

Integrative Biology 123AL, Exercise and Environmental Physiology  
**Lecture Outline, Fall Semester 2021**

INSTRUCTOR: **Professor George A. Brooks, Ph.D.**

Lab Instructors:

TIME: M, W, F 8-9 AM **125 Li Ka Shing** (plus laboratory section)

SEMESTER SCHEDULE: Instruction Begins August 25 and Ends December 3.

Lab Orientation begins the second week of class.

- I. *Objective:* A discussion of the many basic and applied aspects of exercise and an understanding of the effects of exercise, environmental and other stresses on the human body.
- II. *Approach:* A series of lectures, discussions, laboratory exercises and demonstrations on the subject.
- III. *Lecture Outline and Examination Schedule:*

<u>DATE</u>	<u>TOPIC</u>	<u>READING*</u>
Aug. 25, 27	Introduction	Ch. 1*
Aug. 30, Sept. 1, 3, 8	Metabolic Responses to Exercise	Ch. 4-7 (Review 2-3)
Sept. 10, 13, 15	Energy Substrate Use in Exercise	Ch. 8-10
Sept. 20, 22, 24, 27, 29	Cardiopulmonary Responses to Exercise	Ch. 21 (Review 10, 14-16)
Oct. 1, Oct 4	Muscular Responses to Exercise	Ch. 19, 20 (Review 17-18)
Oct. 6, 8, 11	Exercise in the Heat and Cold	Ch. 22
Oct. 13, 15, 18	Exercise at High Altitude	Ch. 23 (Review 11-13)
Subject Material for the Midterm Exam will be above the dividing line.		

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Oct. 20, 22, 27	Exercise Obesity & Diabetes (Metabolic Syndrome)	Ch. 25
<b>Oct. 25</b>	<b>Midterm Examination</b>	
Oct. 29, Nov. 1	Exercise Cancer & Disabilities	Ch. 26
Nov. 3, 5	Exercise & Nutrition	Ch. 28
Nov. 8, 10	Ergogenic Aids	Ch. 29
Nov. 12, 15, 17	Gender Differences and Considerations	Ch. 30
Nov. 19, 22	Growth & Development	Ch. 31
Nov. 26, 29	Aging	Ch. 32
Dec. 1, 3	Fatigue From Muscular Exercise	Ch. 33
<b>Dec. 13</b>	<b>Final Examination (Group 4)</b>	<b>125 LKS, 7-10 PM</b>

The final examination will cover material from **Oct. 18** and afterward, but will be conceptually inclusive of the entire course.

IV. *Grading:*

Midterm	20%
Final Exam	40%
Lab	40%

V. *Lab:* **Lab (IB 123AL) is concurrent.**

\* Reading assignments in: Brooks, G.A., T.D. Fahey, and K.M. Baldwin EXERCISE PHYSIOLOGY: HUMAN BIOENERGETICS AND ITS APPLICATIONS, Volumes 1 and 2, Fifth Edition, KDP (Amazon) 2019.

**Laboratory Outline, Fall Semester 2021**

**Objective:** To obtain practical experience in the measurement of physiological parameters during rest and exercise and to be able to compile, compare, contrast and interpret physiological data. Laboratory demonstrations and exercises will illustrate concepts presented in lectures.

**Mode of Instruction:** Labs will involve videos, short lectures and demonstrations provided by the GSI.

**Mode of Evaluation:** Many lab exercises will involve individual, written Laboratory Reports or responses to Discussion Questions that are due in lab the following week. Laboratory reports will take the format of published articles in peer-reviewed physiological journals. As described below, grading of Lab Reports will emphasize data analysis and interpretation, but Reports will contain all elements of a scientific paper in physiology. Responses to Discussion Questions will be more straightforward, not containing all elements of the Laboratory Report. Again, emphasis in grading will be on data analysis and interpretation.

**Graduate Student Instructors:**

**Materials:** Lab Manual (None, Handouts and Videos This Semester)  
Exercise Physiology -- textbook by Brooks, Fahey, and Baldwin, 5<sup>th</sup> Edition  
Lab Notebook  
Calculator

***Laboratory Schedule:***

<b><u>Week #</u></b>	<b><u>Lab Date</u></b>	<b><u>Laboratory Topic</u></b>	<b><u>Assignment</u></b>
1	Aug. 24	<b>No Laboratory</b>	
2	Aug. 31	Orientation	
3	Sept. 7	Resting Metabolic Rate	Discussion Questions
4	Sept. 14	The Balke Treadmill Test	
5	Sept. 21	Determination of Max VO <sub>2</sub>	<b>Laboratory Report</b>
6	Sept. 28	ECG & Blood Pressure	
7	Oct. 5	Lactate Threshold	
8	Oct. 12	Exercise in the Heat	Discussion Questions
9	Oct. 19	Review for Midterm	
10	Oct. 26	<b>No Lab After Midterm</b>	
11	Nov. 2	Exercise at Altitude	Discussion Questions
12	Nov. 9	Glucose Homeostasis & Exercise	Discussion Questions
13	Nov. 16	Ventilation During Exercise	
14	Nov. 23	<b>No Lab, Thanksgiving Holiday</b>	
15	Nov. 30	Cardiac Output	<b>Laboratory Report</b>
16	Dec. 7	Review for Final Exam	

**Grading:**

	<u>Number</u>	<u>Points</u>	<u>Total</u>
Individual Discussion Questions	8	50 points	400 points
Individual Lab Reports	2	200 points	400 points
GSI Evaluation			<u>100 points</u> 900 points

**Discussion Questions:** are provided in the lab manual and should be answered in a short essay format. All assignments must be submitted to bCourses. Discussion questions will be evaluated for originality using Turnitin through bCourses. Despite the collaborative nature of lab execution and data collection, all course assignments are individual.

