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FORM C - DEGREE/PROGRAM CHANGE

CIP CODE

Date: 6/27/08

Veronika Becker
(Name of individual initiating curricular change form)

Sr. Program Manager
(Title, position, telephone number)

pbecker@unm.edu
(Email address)

F & CM
(Department/Division/Program/Branch)

Assigned by Associate Provost for Academic Affairs

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JUL 16 2008
RECORDS OFFICE

ROUTING (All Four Collated Sets)

1. Department Chairperson
2. College Curriculum Committee
3. College or School Faculty (if necessary)
4. College or School Dean/Dean of Instruction
5. Office of the Registrar—Catalog
6. Director of relevant Library
7. FS Graduate Committee (graduate courses)
8. FS Undergraduate Committee (undergraduate courses)
9. FS Curriculum Committee
10. Assoc. Provost for Academic Affairs
11. Faculty Senate
12. Board of Regents (new degree only)

*** Plan for curricular process to take at least 12 months.**

Mark Appropriate Program:

Undergraduate Degree Program ☐

Graduate Degree Program (For existing degree only) ☐

This form is for Community Health Intervention Concentration
Name of New or Existing Program

This program is or would be located in current undergraduate/graduate catalog on page(s) _____

Mark appropriate category:

	NEW	REVISION OF	DELETION	NAME CHANGE
Degree _____ (Type)	☐ Undergraduate degree only	☐	☐	☐
Major	☐	☐	☐	☐
Minor	☐	☐	☐	☐
Concentration	☐	☒	☐	☒
Certificate	☐	☐	☐	☐
Emphasis	☐	☐	☐	☐
Department	☐	NA	☐	☐
Subject Code	☐	☐	☐	☐

Give exact title and requirements as they should appear in the catalog. See current catalog for format within the respective college (attach additional sheets if necessary). Identify in bracket form what is being changed.

Community Health Concentration (Name Change) from Community Health Intervention Concentration.

Reason(s) for Request (attach additional sheets if necessary).

Per faculty committee, Concentration Requirements, Mission and Description changes attached in catalog copy. Faculty vote that name change better reflects actual mission of the concentration.

Attach statements to address Budgetary and Faculty Load Implications and Long-range planning.

Does this change affect in a significant way, any other departmental programs/branch campuses? Yes ____ No ✔

If yes, have you resolved these issues with department/branch involved? _____(attach statement)

Proposed Effective Term: Fall (Term) , 2008 (Year)

Required Signatures:

Department Chair	Kristine Hollenkamp	Date 7/8/08
College Curriculum Committee	VR	Date
College or School Faculty (if necessary)		Date
College or School Dean/Dean of Instruction		Date 7/14/08
Office of the Registrar—Catalog	Elizabeth A. Barton	Date 09/08/08
Director of relevent Library	N/A no new courses	Date
FS Graduate Committee (graduate courses)		Date 10/2/08
FS Undergraduate Committee (undergraduate courses)		Date
FS Curriculum Committee		Date 11-7-08
Assoc. Provost for Academic Affairs		Date 11/11/08
Faculty Senate		Date
Board of Regents		Date

Entered Banner _____

Entered Catalog _____

For Registrar's Office ONLY:

Copies Mailed _____

Catalog: pg 513:

Community Health Concentration:

Mission: The mission of the Community Health Concentration is to prepare students for leadership roles in population-based disease prevention and health promotion in public and private settings. The philosophical foundation of the concentration relies on a community capacity building, empowerment approach to promote social justice and equity in health. The concentration is designed for students with prior experience, education, or interest in community-focused public health practice or research that values diversity, self-reflection and critical analysis of evidence-based practice and practice-based public health approaches.

Description: Guided by the social-ecological approach, the Community Health Concentration emphasizes training in the basic core principles and skills of community needs and assets assessment, program planning, implementation and evaluation, and policy development and their application to a broad array of health and social issues in population and community-based public health disease prevention and health promotion. The purpose of this concentration is to provide students with the multi-disciplinary knowledge and skills necessary to plan, implement, and evaluate public health programs at multiple levels of the social-ecologic framework.

