

## ADVANCED EXERCISE PHYSIOLOGY

APK4112 ~ 3 CREDITS ~ SPRING 2022

**INSTRUCTOR:** **Max Adolphs, Ph.D.**  
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Preferred Method of Contact: email

**OFFICE HOURS:** Monday, Wednesday, Friday 9:30am – 10:30am  
Thursday 12:00pm – 2:00pm

**MEETING TIME/LOCATION:** Florida Gym Room 210  
Tuesday | Period 1 (7:25am – 8:15am)  
Thursday | Period 1-2 (7:25am – 9:20am)

**COURSE DESCRIPTION:** This course is designed to provide 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:** APK3110C with a minimum grade 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' is required for the course. Students can purchase the e-book using UF All Access. Login at the following website and Opt-In to gain access to your required course materials - <https://www.bsd.ufl.edu/AllAccess> – UF All Access will provide you with your required materials digitally at a reduced price and the charge will be posted to your student account. This option will be available starting 1 week prior to the start of the semester and ending 3 weeks after the first day of class. The publisher's website is included here for convenience (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 meetings per week. One day of the week will be dedicated to live lectures, the other day the class will be a combination of live lectures, going over quizzes from the previous day, and 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:** Students are expected to be in class and participate in discussions. Any missed assignments will result in a zero for the assignment. No late or make-up assignments will be accepted unless prearranged or the absence is excused.

**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.

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:** A student experiencing an illness should visit the UF Student Health Care Center or their preferred healthcare provider to seek medical advice and obtain documentation. If you have an illness, family emergency or death, please contact the Dean of Students Office ([www.dso.ufl.edu](http://www.dso.ufl.edu)) and follow the DSO Care Team procedures for documentation and submission of a request for make-up assignment (<https://care.dso.ufl.edu/instructor-notifications/>). The DSO will contact the instructor. Do not provide any documentation to the instructor regarding illness or family emergency. This is your personal and protected information. The DSO is qualified to receive and verify the documents you provide. The instructor will follow the recommendations from the DSO. 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/>.

## 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/>

## INCLUSION, DIVERSITY, EQUITY, AND ACCESSIBILITY RESOURCES

For suggestions or concerns related to IDEA, please reach out to any of the following:

- Dr. Rachael Seidler, APK Graduate Coordinator, [rachaelseidler@ufl.edu](mailto:rachaelseidler@ufl.edu)
- Dr. Joslyn Ahlgren, APK Undergraduate Coordinator, [jahlgren@ufl.edu](mailto:jahlgren@ufl.edu)

## GRADING:

The following table outlines the point-accruing components of this course. The points listed are approximate and the final grade will be weighted based on the percentages of each category regardless of the actual number of points.

Evaluation Components (number of components)	Points Per Component (total)	% of Total Grade
Lecture Exams (3)	30 points each = 90 points total	45%
Lecture Quizzes	90 points total	45%
Participation	20 points total	10%

**Exams (45% of final grade)** – Exams will be at the end of each module (three exams total, one per module). Each exam will contain 25-35 questions and will last 50-90 min. Exams will be based on reading assignments and content covered in discussions and lectures. Questions will be multiple choice and true/false. Exams require the use of a lockdown browser so that no other material can be accessed. Class materials, notes, or other sources cannot be used during the exams. Unauthorized use of materials will be considered a violation of the Academic Honor Code. Students will take exams in the same room where weekly class meetings are held.

**Quizzes (45% of final grade)** – There will be quizzes administered in class using Canvas. The quizzes will address topics presented during lectures and assigned reading. These quizzes are generally at the end of class but might also happen in the middle or beginning 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.

**Participation (10% of final grade)** – This will be determined based on the student's preparedness assessed by quality and correctness of submission of hand-written answers (submitted online) 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 should 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 to 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. If there are hindrances for students to participate in class, the instructor will meet with the student (individually or in small group) to discuss the topic, or rely on the online submission of hand-written answers and drawings to assign participation points.

