

Brooklyn College
The City University of New York
Department of Physical Education and Exercise Science
Exercise Physiology Laboratory
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Lab Requirements

Course Description: The application of physiological principles toward an understanding of the administration and interpretation of various exercise tests in preparation for the formulation of the exercise prescription.

Course Objectives:

1. Become familiar with the equipment and physiologic concepts used in the assessment of human performance
2. Students will be able to apply standardized testing procedures for the evaluation and assessment of the high and low exercise risk individual
3. Provide the opportunity to apply underlying physiology principles to the administration and interpretation of exercise tests
4. Supplement the lecture and textbook material with relevant laboratory experiments
5. Become proficient with the comparative scientific data in the healthy population for the preparation of case study reports.

Recommended Text: There is no laboratory manual for the course. The laboratory experiments will be posted on the website prior to the scheduled lab. You are expected to download the material and bring it with you to lab on the scheduled date. Extra copies will not be available.

Laboratory Safety Rules and Guidelines:

1. **ABSOLUTELY NO EATING OR DRINKING ALLOWED IN THE LABORATORY. ELECTRONIC DEVICES (e.g. CELL PHONES AND PAGERS MUST BE TURNED OFF)**
2. Never use any equipment unless you are thoroughly trained in the method of operation. If unsure about something ask for help.
3. Laboratory equipment is expensive and difficult to replace. Please do not use any equipment unless instructed to do so.
4. Subjects performing on the treadmill and ergometers are to be supervised by the laboratory group at all times.
5. Please keep the laboratory in good condition by cleaning the equipment and the laboratory area when you are done.
6. Use protective gloves when handling and or coming into contact with body fluids.
7. If you have an underlying health problem which either precludes you from exercising or warrants caution when performing exercise, you must inform the instructor at the beginning of the term.

Class Requirements

Laboratory Sessions

You **MUST** attend all laboratory sessions. This is mandatory due to the nature of the class. An unexcused absence will result in a 10pt deduction for each of the first two absences and 15 point deduction for each additional absence. If you cannot attend a lab you must call or e-mail the instructor ahead of time. Medical or family emergencies and deaths will only be excused with written medical documentation or a copy of the funeral arrangements. All laboratory sessions begin on time so make sure you are prompt. Lab report grades will reflect participation. If you are late, two (2) points will be deducted from your participation grade for every lateness.

If you are participating in the exercise portion of the laboratory you must come to class dressed appropriately for exercise. You must wear sneakers and comfortable clothing. You are not allowed to exercise unless you are properly dressed to do so.

Everyone within your lab group should have an opportunity to experience every role designated within the group (i.e. subject, data recorder, timer, equipment operator etc). Each group member should obtain a copy of all data collected within their group and specific roles should be designated at the beginning of the experiment.

Laboratory Reports

A laboratory session is scheduled at specific times and dates (refer to the syllabus). A corresponding full case study report will be due approximately 1 week following the lab. Although the experiments will be performed in groups, each individual is required to submit a case study report for the individual undergoing the testing. The report must be written in your own words. All reports must be typed and double spaced. All graphs must be computer generated using Excel or some other program, **handwritten graphs will not be accepted**. Photocopies will not be accepted. See the sample case report format for details and the specifics for each lab write-up. **Late case study reports will not be accepted**. If you did not attend a lab, you will not receive the points for the corresponding lab report.

Student Behavior

Every student is expected to treat the instructors and fellow students with respect. Students are expected to be prepared for each laboratory and lecture. You are expected to conduct yourself as honest, responsible and law-abiding members of the academic community.

Plagiarism

Paraphrasing or quoting another's work without citing the source is a form of academic misconduct. Even inadvertent or unintentional misuse or appropriation of another's work (such as relying heavily on source material that is not expressly acknowledged) is considered plagiarism. If you have any questions about using and citing sources, you are expected to ask for clarification.

Students with disabilities

If you have a documented disability for which you are may be requesting an accommodation, you are encouraged to inform the instructor and your undergraduate advisor.

Tentative Laboratory Schedule

Tentative Laboratory Dates			Report Due Dates		Projects
Th	9/13	Lab 1 Pre-participation screening	Lab 1	9/27	
Th	9/27	Lab 2 Blood pressure and heart rate	Lab 2	10/4	
Tu	10/2	Lab 3 YMCA cardiovascular Test	Lab 3	10/9	1 due
Tu	10/9	Lab 4 Maximal exercise testing	Lab 4	10/18	
Tu	10/16	Lab 5 Body composition lab	Lab 5	10/25	2 due
Tu	10/30				3 due
Th	11/1	Lab 6 Muscle strength and endurance	Lab 6	11/6	
Th	11/8	Lab 7 Flexibility and low back	Lab 7	11/15	4 due
Tu	11/27	Lab 8 Exercise testing the elderly client	Lab 8	11/29	5 due
Tu	11/29	Lab 9 Osteoporosis laboratory	Lab 9	no write up	
Tu	12/4	Lab 10 What would you do?	Lab 10	no write up	
Th.	12/11	Lab 11 Mindful exercise	Lab 11	no write up	

