### **BIOLOGICAL FRAMEWORKS FOR ENGINEERS**

## Session #17 [Muscle Cells to Tissues]

#### General Objectives:

- ✓ Review the molecular interactions of the contractile machinery in muscles.
- ✓ Discuss the biomechanics of muscle physiology from a micro and macro perspective

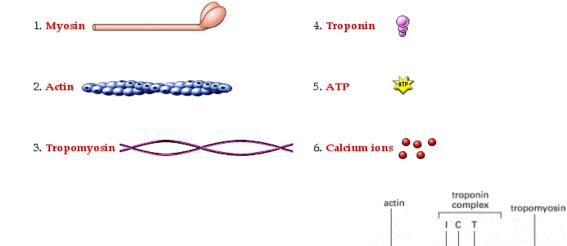
## **Central Framework:**

✓ Muscles are complex actuators through which chemistry and organization provide the body with movement.

### Session Outline:

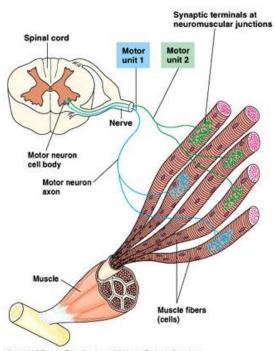
- I. Muscle Overview
- II. Structure of Muscle

#### III. Molecular Participants



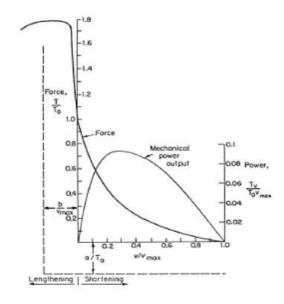
# IV. Actomyosin Contraction

- V. Proteins which support muscle contraction
  - A. Metabolic Pathways
  - B. Ligand Gated Ion Channels
  - C. Neurons
  - D. lon pumps
- VI. Neural Signaling and Muscle Activation



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- VII. Muscle Mechanics
  - A. Muscle Conditions
    - Isometric
    - Isotonic
  - B. Mechanical Events
    - Twitch
    - Tetanus
  - C. Force-Velocity Relationship



D. Length – Tension Relationship

