USC Dornsife College of Letters, Arts and Sciences

**HBIO401L – Physiology and Biomechanics of Movement (4 units)**

**Spring 2017**
**Lecture:** T/Th 8:00-9:20 a.m.
**Location:** VKC 200

**Laboratory:** Th 5:00-7:50 PM
**Location**: PED B16

**Instructor: Gioia Polidori Francisco, PhD**
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**Lab Director: Emi Embler, PhD**

**Course Description**
The study of human movement including (1) bioenergetics, circulation, respiration, and the musculoskeletal system, (2) effects of exercise and training on those systems, and (3) basic laws of motion and analysis of sports locomotion. Prerequisite: MATH 108.

**Learning Objectives**
- Develop a deeper understanding of the central and cross-disciplinary concepts of human biology, which in this course include: bioenergetics, physiological homeostasis and the interrelationship between form and function for the endocrine, cardiovascular, musculoskeletal and nervous systems.
- Develop critical thinking and problem solving skills, using an interdisciplinary approach to understanding complex human movement by exploring cause-effect relationships governing human performance.
- Demonstrate proficiency in modern research methodologies that involve analyzing human movement, quantifying and interpreting physiological & biomechanical variables.
- Improve oral, written, and electronic communication & technical presentation skills
- Apply biological and physiological knowledge towards the resolution of ethical and social issues.
- Provide sufficient knowledge and skill for entry-level employment in a wide variety of fields in the health professions or other biology-related disciplines.

**Required Text:**
Powers, S. and E. Howley, E. (2011). Exercise physiology: theory and application to fitness and performance (9th ed.). New York, NY: McGraw-Hill.

**Description and Assessment of Assignments**

- Class material will be evaluated via quizzes and exams.
- Material covered in labs will be evaluated via laboratory exercises and quizzes as well as classroom exams.

**Grading Breakdown:**

| Assignment | % of Grade |
|---|---|
| Midterm 1 | 20 |
| Midterm 2 | 20 |
| Final Exam | 30 |
| Lab | 25 |
| Quizzes | 5 |
| **TOTAL** | 100 |
| JEP (extra Credit) | 2.5 |

**Additional Policies**

- The grading scale is based on the traditional scale as follows:

| | | |
|---|---|---|
| | **A (≥ 93.00%)** | **A- (≥ 90.00%)** |
| **B+ (≥ 87.00%)** | **B (≥ 83.00%)** | **B- (≥ 80.00%)** |
| **C+ (≥ 77.00%)** | **C (≥ 73.00%)** | **C- (≥ 70.00%)** |
| **D+ (≥ 67.00%)** | **D (≥ 63.00%)** | **D- (≥ 60.00%)** |
| **F (≤ 59.99%)** | | |

- A midterm exam can be taken after the specified date **ONLY** if the student has a **documented** medical excuse.
- Exams and lab grades will not be given a letter grade. Only the final grade will be given a letter grade.
- Quizzes will be given in 2 forms:
    1. A 2-question quiz will be given during the *first 5 minutes* of each lecture. Questions will be based on the material covered in the previous lecture. Each quiz will be worth 2 points: 1 point for each correct response, 0.5 points for each incorrect response.
    2. During lectures and based on the material discussed.

  Individuals who do not take the quiz will get 0 points. NO LATE QUIZZES WILL BE GIVEN.
- The final exam is ***cumulative***.
- A request to take a make-up exam must be accompanied by evidence of necessity (ie: letter from a doctor, plane ticket to a game from an athlete) and must be made ***before*** the date of the scheduled exam. Make-up exams will be different from the scheduled exam and may be proctored by personnel who do not have extensive knowledge in the area being tested.
- Notes will **NOT** be posted on blackboard. Class notes and textbook information will form the basis of the material that will be on the exams. If you attend class regularly, you will be updated on the status of lecture notes and course material/announcements.
- The only extra credit offered for this course is JEP. JEP is the oldest and largest university service-learning program in the country. It offers students the unique opportunity to combine

academic coursework with experiences in the community surrounding the campus. At the beginning of the semester, a JEP representative will visit our class and tell you more about the opportunities available that semester. To register for JEP, visit http://dornsife.usc.edu/joint-educational-project/.

