

## APK 7108 ENVIRONMENTAL PHYSIOLOGY

Class #24682 ~ 3 cr hrs ~ SPRING 2021

**INSTRUCTOR:** **Thomas Clanton, Ph.D.** Professor of Applied Physiology and Kinesiology  
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Preferred Method of Contact: Email through CANVAS

**OFFICE HOURS:** Please request by appointment via email using CANVAS. Meeting can be scheduled live or on ZOOM.  
*Instructor's Permanent Zoom Meeting Room*  
<https://ufl.zoom.us/j/7732191151>

**MEETING TIME/LOCATION:** example: FLG 2:10 periods 3-5, 9:35-12:35.

**COURSE DESCRIPTION:** This is a graduate level class for Ph.D. and MS student majors in Applied Physiology and Kinesiology. The course discusses the energetics of environmental stress on cardiovascular, respiratory, metabolic and muscle physiology as they pertain to physical performance.

**PREREQUISITE KNOWLEDGE AND SKILLS:** Previous graduate level Human Physiology and/or Exercise Physiology class.

**REQUIRED AND RECOMMENDED MATERIALS:** There are no specific textbooks required for this course. All required reading material will be provided in CANVAS from available manuscripts and review articles in the literature. However, we will have an emphasis on Pulmonary Physiology in this class and the instructor will use heavily the textbook, **West's Respiratory Physiology: The Essentials**, 10<sup>th</sup> edition. Authors John B. West and Andrew M. Luks. Available on Amazon (Kindle) or ~\$20. Used versions are also

available. The instructor will also be utilizing the textbook: **Advanced Environmental Exercise Physiology** by Stephen S. Cheung copyright 2010. (available on Amazon ~\$55).

**COURSE FORMAT:** The course will be live on the majority of the schedule. There may be lectures provided by faculty outside the University that will be recorded or on Zoom. Students will have the option of attending on Zoom. We will meet for the entire 3 period session on Wednesday of each week. All material, reading assignments, etc will be posted on CANVAS. A large part of the course will be based on a “problem based learning approach” where students will work in teams to address and share with the class understandings of the physiological responses to environmental stress exposures.

**COURSE LEARNING OBJECTIVES:**

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

- To be able to describe the gas exchange mechanisms by which oxygen and carbon dioxide are exchanged between cells and the environment.
- Be able to recognize the biomechanical/biophysical factors of the lung and chest wall that limit gas exchange in various environments and in common pulmonary diseases.
- Be able to recognize the homeostatic mechanisms that controls the ventilatory rate to manage gas exchange at rest and in exercise.
- To be able to compare and contrast differences in the systemic circulation and the pulmonary circulation in health, environmental exposure and common diseases.
- To identify ways and conditions in which the pulmonary system might limit exercise performance in various stress environments.
- To be able to define what is known about the pathophysiology of passive and exertional heat stroke, prevention strategies and potential long-term consequences.
- To be able to define the fundamental thermoregulatory control system in both hyperthermic and hypothermic environments.
- To identify the effects and importance of hydration and salt balance during exercise and other extreme environments.
- To define the therapeutic aspects of cold and heat exposure in terms of tissue responses and recovery from various clinical disorders.
- To define the respiratory and cardiovascular responses to high altitude exposure, the effects of hypobaric and hypoxic environments on exercise capacity.
- Define the long-term and short term adaptations to altitude exposure.
- Be able to identify the adaptations to underwater immersion and the stress induced and physiology of water submersion.
- To identify the physiological strain involved with prolonged zero gravity exposure.

- To be able to define the molecular mechanisms of epigenetic responses to acute and chronic environmental exposure.

## COURSE AND UNIVERSITY POLICIES:

### **ATTENDANCE POLICY:**

As with all Graduate Level Classes in APK attendance is required and will be noticed if you do not attend. Reasonable requests for being excused from class will be carefully considered. However, please notify the instructor by email through CANVAS if you wish to be excused for a specific class.

**PERSONAL CONDUCT POLICY:** Students are expected to exhibit behaviors that reflect highly upon themselves and our University. Outline for them exactly what that means in the context of your course. 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 contact me.

**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. If you have a necessity to miss an exam for any reason, contact the instructor, Dr. Clanton. It will not be necessary to discuss details but all reasonable requests will be considered though you may need to also 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 assignments (<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/>.

**COVID-RELATED:**

- For this class, we will have face-to-face and zoom instructional sessions to accomplish the student learning objectives of this course. In response to COVID-19, the following policies and requirements are in place to maintain your learning environment and to enhance the safety of our in-classroom interactions.
- You are required to wear approved face coverings at all times during class and within buildings. Following and enforcing these policies and requirements are all of our responsibility. Failure to do so will lead to a report to the Office of Student Conduct and Conflict Resolution.
- This course has been assigned a physical classroom with enough capacity to maintain physical distancing (6 feet between individuals) requirements. Please utilize designated seats and maintain appropriate spacing between students. Please do not move desks or stations.
- 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.
- Follow your instructor's guidance on how to enter and exit the classroom. Practice physical distancing to the extent possible when entering and exiting the classroom.
- If you are experiencing COVID-19 symptoms ([Click here for guidance from the CDC on symptoms of coronavirus](#)), please use the UF Health screening system and follow the instructions on whether you are able to attend class. [Click here for UF Health guidance on what to do if you have been exposed to or are experiencing Covid-19 symptoms](#).
- 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. [Find more information in the university attendance policies](#).

