

## **Advanced Exercise Physiology Spring 2019**

Instructor: Terence E. Ryan, Ph.D. (email: [ryant@ufl.edu](mailto:ryant@ufl.edu))

Class location: FLG 0285 (Tuesdays) and FLG 0260 (Thursdays)

Class time: Tuesdays period 8 (03:00p – 03:50pm) and Thursdays periods 7/8 (01:55p – 03:50pm)

Office hours: By appointment only

### **COMMUNICATION**

Direct contact in person or by email. Students should only contact the course instructor by email using their UF email account. Students are responsible for checking assignments and course postings on Canvas. The instructor will post all course grades on Canvas. Students should point out any discrepancies to the instructor as soon as possible, before the last day of class.

### **COURSE DESCRIPTION**

This is an advanced course focusing on integrative physiology and physiological responses to exercise. The course is designed into three modules: I) Energetics, Metabolism, and Endocrine Exercise Physiology; II) Skeletal Muscle Excitation, Contraction, and Fatigue; and III) Cardiovascular and Hemodynamics Regulation. The course builds on principles and concepts learned in undergraduate courses in the area of physiology such as APK-2100 (Applied Human Anatomy), APK-2105 (Applied Human Physiology), and APK-3110 (Introduction to Exercise Physiology). The modules emphasize exercise and physiological responses to environmental challenges in health and disease and include a focus on new scientific discoveries in areas relevant to the module topics.

#### **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

## STUDENT LEARNING OBJECTIVES

Upon completing this course, students will 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, cardiovascular, and ventilatory responses to exercise in health, disease, and environmental challenges
- Defend and critique material or ideas related to bioenergetics, performance, and integrative exercise physiology

## COURSE MATERIAL

The instructor will post lecture slides, videos, and reading material as appropriate on Canvas. The student is responsible for identifying additional resources (i.e. relevant research articles) 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.

## EVALUATIONS

Participation (20% final grade): This will be determined based on the student's preparedness, involvement, and contribution in classroom discussions. Students are required to participate at least once each module to receive all points in this category. 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. Students are expected to present their answer to discussion questions through illustrations and graphs based their understanding of the physiology. Notebooks are not allowed to be brought to the front while answering questions. 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 (see below). Regular contributions to weekly discussions are highly encouraged, even for students that cannot get up to the board each day.

In-class quizzes (40% final grade): There will be quizzes administered in class using Canvas. The quiz might address a topic that has been discussed during the module and/or will be discussed on the day of the quiz. These quizzes might be at the beginning, middle, or at the end of class and will consist of problem-solving exercises or short-questions. Students will take the quiz individually or in groups at the discretion of the instructor based on the type and nature of questions. There will be 1-10 questions per quiz. You must answer each question before moving on to the next question. You CANNOT go back and change answers to questions. No class materials, notes, or other sources can be used during the quizzes. Unauthorized use of materials will be considered a violation of the Academic Honor Code.

Exams (40% of final grade): Exams will be at the end of each module (three exams, one per module). Each exam will contain 15 to 25 questions and will last 75 min. Exams will be based on reading assignments and content covered in discussions and lectures. The exam will be in groups of 2-3 students so that physiological concepts can be discussed in small group settings. 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. 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.

**Class participation:**

The instructor will use the rubric in the table below to assign participation points:

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> </ul>
Good	16 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	12 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	8 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	4 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 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>

*Final Grades*

**Grades will be assigned based on current UF grading policies for assigning grade points:**

<https://catalog.ufl.edu/ugrad/current/regulations/info/grades.aspx>

Letter Grade	Points (%)	Grade Point
A	94-100	4.00
A-	90-93	3.67
B+	85-89	3.33
B	80-84	3.00
B-	75-79	2.67
C+	70-74	2.33
C	65-69	2.00
C-	60-64	1.67
D+	55-59	1.33
D	50-54	1.00
F	0-49	0.00

Students whose percentage grades lie in the decimal points between two letter grades will be automatically considered for the higher grade based on their performance in the class. **Students should not email the instructor requesting consideration for a higher grade or additional extra-credit.** There will be no additional extra-credit provided in any circumstance. This is a departmental policy and outside the control of the instructor.

Please note that final grades on Canvas may not be entirely accurate. To determine your standing in the class you can use the following equation:

$$\text{Final Grade} = (0.4 * \text{Quiz Percentile}) + (0.4 * \text{Exam Percentile}) + (0.2 * \text{Participation Percentile}).$$

If you have any questions or concerns about your standing in the course, the instructor will be available to discuss in person during a scheduled meeting.

### GENERAL COURSE POLICIES

**Attendance:** Make every effort to attend all lectures. Missing classes will likely have an impact on participation grade. Students called for participation in lecture or discussion sessions and not present will receive a zero for participation. Students who need to miss a class should communicate and discuss with the instructor to avoid penalties on participation.

**Electronic records:** No audio or video recordings may be made of any part of this course without written consent by the instructor. Any material recorded shall be used solely by students in the course and cannot be published, shared with others not taking the course, or made publicly available online in any circumstance.

