

ADVANCED EXERCISE PHYSIOLOGY

APK4112 - 3 CREDITS - FALL 2020

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OFFICE HOURS: Wed (01:00pm – 02:00pm)
Fri (10:00am – 11:00am)

MEETING TIME/LOCATION: T | Period 1 (7:25 AM - 8:15 AM)
R | Period 1 - 2 (7:25 AM - 9:20 AM)

Meetings will be held remotely via Zoom or MS Teams – links will be available on Canvas

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 or similar with minimum C grade.

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 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.

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: Students who are ill or have an emergency that prevents them 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 make arrangements to make-up the assignments. Unexcused absences/availability for exams will result in a zero on the exam. Make-up exams are offered at reasonable times 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 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. Accommodations are not retroactive, therefore, students should contact the office as soon as possible in the term for which they are seeking accommodations.

Several activities in the course are performed in group. The instructor will work closely with the DRC and the students registered therein to make suitable arrangements for group assignments

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/>.

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.

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 name listed on the UF-roster. 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, 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.

Please keep your preferred name (first and last, if possible) visible for live sessions.

FERPA

Aspects of course content may be audio and visually recorded for students in the class to refer back. 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. 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. By enrolling in this course, you will be required to have audio and video enabled for your group presentation. If you do not want your image in any recording pertaining to course content (i.e. presentations, demonstrations), please let me know within the first couple weeks of class.

GETTING HELP:

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:

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

Quizzes (40% 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.

Exams (40% 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. Students can use an active phone call to communicate with their group during the exam. 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. Students must carefully check their answers before submission. The instructor cannot change grades if a student accidentally submits answers different from their group.

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 (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 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 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 lack of time limits the possibility for all students to participate, the instructor will rely on the online submission of hand-written answers and drawings to assign participation points.

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

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

Online submissions of weekly assignments: The hand-written answers and drawings that the instructor will evaluate to grade participation must 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 1.5 final grade points (0.5 per module) of extra credit in the course. Extra credits are based on successful completion of Labster simulations available for each module. Extra credit assignments must be completed before the exam for each module to count toward the grade.

Labster simulations are available on Canvas. Students must achieve a score of 80% or higher on each simulation to receive the extra-credit point for the relevant module.

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	A	B+	B	C+	C	D+	D	E
Percent of Total Points	90.00-100%	87.00-89.99%	80.00-86.99%	77.00-79.99%	70.00-76.99%	67.00-69.99%	60.00-66.99%	0-59.99%
GPA of Each Letter Grade	4	3.33	3	2.33	2	1.33	1	0

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 on the next page.

Date	Class activity	Note	Module
01-Sep	Course Intro		1
03-Sep	topics 1-3	lecture	
08-Sep	Open	Q/A	
10-Sep	topics 1-3	discussion	
15-Sep	topics 4-6	lecture	
17-Sep	topics 4-6	discussion	
22-Sep	topics 7-8	lecture	
24-Sep	topics 7-8	discussion	
29-Sep	Review	Labster Simulations due	
01-Oct	Exam 1		
06-Oct	topic 1	lecture	2
08-Oct	topic 1	discussion	
13-Oct	topics 2-4	lecture	
15-Oct	topics 2-4	discussion	
20-Oct	topics 5-6	lecture	
22-Oct	topics 5-6	discussion	
27-Oct	topic 7	lecture	
29-Oct	topic 7	discussion	
03-Nov	Review	Labster Simulations due	
05-Nov	Exam 2		
10-Nov	topics 1-2	lecture	3
12-Nov	topics 1-2	discussion	
17-Nov	topic 3	lecture	
19-Nov	topic 3	discussion	
24-Nov	topics 4-5	lecture	
01-Dec	topics 4-5	discussion	
03-Dec	Review	Labster Simulations due	
08-Dec	Exam 3		

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 on the same or immediately following day. This will help retain the concepts learned.