Requirements:
Students completing the Community Health Concentration will have taken the core MPH requirements plus at least 13 units specific to the concentration. The Concentration course requirements follow:

1. MPH CH Core Curriculum: Total Units: 18-19
   PH 501 Principles of Public Health (3) F
   PH 502 Epidemiologic Methods I (3) F
   PH 506 Environmental / Occupational Health (3) S
   Stat 538 Biostatistical Methods I (3)
   PH 508 Theory & Practice Seminar – Part I (Mandatory in first semester) (CR/NC) (1) F
   PH 509 Theory & Practice Seminar – Part II (Mandatory in second semester) (CR/NC) (1) S
   PH 511 Writing for the Public Health Professional (Mandatory in first semester) (CR/NC) (1) F
   PH 512 Proposal Writing Workshop (Mandatory for Professional Paper or Thesis Students Only) (CR/NC) 1 F
   PH 522 Public Health Seminar (1 credit for year-long course)
   PH 598 Community Intervention Oriented Practicum Experience: Minimum Units – 2

2. Community Health Concentration Required Curriculum: Total Units – 12
   PH 552 Public Health Program Planning (3) (Every other Fall)
   PH 555 Public Health Evaluation Methods (3) (Every other Spring)
   PH 505 Social and Cultural Theories and Models: Community Interventions (3) (Every other Fall)
   PH 510 Public Health and Health Care Management (3) (Every other Spring)

3. Community Health Concentration selected electives, choose one course:
   PH 564 Public Health & Health Care Communication (3)
   C&J 550 Health Communications (3)
   PH 554 PH Policy, Politics and Advocacy (3 credits required for CHC students)

4. One other elective with community health intervention skills. The following are recommended. Other options require guidance from your advisor (minimum 2 credits):
   PH 580 Community Assessment / Research Field Methods (3)
   PH 607 Popular and Empowerment Education (2) (Every other spring)
   PH 507 Health Care Systems (3) (Every other spring)
   PH 577 PH Leadership in Policy and Advocacy (2 credit option required for CH students)
   PH 564 Rural Health Issues (3)
   PH 560 CBPR Research Methods (to be added)
   Selected health communication courses within the Department of Communications and Journalism

5. Culminating Experience: Choose One
   PH 597: Public Health Integrative Experience (2)
   PH 596: Professional Paper (3)
   PH 599: Masters Thesis (1-6 hours per semester)

NEW COURSE REQUEST—FORM B

- **Allow at least 6 months to complete the entire approval process.**
- **Please refer to the Form B Instructions at www.unm.edu/~unmreq**
- **Four sets of forms must be collated and submitted.**

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ROUTING (All Four Collated Sets)
1. Department Chair
2. College or School Curricula Committee
3. College or School Faculty (if necessary)
4. College or School Dean/Dean of Instruction
5. Office of Registrar—Catalog
6. Director of Relevant Library
7. FS Graduate Committee (graduate courses)
8. FS Undergraduate Committee (undergraduate courses)
9. FS Curricula Committee
10. Associate Provost for Academic Affairs

RECEIVED

Submission Date 08 / 05 / 20 08

Name of Faculty Member Initiating Request Burke Gurney

Initiator's Position / Title Associate Professor

College School of Medicine

Department Orthopaedics and Rehabilitation

Phone 2-6850 Email bgurney@salud.unm.edu

Branches Only – course is Type 1 ☐ Type 2 ☐ Type 3 ☐

A. A1. Attach four copies of a precise, complete catalog listing of the proposed new course following the current format used in the printed UNM catalog. The listing must include the course subject code and the course number, long title, credit hour value, and course description (no more than 35 words). To indicate graduate credit for course numbers outside of 500-699, an asterisk (*) should precede the course number.
A2. Attach four copies of a course syllabus and bibliography (include suggested course text and schedule of topics covered in the course).

B. B1. Course Subject Code PT B2. Course Number 351 B3. Proposed Effective Term Spring 2009

B4. Long Course Title (up to 100 letters, including spaces):

Clinical Exercise Physiology

match long to maximize 30 character limit BB

B5. Proposed Short Course Title (up to 30 letters, including spaces):

C l i n E x P h y s

B6. College School of Medicine B7. Department Orthopaedics and Rehabilitation B8. CIP Code ______
(assigned by Assoc. Provost for Academic Affairs)

B9. Credit Hours				
	Fixed Credit	Variable Credit Low	Or / To	High
Credit Hours	3			
Lecture Hours	3			
Lab Hours	0			

B10. Repeat Rules
Is the course repeatable for credit? Yes ☒ No ☐
- The course may be repeated 99 times (*exclusive of the first time*).

AND / OR
- The course may be repeated for ______ hours (*inclusive of the first time*)

B11. Course Level (check one only): UG ☒ GR ☐ Law ☐ PharmD ☐ MedD ☐
☐ Graduate credit for course numbers outside of 500-699 (requiring an asterisk before the number)
If graduate credit is available for courses numbered outside of 500-699, complete section F1.

B12. Grade Options: The standard grading scale in the catalog will be applied to this course. Yes ☒ No ☐
If no, select the appropriate option and complete section F2.
☐ The grade scale will be exclusively CR/NC.
☐ The grade scale will be an alternative to the standard scales in the catalog.

