-activated force and cross-bridge cycle
- Topic 5 – Passive Muscle Mechanics
- Topic 6 – Active Contractile Properties
- Topic 7 – Muscle Fatigue

### Module 3

- Topic 1 - Cardiovascular Autonomic and Hormonal Control
- Topic 2 – Baroreflex and Exercise Blood pressure
- Topic 3 – Smooth Muscle: Structure-Function and Extrinsic Control
- Topic 4 – Intrinsic Control and Exercise Hyperemia
- Topic 5 – Cardiovascular Responses to Resistance Exercise

Tentative dates and course plan are in the next page.

Date	Class activity	Note	Module
07-Jan	Open day		1
<b>09-Jan</b>	<b>Course Intro</b>		
14-Jan	topics 1-3	lecture	
<b>16-Jan</b>	<b>topics 1-3</b>	<b>discussion</b>	
21-Jan	topics 4-6	lecture	
<b>23-Jan</b>	<b>topics 4-6</b>	<b>discussion</b>	
28-Jan	topics 7-8	lecture	
<b>30-Jan</b>	<b>topics 7-8</b>	<b>discussion</b>	
04-Feb	Review		
<b>06-Feb</b>	<b>Exam 1</b>		
11-Feb	topic 1	lecture	2
<b>13-Feb</b>	<b>topic 1</b>	<b>discussion</b>	
18-Feb	topics 2-4	lecture	
<b>20-Feb</b>	<b>topics 2-4</b>	<b>discussion</b>	
25-Feb	topics 5-6	lecture	
<b>27-Feb</b>	<b>topics 5-6</b>	<b>discussion</b>	
10-Mar	topic 7	lecture	
<b>12-Mar</b>	<b>topic 7</b>	<b>discussion</b>	
17-Mar	Review		
<b>19-Mar</b>	<b>Exam 2</b>		
26-Mar	topics 1-2	lecture	3
<b>31-Mar</b>	<b>topics 1-2</b>	<b>discussion</b>	
02-Apr	topic 3	lecture	
<b>07-Apr</b>	<b>topic 3</b>	<b>discussion</b>	
09-Apr	topics 4-5	lecture	
<b>14-Apr</b>	<b>topics 4-5</b>	<b>discussion</b>	
16-Apr	topics 1-5	Exam review	
<b>21-Apr</b>	<b>Exam 3</b>		
23-Apr	Reading day		
24-Apr	Reading day		



## SUCCESS AND STUDY TIPS:

To succeed in this course, students need to prepare regularly and in advance of attending lecture and discussion sessions. Lectures are available online for previewing and reviewing content. Students should check topics and assignments on course schedule above, watch online lectures, read assigned text, and attend class to ask questions. Reading of assigned text should be done once, paying attention to the content. Students should avoid seeking sources beyond those provided in the course to supplement their reading. This can lead to confusion and overloading

During lectures and discussions, students should write key concepts in 'bullet point' style, while following the discussion and presentation of concepts. The goal is to understand, not memorize, the material. The best forms of studying are: 1) to draw diagrams and figures to help understand and remember physiological processes, 2) discuss course material with classmates, 3) review points presented in the discussion session. Items 1 and 2 should be done before lecture and discussion sessions. Item 3 should be done after the discussion in the same or immediately following day. This will help retain the concepts learned.