Instructors: Andrew Karduna, PhD and Li-Shan Chou, PhD

Prerequisites: HPHY 313; MATH 112; PHYS 201; ANAT 311

Textbook: Biomechanics of Sport and Exercise, 2nd Edition, Peter McGinnis

Course Description: This course provides an introduction to the principles of biomechanics, emphasizing the contribution of biomechanics to understanding human movement, and develops an of mechanical and anatomical concepts related to human performance.

Course Objectives: Upon completion of this course, each student should be able to:
1) Use precise, well-defined terminology to describe motion.
2) Understand how to use Newton’s laws to study forces and torques
3) Analyze the mechanical properties of biological tissues
4) Understand and quantify linear and angular descriptors of human motion (kinematics).
5) Understand the relationship between linear and angular characteristics of motion.
6) Understand and quantify the basic causes of human movement (kinetics).
7) Understand the basic biomechanical factors involved in human movements.

Course Readings: You are responsible for the assigned readings from the text and any other materials that may be assigned. It is suggested that you come to class having already read the assigned reading as this will make the lectures more informative for you.

Attendance Policy: Consistent attendance reflects professional behavior and it is expected that students attend class on a regular basis. In the event of an emergency or illness, students should notify the Course Director. Students are responsible for all missed course content and assignments.

Grading Criteria: Course grade will be on the following scale:
Laboratories 30% A 90-100%
Homework/Quizzes 20% B 80-89%
Midterm Exam 20% C 70-79%
Final Exam 30% D 60-69%

F <60%
Weekly Course Outline

OVERVIEW AND MATHEMATICAL REVIEW

Week 1: Jan 3-7
Introduction to Biomechanics
McGinnis: Introduction

STATICS

Week 2: Jan 10-14
Force, moment and position vectors
McGinnis: Chapter 1 (20-39), Chapter 5 (118-126)

Week 3: Jan 19-21
Newton's 1st Law, static equilibrium, free body diagrams, center of gravity
McGinnis: Chapter 1 (39-44), Chapter 3 (78-81), Chapter 5 (126-144)
Jan 17th – Martin Luther King Jr. Day - NO CLASS HELD

Week 4: Jan 24-28
Musculoskeletal examples

DEFORMABLE BODY MECHANICS

Week 5: Jan 31 – Feb 4
Feb 4th – Mid-Term Exam
Elastic and plastic material properties
McGinnis: Chapter 9 (214-230)

Week 6: Feb 7-11
Material properties of biological tissues
McGinnis: Chapter 9 (230-235)

DYNAMICS

Week 7: Feb 14-18
Linear Kinematics
McGinnis: Chapter 2

Week 8: Feb 21-25
Angular Kinematics
McGinnis: Chapter 6

Week 9: Feb 28 – March 4
Linear Kinetics
McGinnis: Chapters 3 and 4

Week 10: March 7-11
Angular Kinetics
McGinnis: Chapter 7

EXAM

Final Exam Wednesday, March 19, 8 - 10AM