B13. List all schedule type(s) (may be more than one):

a. ~~online~~ lecture b. ______ c. ______ d. ______ e. ______

C. C1. Co-requisites to this course: a. _____ b. _____ c. _____

If this course is a new co-requisite to those listed, you must submit a Form A for each course that is affected.
Note: Please see the instructions for information on one-way vs. two-way co-requisites.

C1a. If the co-requisite course exists in another department, the co-requisite offering department must approve it as well.

Department	a.	b.	c.
Course			
Chair Name			
Chair Signature			

C2. Crosslisted courses: Complete the table, including signatures from all departments offering the crosslisted courses.

Department	a.	b.	c.	d.	e.	f.
Subject Code & Number						
Chair Name						
Chair Signature						

C3. Course Fees: Yes ☐ No ☒ If yes, attach a completed, signed *Special Course Fees Approval Form* from the office of the Associate Provost for Academic Affairs.

C4. Is this course *elective* ☒ or *required* ☐ for a degree program? If *required*, **submit a Form C** as well.

C5. Branches Only: Is this course: Occupational ☐ Technical ☐ Academic ☐ *(Please check one)*

D. D1. Restrictions. List any restrictions placed on students for registration in any section of this course. If none, write "None" in the box.

None

D2. Pre-requisites for Course: If the course has pre-requisites, list all of them, including course subject code and course number or test name and test score for each one. Be sure to include the appropriate conjunction (and / or) between each item and between any sets of pre-requisites. If any of the pre-requisites come from another department, have the department chair sign to acknowledge awareness of those relationships. If none, write "None" in the box.

BIOL 237 and BIOL 238

For courses outside the offering department to be used as pre-requisites:

_____ Department Chair Signature

_____ Department Chair Signature

_____ Department Chair Signature

E. E1. Does this course duplicate any content in the current UNM Catalog? Yes ☐ No ☒

If yes, complete the following table:

Department Name	Duplicate Course	Department Chair	Chair Signature	Check One:	
				AGREE TO DUPLICATE	
				DISAGREE TO DUPLICATE	
				AGREE TO DUPLICATE	
				DISAGREE TO DUPLICATE	
				AGREE TO DUPLICATE	
				DISAGREE TO DUPLICATE	

E2. Has this course been offered as a topic course? Yes ☐ No ☒
If yes, in which term(s), and to what average enrollment? _____

E3. Will this course replace a deleted course? Yes ☐ No ☒ If yes, which one? _____

If yes, and the deleted course is 100 or 200 level, has this change been discussed with all the branch campuses that offer this course? Yes ☐ No ☐

Provide a statement below or attach a memo explaining how this replacement will impact Branch campuses and programs.

F. F1. Justification for Graduate Credit: If the course is numbered outside of 500-699, indicate the nature of additional work to be required of graduate students.

F2. Justification for CR/NC or Alternative Grading Scale (include scale in justification):

G. G1. Budgetary and Faculty Load Implications. All new courses have such implications, even when replacing a deleted course.

a. Justification for offering the course:

This course will be a prerequisite for students applying to the UNM PT Program to prepare them for the content in that Program.

b. Impact on long-range planning for unit, school / college, and university:

This course will continue to be used as a prerequisite for the PT Program.

c. Budget and faculty load data:

Burke Gurney, Associate Professor, will be the sole teacher of this course.

G2. Relevant Library Impact Statement: Complete below or attach a signed memo.

Since this is an online course, there should not be a relevant library impact.

_____ Name of Library

_____ Name and Signature of Librarian

H. Required Signatures:

Office	Signature	Date
1. Department Chair / Program Director	Susan Queen, PT, PhD (Signature Authority curriculum)	8.5.08
2. College or School Curricula Committee		
3. College or School Faculty (if necessary)		
4. College or School Dean / Dean of Instruction	Ellen M Cosgrove MD	8/18/08
5. Office of Registrar—Catalog	Elizabeth A. Bacon	08/22/08
6. Director of Relevant Library	Carl Health Sciences Library	8/11/08
7. FS Graduate Committee (graduate courses)		
8. FS Undergraduate Committee (undergraduate courses)	Carol J Burger	10/4/08
9. FS Curricula Committee		11-7-08
10. Associate Provost for Academic Affairs	Wynn M. Gay	11/11/08

After securing departmental approval, send this form and all attachments, ***collated into 4 sets of documents,*** to the Registrar's Catalog Office, which retains the original and returns copies to the department and college office.