Unless otherwise instructed, class will meet in the teaching laboratory located in 423 WQ

ALL LABORATORY EXERCISES WILL BE POSTED ON THE CLASS WEBSITE PRIOR TO THE SCHEDULED SESSION. PLEASE MAKE SURE THAT YOU DOWNLOAD AND PRINT THE LABORATORY EXERCISE PRIOR TO CLASS. COPIES WILL NOT BE AVAILABLE.

It is most useful to bring a calculator with you for the lecture and laboratory. Programmable calculators and cell phones are not acceptable. In addition, if you are pursuing this profession, it is suggested that you purchase your own stethoscope. I will provide one to you for the laboratory sessions.

CLASS WEBSITE: <http://themcr.com/4231>

ITEMS TO INCLUDE IN THE CASE STUDY

Demographic Factors

Age
Gender
Ethnicity
Occupation
Height
Body weight
Family history of coronary heart disease

Medical History

Present symptoms

Dyspnea or shortness of breath
Angina or chest pain
Leg cramps or claudication
Musculoskeletal problems or limitations
Medications

Past history

Diseases
Injuries
Surgeries
Lab tests

Lifestyle Assessment

Alcohol and caffeine intake
Smoking
Nutritional intake/eating patterns
Physical activity patterns and interests
Sleeping habits
Occupational stress level
Mental status/family lifestyle

Physical Examination

Blood pressure
Heart/lung sounds
Orthopedic problems/limitations

Laboratory Tests (Ideal or Typical Values)

Triglycerides (<150 mg·dl⁻¹)
Total cholesterol (<200 mg·dl⁻¹)
LDL-cholesterol (<130 mg·dl⁻¹)
HDL-cholesterol (>40 mg·dl⁻¹)
Total cholesterol/HDL-cholesterol (<3.5)
Blood glucose (60-110 mg·dl⁻¹)
Hemoglobin: 13.5-17.5 g·dl⁻¹ (men)
11.5-15.5 g·dl⁻¹ (women)
Hematocrit: 40-52% (men)
36-48% (women)
Potassium (3.5-5.5 meq·dl⁻¹)
Blood urea nitrogen (4-24 mg·dl⁻¹)
Creatinine (0.3-1.4 mg·dl⁻¹)
Iron: 40-190 μg·dl⁻¹ (men)
35-180 μg·dl⁻¹ (women)
Calcium (8.5-10.5 mg·dl⁻¹)

Physical Fitness Evaluation

Cardiorespiratory fitness (HR, BP, $\dot{V}O_2$ max)
Body composition (% body fat)
Musculoskeletal fitness (muscle and bone strength)
Flexibility
Neuromuscular tension/stress

Grade Components for Laboratory Reports: Total 25 points

Neatness/grammar/spelling = 3 points
Cover sheet = 1 point
Demographics = 2 points
Vitals = 4 points
Results = 5 points including graphs and data sheet
Interpretation = 6 points
Plan = 4 points

Sample Format for Case Study Reports (SOAP)

All reports must be typed, double spaced and written with minimal usage of pronouns except in the conclusion. All writing, charts, graphs and tables must be computer generated.

Cover sheet: Includes the title of the lab, the investigator (that's you), the client (the subject being tested) the date, instructors name.

Demographics: Age, gender, height, weight, race/ethnicity,

Par-Q Results: Administer the Par-Q first

Medical History: See questionnaire

Lifestyle and Physical Activity Profile: Administer Questionnaires for lifestyle and behavioral aspects

Risk Stratification and Medical Clearance for Exercise: Risk assessment and based on results if client is cleared for the exercise test and exercise program.

Vitals: Waist circumference, resting heart rate, resting blood pressure,

Test Results: List all lab data pertinent to the exercise test. This may include data tables, graphs and all calculations required for the lab. Make sure to use all of the appropriate measurement units

Assessment: Each assignment has a series of questions that should be addressed in this section. Answer each question in complete sentences and proper English. Make sure each answered question is numbered and easy to understand. You do not have to restate the question. Some questions may require a small amount of research (exercise physiology texts) while some may ask for an educated opinion. The results of the experiment should be used in answering the questions and the purposes of the study.

Plan: Summarize the lab, what conclusion can be made regarding the results? Did you achieve the purpose of the lab? Briefly discuss any difficulties and problems encountered during the laboratory that could have compromised the data accuracy; and interpretation of the numerical results in light of published norms wherever possible (e.g. maximal oxygen uptake of your subject compared to age-matched norms). References to published research in which techniques were evaluated or used to collect data are encouraged. Make a few insightful statements about the lab, or suggestions that you have about the activity.

