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HHP 529.01: Advanced Physiology of Exercise I- Metabolism, Endocrinology and Gender Differences

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HHP 529 Advanced Physiology of Exercise I: Metabolism, Endocrinology and Gender Differences

Monday and Wednesday 2:10-3:30, Fall 2001

Course Description :
Exercise physiology can be defined as using exercise to better understand physiology or using physiology to better understand the adaptations that accompany acute and/or chronic exercise. In this course we will approach exercise physiology from both perspectives.

This course is designed to provide you with a concise overview of some of the fundamental principles associated with the metabolic and neuroendocrine aspects of applied human physiology in response to acute and chronic exercise. Throughout the course you will develop an appreciation for the organization and function of metabolism and how the muscle and other tissues respond to the constant need for fuel in the rested and working state.

Course Objectives :
To acquire,

1. an understanding of the biochemical regulation of energy metabolism.
2. an understanding of the techniques used to evaluate substrate utilization during rest and exercise.
3. an understanding of which fuels are used during exercise and how dietary intake may alter availability of substrate.
4. an understanding of the metabolic pathways that allow anabolism and catabolism of CHO, fats and proteins.
5. an understanding of the role of hormonal control during exercise and variations in exercise due to gender.
6. an understanding of the variations between sexes in substrate utilization during exercise.

Instructional Format :
Two 80 minute lectures/week consisting of lecturer instruction of academic material, student run paper synopses (5 minute presentations) of current/classic research (guidelines below), and student research presentations (powerpoint) during the last week of class (guidelines below).

Course Expectations:
It is assumed that all students have had basic anatomy and physiology as well as an appropriate undergraduate course in either exercise physiology, applied human or medical physiology. Your active participation is required. You are expected to keep up with all reading assignments, research papers and with your own research direction for your project.

Grading:
Letter grades will be established as follows...

A	**90 - 100 % (405-450 pts)**
B	**80 - 90 % (360-404 pts)**
C	**70 - 80 % (315-359 pts)**

The percentage grade will be calculated from the total points earned from three examinations, and your research presentation/paper.

Written Exams	- 100 pts each x 3	=	300
Research Presentation/Paper		=	150 (75 points each)

Required Text
Exercise Physiology, Human Bioenergetics and Its Applications, 3rd Edition. Brooks, Fahey, White, Baldwin, 2000. Additional handouts and articles will be distributed periodically throughout the semester.

Course Evaluation :
Students will be advised to critically evaluate the course content, requirements, lecture format, and instructor to ensure future improvements. An official University student evaluation form will be provided during the last full week of instruction.

COURSE OUTLINE

September		**Chapter**
3	Labor Day Holiday	
5	Introduction, history, basic concepts of exercise physiology	Introduction, 1
10	Bioenergetics – the basics	2
12	Intro to the fuel systems and enzyme regulation	3
17	Enzyme function and adaptation	3
19	Whole body metabolism	4
24	Metabolic calculations (CHO, FAT)	4, handouts
26	CHO metabolism (tales of glycolysis, pyruvate and lactate)	5
October		
1	Gluconeogenesis, glycogen synthesis	5
3	Review for Exam #1	
8	Exam #1 – Happy Thanksgiving in Canada eh!	
10	Use of metabolic tracers (6,6 ^{2}H glucose) – glucose Ra, Rd	5, handouts
15	Mitochondrial involvement and CHO metabolism	6
17	Lipid metabolism – storage and circulation	7
22	Lipid metabolism – utilization during exercise	7 cont.
24	CHO/Lipid use during exercise, CHO and lipid supplements	7 cont., handouts
29	Protein metabolism	8
31	Review for Exam #2	

November

5	Exam #2	
7	Introduction to endocrinology (hormone classification)	9
12	Neuroendocrine control of glucose homeostasis	9 cont
14	Lactate metabolism, anaerobic threshold, lactate threshold	10
19	Nutritional aspects of performance	10 cont
21	Thanksgiving Holiday	
26	Gender differences in CHO metabolism during exercise	30, handout
	Research papers due (copies for everyone in class)	
28	Gender diff. in Fat and Protein metabolism during exercise	30, handouts