For Registrar's Office Use ONLY *(After approval by Faculty Senate Curricula Committee):*

Entered in Banner _____ Entered in Catalog _____ Copies Mailed _____

Attributes: 1. _____ 2. _____ 3. _____ 4 _____

Grade Modes _____

Course Description – PT 351 Clinical Exercise Physiology

The physiology of the human body during exercise with emphasis on the cardiopulmonary and neuromuscular systems. Overview of selected pathological conditions of these systems relevant to the practice of physical therapy

Syllabus – Clinical Exercise Physiology – PT 351

Burke Gurney, PT, PhD, OCS
Associate Professor
UNM SOM
Physical Therapy Program

PT 351L

Exercise Physiology
Physical Therapy Program
University of New Mexico -School of Medicine
Credits: 3 hours

Instructor: Burke Gurney. PT, PhD, OCS

Purpose and Prerequisites:
PT 551 will provide students with an in-depth analysis of the cardiopulmonary and musculoskeletal systems in relation to both acute and chronic exercise as well as an overview of selected pathological conditions that affect these systems.

Prerequisite: Two semesters of Anatomy and Physiology Course from an accredited institution of higher education (UNM – BIOL 237 and BIOL 238).

Course Description: This course includes principles of exercise physiology as they relate to the various systems of the body. There is an emphasis on application of these principles when designing specialized exercise programs for effective patient care. Basic cardiopulmonary pathology and the role of exercise in prevention are also addressed. This course builds on the fundamental organization introduced in basic human physiology, a prerequisite for this program.

Required Texts:
1. Exercise Physiology 5th Edition. McArdle. Katch. Katch
2. Basic Electrocardiography, Scheidt. Novartis
3. The text from your human physiology class.

Recommended Texts:
1. American College of Sports Medicine. ACSM's Guidelines for Exercise Testing and Prescription. 7Th Ed. Williams and Wilkins. Baltimore. 2006.
2. Mark's Basic Medical Biochemistry, 2nd Ed. Marks. Marks. Smith. Williams and Wilkens. Baltimore. 2007 or comparable basic biochemistry book.

General Course Objectives
1. Illustrate or describe the biochemical regulation of energy metabolism applying the laws of thermodynamics.
2. Describe the acute and chronic effects of exercise and exercise recovery on the various systems of the body, with emphasis on endocrine, cardiovascular, pulmonary and musculoskeletal systems.
3. Describe the effects of select pathological conditions on the above systems.
4. Describe the role of exercise in preventing and minimizing these pathologies and promoting health.
5. Perform laboratory skills including clinical exercise stress testing, anthropometry, estimation of VO2max, pulmonary function, isokinetic testing, and estimating % body fat.

6. Use the pertinent information to help determine a realistic plan of care for your patients.

Schedule of Classes/Outline of Content

PT 351 **EXERCISE PHYSIOLOGY**

Course Content and Calendar

Week	CONTENT
1	Bioenergetics and Enzymes
2	Fasting-state Biochemistry – liver, muscle and adipose
3	Fed-state Biochemistry – liver, muscle and adipose
4	Exercise-state Biochemistry – liver, muscle and adipose
4	**TEST** on weeks 1-4
5	Muscle Physiology and Properties
6	Neuromuscular Function
7	Metabolic Adaptations to Exercise
8	Ergometry and Calorimetry
8	**TEST** on weeks 5-8
9	Measuring and Estimating VO_2 max
10	Cardiovascular Function
11	Normal ECG
12	Abnormal ECG
12	**TEST** on weeks 9-12

13	Pulmonary Physiology/Function
14	Nutrition and Exercise
15	Body Composition
16	Exercise Testing - The Graded Exercise Test (GXT)
16	TEST on weeks 13-16

Comprehensive Test

Objectives -Exercise Physiology -PT 351

Section 1 -Bioenergetics and Enzymes

1. Define the two laws of thermodynamics and apply them to biological systems.
2. Contrast endergonic with exergonic reactions and give examples of each in the human body.
3. Interpret the absolute and standard free energy equations including Keq and mass action.
4. Categorize a reaction as exergonic or endergonic based on its ΔG value.
5. Define general examples of anabolic and catabolic systems in the body.
6. Describe the basic structure, function, and nomenclature of enzymes, including the role of cofactors, temperature, pH, enzyme concentration and substrate concentration.
7. Define Vmax, Km in enzyme systems.
8. Define an isoenzyme and differentiate between the forms of isoenzymes in relation to Km.
9. Differentiate between allosteric and non-allosteric (Michaelis-Menton) enzymes in terms of velocity profiles, substrate concentrations, and regulation of biochemical pathways.

