



THE COMPLETE STUDENT WORKOUT! - BOOSTING PHYSICAL & MENTAL FITNESS IN A HUMAN BIOLOGY LABORATORY COURSE



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SUPPLEMENTARY MATERIAL

A. Fitness Components - Equipment Needs & Protocols (all components are easily done in pairs)

Aerobic - 3 Minute Step Test

Equipment Requirements: ~12 inch step bench (2 steps ideal), stopwatch & metronome (set at 100 BPM), automatic blood pressure cuff for blood pressure (BP) and heart rate (HR) readings

Quick Protocol: Take baseline BP and HR (average of 3 readings), set metronome to 100 BPM and stopwatch to 3 minutes. Start an "up, up, down, down" (for a 2 step bench) cycle using the metronome to keep a steady and consistent pace. Immediately after the 3 min period, take 3 HR readings using the radial artery during 3 consecutive 10 second counts. For each 10 second count multiply the number by 6 for a final HR in BPM. Take the average of the 3 counts for a final overall post exercise/recovery HR. Compare values to standard 3 minute step test charts (male and female).

Aerobic - Astrand Physical Fitness Test

Equipment Requirements: Cycle ergometer, stopwatch, metronome

Quick Protocol: Standard protocol readily available. For HMB314 students, HR is recorded between the 4-5min and 5-6min and averaged (the steady state HR). For the cycle ergometer, the standard workload for males is 900 kpm/min (level 3) and 600 kpm/min (level 2) for females. MVO_2 's can be calculated using prediction tables, however corrections for age and high steady state HR's may be necessary.

Anaerobic 1A - Vertical Jump Test (Standing Squat Jump)

Equipment Requirements: Axon Squat Jump Mat (comes with software developed by Axon Bioingenieria Deportiva), Desktop computer with parallel port (laptop/USB version available, however problems reported)

Quick Protocol: Subject does a standing squat jump with hands on their hips. Software reports jump height, take off speed and flight time. Leg power can be calculated using the following equation: ***Leg Power = 2.21 x body mass (kg) x [Sqrt(best jump (m))]***

Anaerobic 1B - Standing Long Jump

Equipment Requirements: Tape measure (at least 3 m), landing mats (with grip)

Quick Protocol: Mark a starting line with masking tape, subject stands feet slightly apart, bends knees and swings arms into jump. Measure from starting line to front of shoe landing.

Anaerobic 2A - Hand Grip Strength and Endurance

Equipment Requirements: Hand Grip Dynamometer with BIOPAC Acknowledge Software, desktop computer

Quick Protocol: Subject gives 3 successive contractions of BIOPAC hand grip device (takes average). Subject determines 50% 1 rep max (IRM) from previous result and then holds hand grip for as long as possible at 50% IRM value. Software records max weight and time (see accompanying BIOPAC manual)

Anaerobic 2B - Push-Up/1 minute Sit-Up Test

Equipment Requirements: Handheld counter (optional), stopwatch

Quick Protocol: Define acceptable push up and sit up positions. Do push-ups until fatigue and/or as many sit-ups in a 1 minute period. Standard comparison/performance tables can easily be found online.

Body Composition - Bioelectric Impedance/Girth Measurements

Equipment Requirements: Omron Healthcare HBF-510W Fully Body Sensor, skin fold calipers, measuring tape

Quick Protocol: Just follow the on screen instructions for the full body sensor, it reports body fat %, BMI, visceral fat levels and skeletal muscle %. For skin fold calipers measurements should be taken at the bicep, subscapular, tricep and suprailiac regions. Body fat % can then be calculated using the following equation:

Body fat % = $(4.95/Density - 4.5) \times 100$. Male or female density can be calculated using the **Durnin and Womersley** method.

Flexibility - Sit & Reach, Shoulder, Trunk & Groin

Equipment Requirements: Flex Test Unit Box, measuring tape, wall space and chalk

Quick Protocol: The sit and reach box is simple, straightforward and easy to use. For shoulder flexibility bend the right elbow so your hand hangs behind your head and rest your palm between your shoulder blades. Reach around with your left arm so your palm is facing out and try and touch the fingers of both hands together. Measure the distance between the fingertips. Protocols for the trunk and groin can be easily found online along with standard performance charts.

B. Fitness Module - Structure

Weeks 1 & 2 - Baseline measurements at ALL fitness stations

Week 2 - Students submit a proposal picking their lifestyle variable (yoga, 3X week, 30 minutes), an experimental fitness component (e.g. flexibility) and a control fitness component (e.g. hand grip strength and endurance)

Week 3 - Students introduce their fitness variable/lifestyle change

Weeks 3, 5, 7, 10 - Students monitor their performance on their selected experimental and control fitness stations*

Week 12 - Poster Presentation

***For some fitness components students can easily take additional measurements at home**

C. Selected Student Comments

"Great lab course. Really forced students to break out of their study cubicle and get active. Still an intense course yet very entertaining. Loved it!"

"Please keep this project. It was a great motivator to get active."

"The fitness project helped me highlight different aspects of my life that contribute to my overall fitness and wellness. I feel more encouraged to look up articles that can support health and fitness claims I hear."

"This was one of the most interesting and engaging courses I've taken during my undergrad degree. This project alone helped me to better understand the process of research. The main strengths with this assignments were that it encouraged physical activity during school term - something I tend to ignore with my busy schedule. This helped me get more active while collecting data for the poster. As well, the project actually became almost like a group project as data collection involved interacting with other members in the lab. Awesome assignment."