

Course: EW485E Comparative Biomechanics

Credits: 3 credits – 3 recitation hours – 0 laboratory hours

Course Description: EW485E is a comparative biomechanics elective course divided into two major aims: First aim focuses on presenting an engineering perspective on how animals and plants work, applying concepts from mechanics, controls, dynamics, systems, and materials in order to understand the connection between form and function in biology; locomotion in the sea, in air or land; sensory problems. Second aim concentrates solely on human biomechanics, which concerns with the study of movement using the science of mechanics, more specifically, the area of human performance improvement; injury prevention and rehabilitation; and assistive technology development.

Pre-requisites: N/A

Course Coordinator: Asst. Prof Jaramillo Cienfuegos

Textbook: N/A

Course Objectives:

- a) Discuss applications of engineering understanding and techniques to biological systems
- b) Form testable hypotheses and describe methods for experimental design
- c) Identify biological systems of interest that many help in developing a solution, suggesting model organisms or justifying examination of many
- d) Discuss pitfall in blindly copying solutions from nature
- e) Demonstrate a basic understanding of evolution, the history of life on earth, and the potential role of biomechanics in major evolutionary transitions
- f) Demonstrate basic understanding of musculoskeletal dynamic systems
- g) Demonstrate basic understanding of human biomechanics through performance improvement and injury prevention

Topics:

- Biology, evolution, animal phyla
- Scaling
- Biomaterials: solids, fracture, fatigue,
- Structures
- Viscoelasticity
- Intro to fluids, locomotion in fluids
- Animal flight
- Terrestrial locomotion
- Human biomechanics: Human Performance, Injury Prevention, Assistive Technologies
- Principles of Biomechanics
- Mechanics of Musculoskeletal system, forces
- Muscle modeling

Last Updated: 01-January-2021