Section 2 -Fasting State in liver, muscle and fat cells

1. Describe the biochemistry of the muscle cell during the fasting state including the role of glucagon, alanine and lactate production.
2. Describe the biochemistry of the muscle cell during advanced fasting and starvation.
3. Describe the biochemistry of the liver cell during the fasting state including the role of glucagon, the processes of glycogenolysis, gluconeogenesis, and cholesterol synthesis.
4. Describe how the liver can donate glucose to the bloodstream whereas muscle cannot.
5. Explain the liver's role in the production of ketone bodies.
6. Describe the basic sequence of cholesterol synthesis in the liver.
7. Describe the basic process of atheroma formation.
8. Describe the biochemistry of the adipose cell during the fasting state including the role of lipolysis.

Section 3 -Fed State in liver, muscle and fat cells

1. Describe the biochemistry of the muscle cell during the fed state including the role of GLUT 4, hexokinase, PFK, glycogen synthesis and storage.
2. Describe the biochemistry of the liver cell during the fed state including the role of GLUT 2, and PF, as well as glycogen synthesis and storage.
3. Describe the process of FFA and glycerol synthesis in the liver, and the eventual production of TAG's (lipids) from these constituents.
4. Describe what a lipoprotein is, what it is composed of, the two sources including liver production, and the "life cycle" various forms of lipoproteins in the body.
5. Contrast the role of PFK in the muscle and liver in the fed state.
6. Describe the biochemistry of the adipose cell during the fed state including the role of GLUT 4 and TAG synthesis.
7. Describe the general process of protein synthesis in all three cell types.

Section 4 -Exercise biochemistry in liver, muscle and fat cells

1. Describe the biochemistry of the muscle cell during exercise including the role of glycogenolysis and glycolysis, in supplying the muscle cell with glucose; contrast this supply with blood glucose supplies.
2. Describe in general terms the process of ATP production from glucose both aerobically and anaerobically including the following pathways: glycolysis, pyruvate dehydrogenase, TCA cycle, electron transport chain, oxidative/phosphorylation.
3. Define the role of lactate in anaerobic ATP production.
4. Describe the process of beta oxidation in muscle during the exercise state.
5. Contrast the three energy supply systems of the muscle cell (phosphogen, glycolysis, and cellular respiration) in terms of rate and duration of ATP production and intensity of exercise.
6. Contrast fit verses unfit individuals in terms of the energy supply systems.
7. Describe the role of amino acids in muscle cells during exercise.
8. Describe the biochemistry of the liver cell during exercise and contrast it to the role of the liver cell during fasting.
9. Describe the biochemistry of the adipose cell during exercise including the role of lipolysis.

Section 5 -Muscle Physiology and Properties

1. Describe the unique properties of muscles including excitability, etc.
2. Contrast the excitability of muscle to artificial stimulation to that of nerve tissue.
3. Describe of illustrate the macrostructure and microstructure of muscle from the entire muscle to myocytes to basic structure of actin and myosin.
4. Describe, in correct order, the biochemical events resulting in muscle contraction starting with motor plate activation and ending with cyclical contraction.
5. Differentiate the structure and function of smooth muscle and skeletal muscle.
6. Illustrate the components of the motor unit including the alpha motor nerve and muscle cells it innervates.
7. List and describe the factors that affect muscle force.
8. Illustrate the relationship between 1RM and repetitions.

9. List and describe the factors that increase strength.
10. Use the DAPRE technique to calculate the starting weight and weight increase increments for a case study.
11. List and describe the factors that increase endurance.
12. List and describe the factors that increase power.
Define plyometrics and give an example of a plyometric activity.
13. Explain why sarcopenia occurs during aging including the rate of fiber loss and the role of the motor neuron in that loss.
14. Describe the changes that take place in muscle during aging at a tissue, cellular, and biochemical level.
15. Define specific tension and how aging affects it.
16. Construct a strength training protocol for the aging patient.
17. Describe the causes and consequences of osteoporosis.
18. Describe the role of exercise in prevention and reversal of osteoporosis.
19. Describe the effects of aging on collagen, GAG's and the role of glycosamine, chondroitin, and cosamine supplementation.

