University of Southern California – Department of Biological Sciences
HBIO 439L: **Human Performance and Bioenergetics**
(2 or 4 units)

Instructor: Jill McNitt-Gray, Ph.D.
Office Hours: M 4-5 and by appointment in PED B9; Email: mcnitt@usc.edu

Required Text and Supplies:
Web-Based Lecture Notes, Selected Literature Readings, Electronic Storage Device
Lab Notebook required at all times

Lecture Time(s): TBD (4-units, 3 hrs; 2-units, 1 hr) Class time is formally scheduled for Wed afternoon; Given the project based nature of this course, the meeting times may vary. Students are encouraged to contact the Dr. McNitt-Gray regarding any potential time conflicts.
Lab Time(s): TBD (3 hrs), Class time is formally scheduled for Wed afternoon; Given the project based nature of this course, the meeting times may vary. Students are encouraged to contact the Dr. McNitt-Gray regarding any potential time conflicts.

Evaluation:
Effective application of principles in projects: (15%) Physiology / Nutrition and literature review; (15%) Motor Learning / Motor Control; (15%) Kinematics; (15%) Kinetics; (40%) Comprehensive Final presentation & technical note

Standard Grading Scale: >90%=A,> 80%=B, >70%=C, >65%=D, <65% =F

Objectives:
(1) Develop critical thinking and problem solving skills, exploring an interdisciplinary approach within complex human movement to understand cause-effect relationships governing human performance

(2) Gain hands-on experience analyzing human movement, quantifying and interpreting physiological & biomechanical variables of highly skilled individuals and individuals with disabilities or impaired movement patterns.

(3) Improve oral, written, and electronic communication & technical presentation skills

Exemplar topics will be related to human performance, motor control, mechanical & physiological energy cost in normal, elite, and clinical populations

For example:

a) Positive learning transfer with yoga as a complex motor skill practice complement - impact on movement intention / movement integrity / coordination strategies / metabolic cost / skill performance

b) Mobility in individuals with and without disability: Compare and contrast wheelchair propulsion mechanics of paralympians with clinical populations using wheel chairs

c) Mobility of individuals with and without prosthetic devices: Compare and contrast locomotion mechanics of paralympians with clinical populations using above and below knee prosthetic devices

d) Mobility of individuals under physically challenging conditions: Human performance changes with the onset of physiological fatigue; motor complexity, coordination strategies, altered mechanical loading strategies

Data Collection Sites:
USC Kinesiology Laboratories; US Olympic Training Center, Chula Vista, California; Rancho Los Amigos National Rehabilitation Center, Downey, California

Weekly Topics: Class activities will emphasize the following aspects
Laboratory Experience / Activity

1. Introduction: Research involving Human Subjects
On-line certification process (CITI certification)

2. Experimental Design and Literature Review

Electronic library search and bibiliography references (Endnote)

3. Physiology & Nutrition of Human Performance (15%)

Quantify metabolic aspects of complex motor skill, evaluate performance variables

4. Kinematic Data - principles & analysis

Define mechanical objectives in each phase of task, digitally capture human motion / determine critical performance variables

5. Motor Learning - Complex Motor Skills (15%)

Analyze kinematic data in terms of perception-action, determine multi-joint coordination patterns

6. Kinetic Data - principles & analysis

Collect reaction force data, analyze critical performance variables

7. Present Project Pilot Results (Draft 10%)

Develop plan for quantitatively evaluating performance between two conditions

8. Assimilate results from data collection

Develop plan for communicating results of performance evaluation

9. Physiology/ Motor Control Analysis & Interpretation of results in relation to literature

Analyze bioenergetics and motor performance using observed motion

SPRING BREAK

10. Kinematic data analysis & Interpretation (15%)

Analyze observed motion (total body / joint / segment levels)

11. Kinetic data analysis & Interpretation

Analyze causes of observed motion (total body level analysis)

12. Test hypotheses and present results (15%)

Analyze causes of observed motion (joint level analysis)

13. Write draft of two page abstract

Prepare experimental design / methods / variables (presentation)

14. Interpret findings in light of the current literature

Prepare experimental results and discussion (Presentation)

15. Final Presentations with written technical note *(remaining 30%)*

Write 3000 word technical note (J of Biomechanics format)

**course plan may be modified as needed throughout the semester

Academic Accommodations

Any student requesting academic accommodations based on a disability are required to register with Disability Services and Programs (DSP) each semester.

A letter of verification for approved accommodations can be obtained from DSP. Please be sure the letter is delivered to me (the instructor) as early in the semester as possible.

DSP is located in Student Union (STU) 301 and is open 8:30am-5:00pm Monday-Friday. The phone number for DSP is (213) 740-0776.

Academic Integrity

Students who violate University standards of academic integrity are subject to disciplinary sanctions, including failure in the course and suspension from the University.

Since dishonesty in any form harms the individual, other students and the University, academic integrity policies will be strictly enforced.

I expect you will familiarize yourself with the Academic Integrity guidelines found in the current SCampus.

Academic Integrity Violations

· Academic dishonesty/misconduct (plagiarism, cheating, unauthorized collaboration, etc.) will not be tolerated.

All academic integrity violations will result in a grade sanction and will be reported to the Office for Student Judicial Affairs.

It is your responsibility to "reasonably" protect your own work from the plagiarism of others.

· If plagiarism is detected on a group project, all members of the group will be held responsible.

· You are expected to be familiar with the Academic Integrity guidelines found in the current SCampus (student guidebook). An electronic version is available at http://usc.edu/scampus.