## PRIVACY:

Our class sessions may be audio-visually recorded for students in the class and posted on CANVAS to refer back and to accommodate enrolled students who are unable to attend live. 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. Likewise, students who un-mute during class and participate orally are agreeing to have their voices recorded. If you are not willing to consent to having 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. The chat will not be recorded or shared. As in all courses, unauthorized recording and unauthorized sharing of recorded materials is prohibited.

## 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:

30% Grade: Weekly CANVAS quizzes on material presented in the previous week (12 x 25 pts) = 400 pts.

30% Participation and quality of Student Presentations. At least 2 presentation x 150 pt each 300 pts

10% Class participation 100 Pts

15 % midterm (essay) 150 pts

15% Comprehensive final (essay) 150 pts

Total pts: 1000

Evaluation Components (number of each)	Points Per Component	Approximate % of Total Grade
Weekly CANVAS exercises/Quizzes	12 x 25 pts each = 400 pts	400/1000= 40%
Student Presentations	~3 x 100 pts	300/1000 = 30%
Class participation	100 pts	100/1000 = 10%
Midterm essay exam	150 pts	150/1000 = 15%
Comprehensive Final	150 pts	150/1000 = 15%
Extra Credit (to be determined)	To be determined	No more than 10%

**Lecture Exams** –(40%) Weekly CANVAS quizzes and exercise. After the weekly meetings, a relatively short CANVAS exercise/quiz will be opened to be completed within 1-2 weeks. For weeks with student presentation, the students presenting will be responsible for creating the questions from their presentation and an evaluation of the quality of those question will be part of their presentation grade.

**Student Presentations:** (30%) After the first 2-3 weeks of the class the instructor will give an intense respiratory physiology series. After that, students will be assigned to present material on given topics of environmental physiology. Each presentation group will be given some “starter journal articles” and a set of specific objectives, goals or problems to be addressed during the presentation. The groups will divide the presentation up into parts so that each student has the opportunity to present and show they work to the class and the instructor. Your grade will be determined by your participation in the presentation, how prepared you were and the overall quality of the material. The main instructor (Clanton) will follow up for a short period on the next week of any additional information he thinks you need that was not covered.

**Class Participation:** 10% Each student starts with all 100 pts at the beginning of the semester. If students are absent or unprepared to participate in discussion that is expected, this will be reduced by each deficit in participation.

**Midterm and Comprehensive Final (30%):** These will be mixed format of multiple choice, essay, problem solving etc. We will discuss as a class the format of these exams and what information or tools can be used during the exam.

**Extra Credit** – Will be arranged if needed depending on how the class is doing during the course of the semester. It may consist of as much as an additional 10% addition to the overall grade.

**GRADING SCALE:** Note: I will try to use this modified grading scale for this class. Grades will be rounded to the

Letter Grade	Points Needed to Earn Each Letter Grade	Percent of Total Points Associated with Each Letter Grade	GPA Impact of Each Letter Grade
A	≥ 900	90.00-100%	4.0
B+	870.0-899.9	87.00-89.99%	3.33
B	800.0-869.9	80.00-86.99%	3.0
C+	770.0-799.9	77.00-79.99%	2.33
C	700.0-769.9	70.00-76.99%	2.0
D+	670.0-699.9	67.00-69.99%	1.33
D	600.00- 669.90	60.00-66.99%	1.0
E	≤ 599.9	0-59.99%	0

## WEEKLY COURSE SCHEDULE:

Please note that this weekly schedule is likely to be subject to change this semester. This is my first time teaching this course and it may need to vary to fit the material into the class. I put quite a bit of flexibility into the last 2-3 weeks to account for this.

Week	Dates	Lecture Topic (required reading pages)	Notes
1	Jan 13	Introduction to the Course Respiratory Physiology 1 Alveolar Gas Exchange- Hypoxia and altitude.	
2	Jan 20	Respiratory Physiology 2 Carriage of O <sub>2</sub> and CO <sub>2</sub> - in the blood- regulation of pulmonary circulation Respiratory Physiology 3 Biomechanics of Breathing	
4	Feb 3	Mechanisms of Thermoregulation during exercise/hyperthermia/hypothermia and fever.	

5	Feb 10	Regulation of body fluids and salt balance in exercise and in hyperthermic environments. Pathophysiology of Exertional Heat stroke	
6	Feb 17	Mechanisms of Acclimatization Tissue responses to heat/cold and osmotic stress.	
7	Feb 24	<b>Midterm 1</b> Problem solving class discussion	
8	March 1	Long and short term adaptations to altitude exposure Intermittent hypoxia and training responses to intermittent hypoxic exposure	
9	March 10	Physiology and pathophysiology of underwater immersion and hyperbaric exposure	
10	Mar 17	Microgravity and the physiology of space travel	
11	Mar 24	<b>UNIVERSITY RECHARGE DAY NO CLASS</b>	
12	Mar 31	Epigenetic responses to environmental exposure. A frontier of physiology	
13	Apr 5	Chronobiology of exercise performance Class discussions and problem solving	
14	Apr 14	Class Presentations Class discussions	
15	Apr 21	Review Catch UP/Review/Problem solving session	
16	Apr 26	<b>FINAL COMPREHENSIVE EXAM</b>	<b>10:00 – 12:00 AM</b>