Section 6 -Neuromuscular function
1. Describe the process of nerve excitation starting from the alpha motor neuron, to the secretion of its neurotransmitter, to the action potential to sarcoplasmic reticulum.
2. Describe the basic functions of the autonomic nervous system including both the sympathetic and parasympathetic divisions.
3. Differentiate between the various neurotransmitters and their receptors including acetylcholine, epinephrine, norepinephrine and their affect on the heart and lungs.
4. Describe the anatomical and physiological characteristics of the three types of motor units in terms of excitability, conduction velocities, twitch responses, fatigue curves, fiber diameters, biochemical capacities, etc.
5. Describe how fiber type proportions are determined in the human body.
6. Describe the basic procedure of muscle biopsy and staining, and the problems with muscle biopsy methods for determining fiber type proportion.
7. Discuss the role of fiber type recruitment with different types of exercise, i.e. aerobic verses anaerobic (weight lifting type) exercise.
8. Describe the relationship of fiber type % and exercise performance including torque production, speed of contraction, etc.
9. Relate fiber type proportions to elite athletes.
10. Explain the role of training and detraining on fiber type proportion, muscle hypertrophy and hyperplasia.

Section 7 -Metabolic Adaptations to Exercise
1. Define $V0_2$ and VO_2 max, and their measure in both absolute and relative units.
2. Define steady state $V0_2$ during incremental exercise.
3. Give ranges of$V0_2$ max from the critically ill to the elite athlete.
4. Describe differences in VO_2 relative to exercise mode and sex.
5. Describe the concept of % VO_2max and its relationship to other physiological measures such as HR, SV, etc.

6. Define lactate threshold, and interpret a graph relating blood or muscle lactate to work load ($V0_2$) including identifying the lactate threshold.
7. List causes of lactate accumulation.
8. Define steady state exercise.
9. Draw and interpret a graph relating $V0_2$ to workload including oxygen deficit, and exercise at light, moderate, and maximal levels of VO_2.
10. Describe energy sources during exercise including prolonged exercise.
11. Define O_2 debt or EPOC as it relates to the recovery phase of exercise.
12. Describe glycogen synthesis as it relates to exercise recovery.
13. Differentiate between anaerobic and aerobic exercise in terms of chronic muscle adaptations including mitochondrial densities, capillary densities, lactate threshold, glycogen concentrations, glycogenolysis and glycolysis rates, fat burning capacity, creatine phosphate levels, and muscle buffering capacities.

Section 8 -Ergometry and Calorimetry
1. Define ergometry, work, and power as they are used in exercise physiology and convert work and power between units.
2. Compute, given rpm and load, the power, and, given duration, the work done with a cycle ergometer.
3. Define efficiency, and, given a work or power output, calculate the energy input.
4. Explain the use of treadmills as an ergometer including the difficulties of accurate measures and the use of the ACSM equations in estimating work and power.
5. Define calorimetry and apply the first law of thermodynamics to explain how bomb calorimetry will allow computation of energy in food.
6. Contrast direct and indirect calorimetry, including differentiating between open and closed circuit indirect calorimetry.
7. List and describe the data provided from indirect calorimetry.
8. Contrast RQ and RER and the problems inherent with RER.
9. Contrast the consumption of fat and CHO in relation to RER, kcal/g, and kcal/L O_2.
10. Given a thermal equivalents table, RER, time, and VO_2, calculate work (energy consumption) and power.
11. Given the information in objective 10, compute the % kcal from fat, CHO, total kcal and grams burned from fat and CHO.
12. Describe the systems used in indirect calorimetry, contrasting time averaged and breath-by-breath systems.

Section 9 - Estimating VO_2max
1. Define VO_2max and differentiate between $V0_2$max and VO_2peak.
2. Review the criteria for $V0_2$max.
3. Differentiate between direct and indirect measures of $V0_2$max.
4. Given the ACSM prediction equations and exercise intensity, estimate $V0_2$max for bicycle and treadmill exercise.
5. Differentiate between maximal and submaximal exercise testing.
6. List assumptions for submaximal exercise testing including standard error of estimate.
7. Given 2 submaximal exercise intensities and corresponding HRs, calculate estimated VO_2max using metabolic calculation table (slope method).

8. Describe the use of field tests to estimate exercise tolerance, including their limitations.
9. Calculate exercise intensity using the %VO_2 method and the HR methods (% HRmax heart rate and heart rate reserve [Karvonen] methods), and the perceived rate of exertion (PRE) method.
10. Describe the Rating of Perceived Exertion (RPE or Borg Rating).
11. Discuss the concepts of exercise duration and frequency.
12. Describe the estimated rate of progression of VO_2 with an exercise program.

