

CARDIOPULMONARY EXERCISE PHYSIOLOGY SPRING 2003

INSTRUCTOR: Joel B. Mitchell

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TEXT: Textbook of Medical Physiology, 10th ed. Guyton & Hall.

It is also recommended that you keep your basic exercise physiology text as a reference text.

COURSE OBJECTIVES:

At the end of the semester you should understand:

1. the basic physiology of the cell, including membrane transport and potentials;
2. the anatomical features, electrical activity, contractile characteristics, and hemodynamics of a normal cardiovascular system;
3. the anatomical features, gas exchange characteristics, regulation and ventilation/perfusion relationships in the normal pulmonary system;
4. the anatomical features & basic physiology of the renal system, and regulation of fluid balance; and
5. the responses of the cardiovascular, pulmonary, and renal systems to acute and chronic exercise of varying intensity, duration, and mode.
6. In addition, students should be able to review and interpret literature dealing with the cardiovascular and respiratory responses of individuals under various exercise, environmental and clinical conditions, and be able to handle the information gleaned from this literature in a seminar style class setting.

EVALUATION AND COURSE REQUIREMENTS

50 pt. Question Sets (4)	200
100 pt. Final Examination (1)	100
100 pt. Paper and presentation	100
100 pt. Seminar Leading	100
25 pt. Lab write-ups (4)	<u>100</u>
	600 pts.

- The question sets will be handed out on the week prior to each scheduled class meeting and will correspond to the assigned readings. Rough drafts of

your answers to the question sets will be due each meeting. The final typed draft of the answers to the question sets will be due for grading on the following dates:

- Set # 1 - Feb. 11
- Set # 2 - Feb. 25
- Set # 3 - Mar. 11
- Set # 4 - Apr. 1

There are two purposes for the question sets: 1) to generate discussion, and 2) to take the place of mid-term exams. With this in mind, everyone will be expected to have questions and contribute to the discussion of the topics assigned for each class meeting. Ten points out of each final 50 points for each question set will be a participation grade.

- The final exam will be on the Tuesday of finals week at the regular class meeting time on May 6.
- You are to write a 5-10 page paper on a topic of your choice (approved by me), and make a 15 minute presentation to the class (paper = 75, present. = 25 pts.). A minimum of 12 references must be used, of which only two may be text books. Paper is to be typed, double spaced. Presentations will be made on April 29th & the paper is due May 2.
- In the final section of the course, the class will be conducted in a seminar fashion with students leading the discussion over articles related to the topic they have chosen. You will be evaluated on your performance. The seminar topics are listed below—once you have chosen your topic, you will need to find a review article to start with and three current (maximum of five years old) original investigation articles to support your area. The three articles will be given to the rest of the class one week in advance. Everyone will be responsible for the material and contributing to the discussions.
- Labs will be conducted with the entire group during regular class time. Write-ups, including calculations, questions, etc will be due two weeks from the time of the data collection.

Grading: 540-600 = A
 480-539 = B
 420-479 = C

COURSE OUTLINE:

<u>Topic</u>	<u>Chapter</u>	<u>Class Mtg.</u>	<u>Date</u>
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SECTION I. FOUNDATION MATERIAL

Control Concepts	1		
Cell Structure and Function	2		
Membrane Physiology	4 & 5	2	1/21
Heart Structure and Function	9		
Electrophysiology of the Heart	10	3	(Lab) 1/28
Hemodynamics	14		
Circulation	15		
Microcirculation & Lymphatics	16	4	2/4
Humoral Flow Regulation	17		
Neural Flow Regulation	18		
Blood Pressure Regulation	19	5	2/11
Cardiac Output and Venous Return	20		
Muscle Blood Flow	21	6	(Lab) 2/18
Pulmonary Ventilation	37		
Pulmonary Circulation	38	7	2/25
Gas Exchange	39		
Gas Transport	40		
Regulation of Respiration	41	8	(Lab) 3/4
Fluid Compartments	25		
Glomerular Filtration	26		
Tubular Processing	27	9	3/11
Fluid Osmolarity	28		
Blood Volume & Electrolyte Balance	29		
Acid-Base Balance	30	10	(Lab) 3/25

SECTION II. SEMINAR SECTION ON EXERCISE RESPONSES

11-14 4/1 – 4/22

SECTION III. PRESENTATIONS

15 4/29

SEMINAR TOPICS: Cardiac Transplantation and Exercise
 Polycythemia and Exercise Performance
 Pregnancy and Exercise
 Cardiopulmonary Responses to Aging
 Cardiopulmonary Responses to Space Flight
 Orthostatic Tolerance and Training
 Exercise and CV Disease Prevention

Training and Cross-Stressor Adaptation
Myocardial Hypertrophy w/ Training
Cardiac Metabolism
Cardiac Output and Stroke Volume Adaptations
Respiration as a Limiting Factor During Exercise
Exercise-induced Asthma