Sample Case Study

Mr. MM is a 28 year old police officer (5'5", or 165.1cm); 230lbs and 37% body fat). He has enrolled in your adult fitness program. His job demands a fairly high level of physical fitness – a level he was able to achieve 6 years ago when he passed the physical fitness battery used by the police department.

Lifestyle:

Before becoming an officer he jogged 20 minutes, usually three times per week. Since starting the job he has had little or no time for exercise and has gained 15 lbs. He works 8 hours per day, is divorced, and takes care of 2 children, ages 7 and 9. At least 3 times per week, he and the children dine out usually at fast food restaurants like Burger King and Taco Bell.

Medical History:

His medical record reveals that he smoked one pack of cigarettes a day for 4 years while in college. He quit 3 yrs ago. The past 2 years he has tried some quick weight loss diets, with little success. He reports that his father died of an MI when he was 52 and his older brother has hypertension.

Risk Stratification:

Recently, he had a blood test with the following results: Chol = 220mg/dl, triglycerides = 98mg/dl, HDL = 37mg/dl, LDL= 150mg/dl, Cholesterol/HDL ratio 5.9. Fasting glucose 82mg/dl.

Medications: Started on Lipitor 20mg once a day following the blood test

Vitals: Resting data: HR= 75bpm BP = 140/90mmHg. He had a normal physical examination no complaints of symptoms or medical problems.

Exercise Test Results:

Mode/protocol = Treadmill Modified Bruce

ECG revealed 1.0mm (non significant) ST segment upsloping depression

Endpoint: Stage 4 of Bruce Protocol (3.4mph/14% elev). Test terminated due to leg fatigue no chest pain or arrhythmias were noted.

STAGE	METS	DURATION	HR (bpm)	BP (mmHg)	RPE
1	2.3	3min	126	145/88	8/20
2	3.5	3min	142	160/80	11/20
3	4.6	3min	165	172/80	14/20
4	7.0	3min	190	190/80	18/20

Interpretation: Below Average Aerobic Capacity for age and gender
Normal heart rate and blood pressure response
Obese

Plan: Prescribe an aerobic program
Dietary program for weight reduction and management
Lifestyle changes (fast food, exercise/job hours, family support)

INFORMED CONSENT FOR PARTICIPATING IN EXERCISE PHYSIOLOGY LABORATORY

Explanation of the graded (progressive) exercise test

You will perform a graded exercise test on a cycle ergometer and/or a treadmill. The exercise intensity will increase every 2, 3 or 4 minutes. Depending on your heart rate or other symptoms and variables, you may continue to work harder or the test will end. We may stop the test at any time because of signs of fatigue or discomfort. Also, you may stop the test for any reason at any time.

Explanation of other tests

You will also perform several other tests, including evaluations of your muscle strength, anaerobic power, body composition, pulmonary function and blood pressure.

Benefits to be expected

The results obtained from the graded exercise test and related tests will assist in the assessment of your current level of physical fitness. You will learn how it feels to perform these tests and how to administer them, in addition to learning how to interpret them.

Inquiries

Any questions about the procedures used in the exercise tests are encouraged. If you have any doubts or questions, please ask for further explanations.

Risks and discomforts

The possibility does exist that certain changes will occur during the graded exercise test. They include: abnormal blood pressure, fainting, disorders of heartbeat and in very rare instances, heart attack or death. Every effort will be made to minimize the risk of these changes through preliminary screening and by observation during the test. Emergency procedures and trained laboratory personnel are available to deal with any unusual situations that

may arise. All of the other tests involve minimal risk but could result in muscle strains, respiratory difficulties and lightheadedness. Psychological distress is possible when performing these tests in front of your student peers and the instructor. Although informed consents contain statements indicating the confidentiality of test results, this informed consent for participating in exercise physiology laboratory states that not only is it difficult in an instructional setting to keep test data confidential, but confidentiality may minimize learning. Discussing freely the individual and group data enhances the visualization, personalization and retention of information. Therefore, confidentiality cannot be guaranteed in most instances.

Please inform the instructor of your present health status, medications or former symptoms of concern associated with the tests mentioned within this Informed Consent or course syllabus (outline). Symptoms of special importance are those related to your heart such as pain in the chest, neck, jaw, back and arms or shortness of breath.

Freedom of consent

Your permission to perform the tests is voluntary. We will work together toward making an effort to find a substitute assignment or any of the tests that you do not feel comfortable in performing.

“I have read this form and I understand the test procedures that I will perform. I freely consent to participate voluntarily in all of the described laboratory tests.”

Print Full Name

(Date)

(Signature of Participant)

(Date)

(Witness)

(Date)

