

ADVANCED EXERCISE PHYSIOLOGY

APK4112 ~ 3 CREDITS ~ SPRING 2023

INSTRUCTOR: **Terence E. Ryan, Ph.D.**
Office: FLG 114
Office Phone: 352-294-1700
Email: ryant@ufl.edu
Preferred Method of Contact: CANVAS email
Preferred pronouns: *he, him, his*

OFFICE HOURS: Tuesday 12:30pm – 1:30pm
Wednesday 12:00pm – 1:00pm

MEETING TIME/LOCATION: Florida Gym Room 285
Tuesday | Period 7 (1:55pm – 2:45pm)
Thursday | Period 7-8 (1:55pm – 3:50pm)

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 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. 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) 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. 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.

In all cases, 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.

COVID-RELATED: In response to COVID-19, the following practices are in place to maintain your learning environment, to enhance the safety of our in-classroom interactions, and to further the health and safety of ourselves, our neighbors, and our loved ones.

- If you are not vaccinated, get vaccinated. Vaccines are readily available at no cost and have been demonstrated to be safe and effective against the COVID-19 virus. Visit this link for details on where to get your shot, including options that do not require an appointment: <https://coronavirus.uflhealth.org/vaccinations/vaccine-availability/>. Students who receive the first dose of the vaccine somewhere off-campus and/or outside of Gainesville can still receive their second dose on campus.
- You are expected to wear approved face coverings at all times during class and within buildings even if you are vaccinated. Please continue to follow healthy habits, including best practices like frequent hand washing. Following these practices is our responsibility as Gators.
 - Sanitizing supplies are available in the classroom if you wish to wipe down your desks prior to sitting down and at the end of the class.
 - Hand sanitizing stations will be located in every classroom.
- If you sick, stay home and self-quarantine. Please visit the UF Health Screen, Test & Protect website about next steps, retake the questionnaire and schedule your test for no sooner than 24 hours after your symptoms began. Please call your primary care provider if you are ill and need immediate care or the UF Student Health Care Center at 352-392-1161 (or email covid@shcc.ufl.edu) to be evaluated for testing and to receive further instructions about returning to campus. UF Health Screen, Test & Protect offers guidance when you are sick, have been exposed to someone who has tested positive or have tested positive yourself. Visit the [UF Health Screen, Test & Protect website](#) for more information.
 - Course materials will be provided to you with an excused absence, and you will be given a reasonable amount of time to make up work.

- If you are withheld from campus by the Department of Health through Screen, Test & Protect you are not permitted to use any on campus facilities. Students attempting to attend campus activities when withheld from campus will be referred to the Dean of Students Office.
- Continue to regularly visit coronavirus.UFHealth.org and coronavirus.ufl.edu for up-to-date information about COVID-19 and vaccination.

IN-CLASS RECORDING: Students are allowed to record video or audio of class lectures. However, the purposes for which these recordings may be used are strictly controlled. The only allowable purposes are (1) for personal educational use, (2) in connection with a complaint to the university, or (3) as evidence in, or in preparation for, a criminal or civil proceeding. All other purposes are prohibited. Specifically, students may not publish recorded lectures without the written consent of the instructor.

A “class lecture” is an educational presentation intended to inform or teach enrolled students about a particular subject, including any instructor-led discussions that form part of the presentation, and delivered by any instructor hired or appointed by the University, or by a guest instructor, as part of a University of Florida course. A class lecture does not include lab sessions, student presentations, clinical presentations such as patient history, academic exercises involving solely student participation, assessments (quizzes, tests, exams), field trips, private conversations between students in the class or between a student and the faculty or lecturer during a class session.

Publication without permission of the instructor is prohibited. To “publish” means to share, transmit, circulate, distribute, or provide access to a recording, regardless of format or medium, to another person (or persons), including but not limited to another student within the same class section. Additionally, a recording, or transcript of a recording, is considered published if it is posted on or uploaded to, in whole or in part, any media platform, including but not limited to social media, book, magazine, newspaper, leaflet, or third-party note/tutoring services. A student who publishes a recording without written consent may be subject to a civil cause of action instituted by a person injured by the publication and/or discipline under UF Regulation 4.040 Student Honor Code and Student Conduct Code.

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.

INCLUSION, DIVERSITY, EQUITY, AND ACCESSIBILITY RESOURCES

This is a science-based course, which should ideally be objective in its presentation, interpretation, and valid for everyone. However, much of science is subjective and is historically built on a small subset of privileged voices. I acknowledge that the readings for this course were authored by white men and women. Furthermore, the course relies heavily on findings from experiments mostly conducted by white men. The interpretation and presentation are modified, as feasible, by the instructor. I will make an effort to acknowledge whenever possible the contribution that people from several races, sexes, and backgrounds have given to the field. However, I admit that it is possible that there may be both overt and covert biases in the material due to the lens with which it was written, even though the material is primarily of a scientific nature. Integrating a diverse set of experiences is important for a more comprehensive understanding of science. Please contact me (in person or electronically) or submit anonymous feedback if you have any suggestions to improve the quality of the course materials.