Section 10 -Cardiovascular Function

1. Contrast the central and peripheral components of VO_2.
2. List and describe the various components of blood including hemoglobin, hematocrit, WBCs, platelets, Hemoglobin A1C, bilirubin, creatine kinase, ESR, troponin, BUN, Creatinine, blood glucose, plasma.
3. Recognize the given normal and abnormal lab values (don't worry about WBC differential counts).
4. Describe and contrast osmolarity and osmolality including homeostatic responses of the body to dehydration and hyperhydration.
5. Describe the unique characteristics of the arteries, arterioles, and capillaries including the vasodilatory and vasoconstriction triggers of arterioles.
6. Describe the role of the venous system in venous return.
7. Describe blood pressure homeostasis,
8. Describe the structure, autonomic control, and contraction characteristics of the heart.
9. Contrast the right and left circulatory halves of the heart in terms of region perfused, blood pressures, and muscle mass, etc.
10. Describe the blood supply to the heart.
11. Describe the components of the cardiac cycle.
12. Define heart rate (HR), end diastolic volume (EDV) stroke volume (SV), ejection fraction (EF), cardiac output (CO) and their relationship.
13. Describe the Fick Equation and its relationship to CO and VO_2.
14. Describe the various diagnostic tools used by physicians in diagnosing heart problems including echocardiography, and cardiac catheterization.
15. Describe the acute responses of the heart to exercise including regulation of the cardiac cycle through chronotropic and inotropic increases.
16. Contrast the Starling Law verses contractility.
17. Recognize the HR, SV, CO, and peripheral extraction responses to exercise.
18. Given all of the components of the Fick equation, (maximal HR, SV, peripheral extraction, hemoglobin concentration), calculate VO_2max.
19. Contrast UE and LE exercise in relation to submaximal workload and VO_2max.
20. Describe the body's reaction to isometric exercise.
21. Explain the blood flow paradox using differential blood flow and increased O_2 extraction.
22. Relate blood distribution with exercise mode, comparing VO_2 with UE and LE exercise.
23. List the chronic adaptations of the heart and blood to endurance exercise.

24. Describe the effect of aging on the cardiovascular system including heart, lung capacity, pulmonary respiration O2 extraction, and blood.
25. Describe the ACSM criteria for cardiovascular training in the elderly individual.

Section 11 -Normal Electrocardiography (ECG, EKG)
1. Differentiate between a 3 lead and a 12 lead ECG.
2. Describe the relationship between electrical activity of the heart (current flow) and lead axis.
3. Describe the normal sequence of cardiac depolarization and repolarization and draw the depolarization sequence on a diagram of the heart.
4. Given an electrocardiograph, measure the time interval and microvolt activity of each stage.
5. Recognize that HR can be manually measured by counting the number of boxes between similar ECG events (e.g. from R wave peak to R wave peak).
6. Name the waves, segments, and intervals in a normal ECG.
7. Recognize normal cardiac electrical axis.

Section 12 -Abnormal ECG
1. List the automaticity (autorhythmicity) in beats per minute (bpm) of the SA node, the atria, the AV node, and the ventricle.
2. Given an ECG, differentiate between a normal ECG (normal sinus rhythm) and the following supraventricular rhythms: sinus bradycardia, sinus tachycardia, sinus arrhythmia, atrial rhythm, wandering atrial pacemaker, atrial flutter and atrial fibrillation.
3. Given an ECG, differentiate between a normal ECG and the following ventricular rhythms: ventricular tachycardia, ventricular fibrillation.
4. Given an ECG, recognize a first degree and third degree atrioventricular conduction defects (heart blocks).
5. Given an ECG, differentiate between a normal ECG and the following unusual beats: Premature atrial contraction, premature junctional (nodal) contraction, and premature ventricular contraction.
6. Recognize and describe right and left atrial and ventricular hypertrophy including causes of each.
7. Given an ECG, differentiate between a normal ECG and: myocardial ischemia.
8. Recognize the three types of ST segment depression and the related prognosis.
9. Given an ECG, differentiate between a normal ECG and: subendocardial and transmural myocardial infarct including the related prognosis.
10. Given an ECG, recognize approximate location of a myocardial infarct including anterior, inferior, and anterolateral.
11. Appreciate that the overall interpretation of a 12 lead ECG by a physician involves a systematic approach of many separate steps.

Section 13 -Pulmonary Physiology/Function
1. Describe the anatomy and mechanics of the lungs as it pertains to ventilation, including conducting zone, respiratory zone, alveoli, surfactant, and pleural cavity.
2. Differentiate between minute ventilation and alveolar ventilation.