**Laboratory Reports:** Reports will take the format of published articles in peer-reviewed physiology journals. Grading will emphasize data presentation, analysis, and interpretation. As described below, the report should include a brief introduction on background physiology and the purpose of the lab exercise; a methods section describing what you did; the equipment and formulas used; a results section presenting your data in written, table and/or graphical format; a discussion section interpreting your results within the larger context of physiological research; and a conclusion summarizing your findings. All lab reports will be evaluated for originality using Turnitin through bCourses. Despite the collaborative nature of lab execution and data collection, all course assignments are individual.

**GSI Evaluation:** will be based on attendance, preparation, timeliness, participation, and contribution to discussions.

**NOTE:** Assignments must be uploaded to bCourses by the *beginning* of lab the week following lab exercises. Late assignments will be marked down 10% each day, or part thereof.

**Cheating, Plagiarism, Academic Misconduct:** Use of graded work from prior semesters, and use of another student's work to complete an individual assignment is considered academic misconduct.

UC Berkeley's honor code states, "As a member of the UC Berkeley community, I act with honesty, integrity, and respect for others." As a tool to promote academic integrity in this course, written work submitted via bCourses will be checked for originality using a computer application.

It is every student's responsibility to understand what constitutes academic misconduct, to understand what plagiarism is, and to understand how to avoid misconduct.

The UCB Division of Student Affairs provides definitions for what constitutes cheating and plagiarism here: <http://sa.berkeley.edu/conduct/integrity/definition>

The UC Berkeley library website is also a resource for what constitutes plagiarism along with some links to information about how to avoid plagiarizing:  
<http://www.lib.berkeley.edu/instruct/guides/citations.html>

If you have questions about what constitutes plagiarism please read the information linked above and then follow-up with your lab or course instructors if necessary.

Reproducing, sharing, or distributing course notes and materials for commercial purposes or compensation is a violation of the Berkeley Campus Code of Student Conduct (University Policy 102.23). This policy includes graded work and recordings of lecture and lab. More detail is available here: <http://sa.berkeley.edu/conduct/code-of-conduct/policies>

Cases of cheating (including attempted cheating) may be reported to the Office of Student Conduct. The standard procedure for dealing with cheating is: (1) An “F” on the assignment; (2) A potential letter in your file that identifies you as a cheater (this letter, upon request, will be sent to medical and graduate schools, employers, etc.); (3) Hours of campus service; and (4) Risk of suspension or dismissal.

It just isn't worth it. If you are having trouble completing an assignment by a deadline talk to or email your lab instructor *before* the due date. Take steps to avoid making the choice to cheat. Receiving a zero or taking late penalties is better than receiving an academic misconduct report.

## **SUGGESTIONS FOR AN IDEAL LAB REPORT**

Your report should include six distinct sections (200 points total).

Create a descriptive title for your report. The lab reports are designed to get you used to writing a scientific paper. The lab reports should include all the pertinent information in a concise manner (3-5 pages, double-spaced, including tables and figures, no smaller than Times 12 Font). Write in the past tense, since the experiment has already been done. Please read the lab manual thoroughly. It will help you with your presentation of the data. Also, the text and the references at the end of the lab will be a good starting point to help understand the relevant physiology.

### 1. Introduction (30):

Relevant physiological background information and introduction of important terms, concepts, and abbreviations. What is your lab report about, and why is it important to understand (ideally in context of some real world applications). Be sure to include a clearly stated hypothesis.

### 2. Methods (20):

Include a brief description of the procedures, data to be collected, precise equipment (e.g., Tissot Spirometer). Include enough information for someone to repeat the experiment and any calculations performed. Should be written concisely (no more than a page) and in chronological order. Include any formulas used in the appendix (this will not count towards your page limit).

### 3. Results (50):

Clear narration of your data and trends, both quantitatively and qualitatively. Make sure you are describing your data, and not interpreting it. Include effective figures for your major comparisons with appropriately labeled axes, labels, and units (these must be included in the body of your report and count towards your page limit, so think about formatting carefully). Be sure to include any analysis that is used to test your hypothesis (e.g. if you hypothesize your data will follow a logistic curve, how do you test to what extent that is the case?). Also include a properly formatted data table in an appendix (this will not count towards your page limit).

### 4. Discussion (80):

Briefly restate the purpose and hypothesis, as well as whether your main results support or reject your hypothesis. Explain the mechanisms of relevant physiological processes, Compare and contrast

expected (based on previous research on the topic) and actual results. Discuss potential sources for error or unexpected results, as well as limitations of the experiment with suggestions for improvement. Explain how your experiments and results fit into the 'big picture' by discussing their significance and real world application. Unless the detailed physiological mechanisms you are describing are common knowledge, there should be relevant citation of literature (see also references below).

5. Conclusion (10):

Your take home message; should be no longer than 5 sentences. Include a summary of what your data suggest, their importance, and whether this was in line with your hypothesis or not. Do NOT include any new ideas or information in the conclusion.

6. References (10):

Include at least two primary (peer reviewed) references used in your report. Also cite other sources you use for information that is not common knowledge. Be sure to cite appropriately in the text using an (Author(s), Year) format. Be sure to summarize the ideas presented by these authors into your own words.