**Make-up Quizzes/Exams:** Unexcused absences/availability for quizzes/exams will result in a zero. Students who are ill or have an emergency that prevents from taking the exam during the time available are responsible for contacting the instructor prior to the absence. Make-up exams are offered at the discretion of the instructor.

A student experiencing an illness should visit the UF Student Health Care Center 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 requesting a make-up assignment (<https://www.dso.ufl.edu/care/courtesy-letters/>). 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.

Canvas: A ticket number received from UFIT Helpdesk must accompany requests for make-ups due to technical issues (see Academic Resources below). The ticket number will document the time and date of the problem. If the time and date are past the assignment deadline, the request may not be granted. You must e-mail your instructor within 24 hours of the technical difficulty if you wish to request a make-up.

Requirements for class attendance and make-up exams, assignments, and other work are consistent with the university policies that can be found at <https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx>.

**Accommodations for students with disabilities:** Students requesting classroom or other special accommodations for disabilities must first register with the Dean of Students Office—Disability Resource Center ([www.dso.ufl.edu/drc/](http://www.dso.ufl.edu/drc/)). The Dean of Students Office will provide documentation to the student who must then present the documentation to the instructor when requesting accommodation. Please, provide the request to the instructor as soon as possible.

**Students registered with the DRC:** Schedule a meeting with the instructor to make arrangements that will be best suited to you. Several components of the course involve assessments in groups and/or in-class. It is impractical to conduct in-class assessments at the DRC, as those overlap with lecture or discussion sessions. However, the instructor can make arrangements for students to complete in-class assessments with extended time or supervised in a different environment near the classroom.

**Technology:** The use of cell phones (and the like) is strictly prohibited during lectures and exams. Any cell phone used during a lecture 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.

**Course Evaluation:** Students are expected to provide feedback on the quality of instruction in this course based on 10 criteria. These evaluations are conducted online at <https://evaluations.ufl.edu/>. Evaluations are typically open during the last two or three weeks of the semester, but students will be given specific times when they are open. Summary results of these assessments are available to students at <https://evaluations.ufl.edu/>.

**Academic Honesty:** As a UF student, you have committed yourself to uphold the Honor Code, which includes the following pledge: *"We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honesty and integrity by abiding by the Honor Code".* You are expected to exhibit behavior consistent with this commitment to the UF academic community, and on all work submitted for credit at UF, the following pledge is either required or implied: *"On my honor, I have neither given nor received unauthorized aid in doing this assignment."* It is assumed that you will complete all work independently in each course unless the instructor provides explicit permission for you to collaborate on course tasks. Furthermore, as part of your obligation to uphold the Honor Code, you should report any condition that facilitates academic misconduct. It is your responsibility to know and comply with all UF policies and procedures regarding academic integrity and the Honor Code. Violations of the Honor Code are not tolerated. Violations will be reported to the Dean

of Students Office for consideration of disciplinary action. The Honor Code specifies a number of behaviors that are in violation of this code and the possible sanctions: <https://sccr.dso.ufl.edu/process/student-conduct-code/>.

## 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 so that a team member can reach out to the student.

*Counseling and Wellness Center:*

<http://www.counseling.ufl.edu/>, 392-1575;

and the University Police Department: 392-1111 or 9-1-1 for emergencies.

*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 Resource Center*, Reitz Union, 392-1601. Career assistance and counseling.

<http://www.crc.ufl.edu/>

*Library Support*, <http://cms.uflib.ufl.edu/ask>.

Various ways to receive assistance with respect to using the libraries or finding resources.

***Tentative class schedule is shown on the next page.***

**Advanced Exercise Physiology – Tentative schedule\***

\* The schedule is subject to change. Changes will be announced in class or on Canvas.

<b>Date</b>	<b>Class Activity</b>	<b>Module</b>
08-Jan	Course introduction	Module 1
10-Jan	Discussion 1 (topic 1 and 2)	
15-Jan		
17-Jan	Discussion 2 (topics 3 and 4)	
22-Jan		
24-Jan	Discussion 3 (topics 5 and 6)	
29-Jan		
31-Jan	Discussion 4 (topics 7 and 8)	
05-Feb	Exam 1 Review Session	
07-Feb	EXAM 1	
12-Feb		Module 2
14-Feb	Discussion 1 (topics 1 and 2)	
19-Feb		
21-Feb	Discussion 2 (topics 3 and 4)	
26-Feb		
28-Feb	Discussion 3 (topics 5 and 6)	
05-Mar	SPRING BREAK	
07-Mar		
12-Mar		
14-Mar	Discussion 4 (topics 7 and 8)	
19-Mar	Extra Credit Quiz and Exam 2 Review Session	
21-Mar	EXAM 2	
26-Mar		Module 3
28-Mar	Discussion 1 (topics 1 and 2)	
02-April		
04-April	Discussion 2 (topic 3)	
09-April		
11-April	Discussion 3 (topics 4 and 5)	
16-April	Extra Credit Quiz and Exam 3 Review Session	
18-April	EXAM 3	

\*Note: There will be an in-class quiz or exam on all dates highlighted in blue.