3. Describe the regional distribution of ventilation and perfusion and the ventilation/perfusion (V/Q) ratio as well as V /Q mismatch/compensation.
4. Explain the use of a V/Q scan in helping a physician diagnose a pulmonary embolism or airway obstruction.
5. Describe the roles of the alveoli and surfactant in external respiration.
6. Use Dalton's law to compute the partial pressures of oxygen and carbon dioxide in the atmosphere, lungs.
7. List the blood partial gas pressures.
8. Describe the carrying capacity of the blood.
9. Use the oxyhemoglobin dissociation curve to explain the change in hemoglobin affinity for oxygen in the lungs verses the working and nonworking muscle including the Bohr Effect.
10. Contrast the dissociation curves of hemoglobin and myoglobin in explaining how oxygen moves from the red blood cell to the muscle cell.
11. Describe carbon dioxide transport from the cells to the lungs via the RBC's including the Haldane Effect.
12. Explain how the lungs and kidneys help maintain pH homeostasis in the body.
13. Describe the acute adaptations of ventilation during exercise including H^+ as the primary player.
14. Define ventilator threshold and explain why it can be used as an indirect measure of lactate threshold.
15. Describe the chronic adaptations of the lungs to exercise.
16. Explain the basic operations of a spirometer and its role in measuring static lung parameters including the following lung volumes and capacities: tidal volume, residual volume, total lung capacity, inspiratory reserve, expiratory reserve, forced vital capacity.
17. Describe the use of helium dilution in determining residual volume.
18. Describe forced expiratory volume (FEV) and $\%FEV_1$ (a dynamic lung measure) as a measure of obstructive lung disease.
19. Describe the use of peak flow meters in measuring expiratory flow in people with asthma.
20. Describe the use of a pulse oximeter in measuring arterial hemoglobin oxygen saturation.
21. Contrast obstructive and restrictive lung diseases including their presentation using both static and dynamic lung measures.
22. Describe pulmonary edema including its causes.

Section 14 -Nutrition and Exercise

1. Describe the demographics, disease association, types and causes of obesity.
2. Describe the set point theory and its proposed role in obesity.
3. List the key neuropeptides and hormones that influence weight homeostasis including leptin, neuropeptide Y, galanin, and insulin.
4. Describe each of the three tiers in weight loss intervention/management.
5. Differentiate between BMR and RMR.
6. Explain the food pyramid with emphasis on the Harvard food pyramid.
7. Recognize the water and fat soluble vitamins including their alternative names and their roles in metabolism.

8. Describe the role of minerals in basic body metabolism.
9. Describe the role of radical oxygen species in oxidative stress of the body, and the role of antioxidants in minimizing the stress.
10. Describe the role of sports drinks and water in hydration as they relate to gastric emptying and osmolality homeostasis.
11. Describe the effect of stomach contents on gastric emptying.
12. Discuss different ergogenic aides, both alleged and real.
13. Describe the process of designing a weight management program including estimating RMR, and other caloric expenditures.
14. Explain the benefits of both aerobic and weight lifting exercise in weight loss.
15. Describe the health considerations of fad diets including high fat and high protein, and skipping meals.

Section 15 -Body Composition

1. Define the following terms: fat free body, % body fat, fat mass, body density.
2. Explain why it is necessary to quantify your patient's % body fat.
3. Identify the normal range of % body fat for adult men and women.
4. Describe hydrodensitometry including the assumptions associated with it.
5. Explain why hydrodensitometry isn't used all the time.
6. Describe Dual energy X-ray absorpitometry (DEXA) and its use in both body composition and osteoporosis.
7. Describe the method for determining % body fat with skin calipers called skinfolds (SKF) including the standard error of estimate.
8. List the assumptions and limitations associated with skin fold measurement.
9. Describe bioelectric impedance (BIA) including the standard error of estimate.
10. Differentiate the type of person SKF might be used on verses BIA.
11. Define anthropometric measure including body mass index (BMI) and waist-hip-ratio (WHR) and explain why they are poor measures.
12. Describe near-infrared interactance and explain why it is a poor measure.

Section 16 - Exercise Testing -The Graded Exercise Test (GXT)

1. Define GXT (stress testing) including the usual outcome measures.
2. Differentiate between the physician's reasons and the physiologist's reasons for performing a GXT.
3. Define sensitivity and specificity as it pertains to GXT.
4. List and define the criteria of a positive stress test used by MD's to diagnose suspected heart disease.
5. List and define the criteria for determining prognosis/severity of known heart disease.
6. Describe the signs and symptoms of angina pectoris as well as the 6 necessary questions you would ask a patient if you suspect it.
7. List "other" reasons for doing a stress test.
8. Given a MET level table and a patient's safe MET level, determine if they can return to work.
9. Elaborate on why non MD's do stress testing.

10. Describe the process of screening a patient for a stress test including checking for major symptoms and signs suggestive of cardiopulmonary (CP) disease and determining if they have coronary risk factors.
11. Recognize the absolute and relative contraindications of GXT, both cardiac and non-cardiac.
12. Discuss the criteria for a "good" GXT protocol for both MD's and non-MD's, giving examples of protocols and their limitations.