A rubric for assignment of participation points is below:

Excellent	20 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> <li>- Is always involved in class discussions</li> </ul>
Good	18 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> <li>- Is often involved in class discussions</li> </ul>
Reasonable	16 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> <li>- Is occasionally involved in class discussions</li> </ul>
Basic	14 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> <li>- Is rarely involved in class discussions</li> </ul>
Bare Minimum	12 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> <li>- is never involved in class discussions</li> </ul>
Unacceptable	0 pts	<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</li> </ul>

**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.

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

Letter Grade	Percent of Total Points Associated with each Letter Grade	GPA Impact of Each Letter Grade
A	90.00 – 100%	4.00
B+	87.00 – 89.99%	3.33
B	80.00 – 86.99%	3.00
C+	77.00 – 79.99%	2.33
C	70.00 – 76.99%	2.00
D+	67.00 – 69.99%	1.33
D	60.00 – 66.99%	1.00
E	0.00 – 59.99%	0.00

## 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.

<b>Date</b>	<b>Class Activity</b>	<b>Module</b>
6-Jan	Course introduction – topic 1	Module 1
11-Jan	Lecture – Topics 1-2 (quiz)	
13-Jan	Lecture and Discussion – Topics 2-3 (quiz)	
18-Jan	Lecture – Topic 3 (quiz)	
20-Jan	Lecture and Discussion – Topics 4-5 (quiz)	
25 -Jan	Lecture – Topics 5-6 (quiz)	
27-Jan	Lecture and Discussion – Topics 7-8 (quiz)	
1-Feb	Lecture – Topic 8 (quiz)	
3-Feb	<b>Exam 1</b>	
8-Feb	Lecture – Topics 1-2 (quiz)	Module 2
10-Feb	Lecture and Discussion – Topic 2 (quiz)	
15-Feb	Lecture – Topic 3 (quiz)	
17-Feb	Lecture and Discussion – Topics 3-4 (quiz)	
22-Feb	Lecture – Topic 4 (quiz)	
24-Feb	Lecture and Discussion – Topics 5-6 (quiz)	
1-Mar	Lecture – Topic 7 (quiz)	
3-Mar	<b>Exam 2</b>	
8-Mar	Break	
10-Mar	Break	
15-Mar	Lecture – Topic 1 (quiz)	Module 3
17-Mar	Lecture and Discussion – Topic 1-2 (quiz)	
22-Mar	Lecture – Topic 2 (quiz)	
24-Mar	Lecture and Discussion – Topic 3 (quiz)	
29-Mar	Lecture – Topic 3 (quiz)	
31-Mar	Lecture and Discussion – Topic 3 and 4 (quiz)	
5-Apr	Lecture – Topic 4 (quiz)	
7-Apr	Lecture and Discussion – Topic 4 (quiz)	
12-Apr	Lecture – Topic 4-5 (quiz)	
14-Apr	Lecture and Discussion – Topic 5 (quiz)	
19-Apr	Lecture – Topic 5	
21-Apr	<b>Reading Day</b>	
27-Apr	<b>EXAM 3 – 8 PM</b>	

*Disclaimer: This syllabus represents current plans and objectives. As we go through the semester, those plans may need to change to enhance the class learning opportunity.*

## SUCCESS AND STUDY TIPS:

- Read the book/ PowerPoints/ Papers before coming to class.
- Physiology is highly conceptual. Trying to memorize everything does not work (plus that approach is boring). When lectures are going on, focus less on taking notes and more on trying to comprehend concepts. This will help tremendously on exams.
- Go over the goals/ learning objectives section after each lecture and see if you can answer the learning objectives which correspond to the material that was covered. If you are struggling to understand them, meet with me!
- To expand on the last point, you should study daily. Trying to cram everything in before an exam in physiology is a huge mistake that almost never ends well.
- Repetition is key to learning complex concepts. Go over the material again and again.