Furthermore, I would like to create a learning environment for my students that supports a diversity of thoughts, perspectives and experiences, and honors your identities (including race, gender, class, sexuality, religion, ability, etc.) To help accomplish this:

- If you have a name and/or set of pronouns that differ from those that appear in your official UF records, let me know as indicated above.
- If you feel like your performance in the class is being impacted by your experiences outside of class, please don't hesitate to come and talk with me. I want to be a resource for you. Remember that you can also submit anonymous feedback (which will lead to me making a general announcement to the class, if necessary to address your concerns).
- If you prefer to speak with someone outside of the course, see the list of contacts below.
- I am continuing to learn about diverse perspectives and identities, and still adapting to the cultural differences between countries and regions. If something was said in class (by anyone) that made you feel uncomfortable, please talk to me about it. Again, anonymous feedback is always an option.

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

- Dr. Linda Nguyen, APK IDEA Liaison, linda.nguyen@hnp.ufl.edu
- Dr. Rachael Seidler, APK Graduate Coordinator, rachaelseidler@ufl.edu
- Dr. Joslyn Ahlgren, APK Undergraduate Coordinator, jahlgren@ufl.edu

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:

The following table outlines the point-accruing components of this course.

Evaluation Components (number of each)	% of Total Grade
Exams (3)	40.0%
Quizzes (8)	40.0%
Participation (3)	20.0%
Labster Simulations (Extra Credit)	1.5%

Exams (40% of final grade) – Exams will be at the end of each module (three exams total, one per module). Each exam will contain 15-25 questions and will last 50-120 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 and these exams require the use of Lockdown Browser.

Quizzes (40% of 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 lowest quiz score for each student will be dropped automatically.

Participation (20% 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"> - Defines, describes, and illustrates concepts - Explains, assesses and criticizes ideas - Demonstrates preparation and reading of assignments
Good	18 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	16 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	14 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	12 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 pts	<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

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. Points will be deducted from answers that do not include schematic or diagram drawings.

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 due date for each module to count toward the grade. Labster simulations are available on Canvas.

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 are below. Any changes to schedule will be announced on Canvas.

Date	Class Activity	Module
10-Jan	No class meeting	Module 1
12-Jan	Course Introduction and Lecture – Topic 1	
17-Jan	Lecture - Topic 2	
19-Jan	Quiz and Discussion – Topics 1-2	
24-Jan	Lecture - Topics 3-4	
26-Jan	Quiz and Discussion – Topics 3-4	
31-Jan	Lecture - Topics 5-6	
02-Feb	Discussion – Topics 5-6	
07-Feb	Lecture - Topics 7-8	
09-Feb	Quiz and Discussion – Topics 7-8	
14-Feb	Exam Review and Labster Simulations Due	
16-Feb	EXAM 1	
21-Feb	Lecture – Topics 1-2	Module 2
23-Feb	Quiz and Discussion - Topics 1-2	
28-Feb	Lecture – Topics 3-4	
02-Mar	Quiz and Discussion - Topics 3-4	
07-Mar	Lecture – Topics 5-6	
09-Mar	Quiz and Discussion - Topics 5-6	
14-Mar	SPRING BREAK – No class	
16-Mar		
21-Mar	Lecture – Topic 7	
23-Mar	Discussion - Topic 7	
28-Mar	Exam Review and Labster Simulations Due	
30-Mar	EXAM 2	
04-April	Lecture – Topics 1-2	Module 3
06-April	Quiz and Discussion – Topic 1-2	
11-April	Lecture – Topics 3-4	
13-April	Quiz and Discussion – Topics 3-4	
18-April	Lecture – Topic 5	
20-April	Discussion (Topic 5) and Exam Review . Labster Simulations Due	
25-April	EXAM 3	

SUCCESS AND STUDY TIPS:

- Read the textbook and other reading assignments BEFORE coming to lectures and discussions. Do not take notes, underline, highlight, or attempt to memorize anything. Just READ and enjoy!

- There will be material in the reading assignments that is not covered in lecture which WILL appear on quizzes and exams. There is simply not enough lecture time to cover all materials.
- Do not attempt to memorize all materials. The best grades are usually obtained by focusing efforts on full comprehension of the materials and developing critical thinking skills.
- Examine quiz and exam questions carefully. Some questions involve multiple parts. Taking complex questions and breaking them down to identify exactly what the question is REALLY asking for is very helpful.
- Do not fall behind. This course moves at a FAST pace and covers advanced topics. You can easily get overwhelmed if you procrastinate.
- Stay organized – keep track of important due dates.
- Check CANVAS announcements and emails daily! The instructor will post important and helpful information here.
- Don't be afraid to be incorrect during discussions. The goal of these sessions is to develop full comprehension of the materials (rather than short-term memorization) so that you can discuss your thought process and how you came to your conclusion.