**Statement on Academic Conduct and Support Systems**

**Academic Conduct**

Plagiarism – presenting someone else's ideas as your own, either verbatim or recast in your own words – is a serious academic offense with serious consequences. Please familiarize yourself with the discussion of plagiarism in *SCampus* in Section 11, *Behavior Violating University Standards* https://scampus.usc.edu/1100-behavior-violating-university-standards-and-appropriate-sanctions/. Other forms of academic dishonesty are equally unacceptable. See additional information in *SCampus* and university policies on scientific misconduct, http://policy.usc.edu/scientific-misconduct/.

Discrimination, sexual assault, and harassment are not tolerated by the university. You are encouraged to report any incidents to the *Office of Equity and Diversity* http://equity.usc.edu/ or to the *Department of Public Safety* http://capsnet.usc.edu/department/department-public-safety/online-forms/contact-us. This is important for the safety whole USC community. Another member of the university community – such as a friend, classmate, advisor, or faculty member – can help initiate the report, or can initiate the report on behalf of another person. *The Center for Women and Men* http://www.usc.edu/student-affairs/cwm/ provides 24/7 confidential support, and the sexual assault resource center webpage sarc@usc.edu describes reporting options and other resources.

**Support Systems**

A number of USC's schools provide support for students who need help with scholarly writing. Check with your advisor or program staff to find out more. Students whose primary language is not English should check with the *American Language Institute* http://dornsife.usc.edu/ali, which sponsors courses and workshops specifically for international graduate students. *The Office of Disability Services and Programs* http://sait.usc.edu/academicsupport/centerprograms/dsp/home_index.html provides certification for students with disabilities and helps arrange the relevant accommodations. If an officially declared emergency makes travel to campus infeasible, *USC Emergency Information* *http://emergency.usc.edu/*will provide safety and other updates, including ways in which instruction will be continued by means of blackboard, teleconferencing, and other technology.

**Course Schedule: A Weekly Breakdown**

| Date | Lecture Topic | Reading Assignment | Lab |
|---|---|---|---|
| Jan 10 | Introduction, Physiology of Exercise | | Intro |
| Jan 12 | Bioenergetics I | 3 | |
| Jan 17 | Bioenergetics II | 3 | Locomotor Energetics |
| Jan 19 | Exercise Metabolism | 4 | |
| Jan 24 | Hormonal Responses to Exercise I | 5 | Hormonal Response |
| Jan 26 | Hormonal Responses to Exercise II | 5 | |
| Jan 31 | Nervous System | 7 | Stretch Reflex |
| Feb 2 | Musculoskeletal System I | 8 | |
| Feb 7 | Musculoskeletal System II | 8 | EMG |
| Feb 9 | Circulatory System | 9 | |
| Feb 14 | Respiratory System | 10 | Blood Pressure |
| Feb 16 | Acid/Base & Temperature Regulation | 11-12 | |
| Feb 21 | Physiology of Training/Review | 13 | Pulmonary Function |
| Feb 23 | **MIDTERM 1** | | |
| Feb 28 | Cause-Effect, Motion Analysis | | Motion Analysis |
| Mar 2 | Linear Kinematics | | |
| Mar 7 | Linear/Angular Kinematics | | Kinematics |
| Mar 9 | Angular Kinematics | | |
| Mar 12-19 | **SPRING BREAK** | | No Lab |
| Mar 21 | Linear Kinetics (F=ma) | | F=ma |
| Mar 23 | Linear Kinetics (F=ma) | | |
| Mar 28 | Impulse/Momentum | | Project Meetings |
| Mar 30 | Projectile Motion | | |
| Apr 4 | Projectile Motion | | Project |
| Apr 6 | Angular Kinetics | | |
| Apr 11 | Joint Kinetics | | Project |
| Apr 13 | Joint Kinetics | | |
| Apr 18 | **MIDTERM 2** | | Project |
| Apr 20 | Joint Kinetics | | |
| Apr 25 | Real World Examples | | Project Presentations |
| Apr 27 | Review | | |
| Apr 29- May 2 | **STUDY DAYS** | | |
| TBD | **FINAL EXAM** | | |