December

3	Research presentations
5	Research presentations
10	Review for Exam #3
12	Exam #3

Weekly Research Paper Reviews

I will provide 2 articles every Wednesday for you to copy. These will either be review articles/chapters or original data based research articles. You have the rest of the week and the weekend to read and review them. You should consider taking some notes (purpose, subjects, major results, major discussion highlights). Each Monday, names will be drawn at random (one for each article). If drawn, you will provide a short 5 minute review of the paper highlighting the purpose, major findings and discussion. **If you are drawn and do an average job - .5 points. If you are drawn and do an excellent job – 1 point. These are bonus points that are tacked on to the total for the semester (It provides some incentive I suppose). If you are unprepared, do a poor job, or not in class you will receive 0 points and suffer the guilt, shame and ridicule of your fellow grad students.**

Research Proposal Paper and Presentation Guidelines

Format: A total of 15-20 minutes will be allowed for each research presentation. This will be followed by 2-5 minutes of questions, comments and discussion. The topic must be an original idea and should cover some aspect of exercise metabolism (energy balance, substrate utilization, energy expenditure).. Power point presentations via computer and projection system are required – time to learn if you don't already know how.

Topic The topic should relate specifically to an area of exercise metabolism (as mentioned above).. The research topic of choice should include an area that you might be interested in pursuing. However, you should consider a few variables that may limit your ideal study (i.e. equipment/facilities and $$). The purpose of this presentation is to get your mind thinking early towards potential thesis ideas and the process of research.

Written Paper - (no more than five pages)

Component	**Points**
Title (15 words or less)	
Review of previous research (1 page limit)	15
Clearly defined purpose (1-2 sentences)	10
Methodology (1 page limit)	
Identify subjects, setting and testing procedures	15
Dependent/Independent variables of interest	10
Data analysis (1/2 page limit)	5
Directional hypotheses - what will you be testing (1/2 page limit)	5
Expected outcome/results/conclusions (1 page limit)	15
Total	**75**

Presentation – 15-20 minutes, 2-5 minutes of questions

Component	**Points**
Introduction - provide background information and rationale	10
Clearly state purpose of study	5
Methodology	
Identify subjects, setting and testing procedures	15
Highlight unique variables you intend to collect/measure and why	10
Data analyses - how will you analyze your data	5
Well drawn conclusions or potential outcome (what will it mean?)	10
Appropriate use of Powerpoint to illustrate study	10
Clarity of presentation*	5
Ability to address questions/comments as necessary	5
Total	**75**

Bring enough copies of your paper for everyone Monday, November 27
The order of presentations will be decided using a random numbers table

Name: _____

Written Paper - (no more than five pages)

	Points
Title (15 words or less)	
Review of previous research (1 page limit)	/15
Clearly defined purpose (1-2 sentences)	/10
Methodology (1 page limit)	
Identify subjects, setting and testing procedures	/15
Dependent/Independent variables of interest	/10
Data analysis (1/2 page limit)	/5
Directional hypotheses - what will you be testing (1/2 page limit)	/5
Expected outcome/results/conclusions (1 page limit)	/15
Total	**/75**

Presentation – 15-20 minutes, 2-5 minutes of questions

	Points
Introduction - provide background information and rationale	/10
Clearly state purpose of study	/5
Methodology	
Identify subjects, setting and testing procedures	/15
Highlight unique variables you intend to collect/measure and why	/10
Data analyses - how will you analyze your data	/5
Well drawn conclusions or potential outcome (what will it mean?)	/10
Appropriate use of Powerpoint to illustrate study	/10
Clarity of presentation*	/5
Ability to address questions/comments as necessary	/5
Total	**/75**
Grand Total	_____**/150**