**ES 335 Exam #3 Review**

* Structural vs. Material Properties
  + Force length vs. stress-strain
    - Know what each represents
    - Know units
    - Regions of curves: elastic, plastic, yield, ultimate strength, failure
    - Stiffness vs. elastic modulus
* Viscoelastic properties
  + Be able to explain and apply (provide an example) of the following:
    - Strain-rate dependent stiffness
    - Load-relaxation
    - Creep
    - Hysteresis
  + Know what types of stretching utilize specific viscoelastic properties
* Tendon/ligament
  + Functional and structural differences between tendon and ligament
  + How is ligament/tendon strength affected by disuse?
* Skeletal system
  + Composition of bone—understand the function of the different components
    - Cortical (compact) vs. cancellous (trabecular) bone
  + Bone modeling (hypertrophy) vs. bone remodeling (atrophy)
    - role of osteoblasts and osteoclasts
  + Wolf’s law
  + How is bone strength affected by disuse?
  + What happens with osteoporosis and how does it affect bone strength?
  + Types of bone—know description, examples and function
    - Short bones
    - Long bones
    - Flat bones
    - Sesamoid bone
  + Stress fracture vs. traumatic fracture
  + Types of loading—know general bone strength in each
    - Compression
    - Tension
    - Bending
      * Be able to diagram a bone loaded in bending—C’s and T’s for compression and tension, location of fracture and side fracture will start on
    - Shear
    - Torsion
* Muscular system
  + Muscle structure
    - Sarcomere
    - Sliding filament theory
  + Agonists, antagonists, stabilizers (neutralizers)
  + Functional muscle group
  + Be able to perform a muscular analysis
  + Factors that affect muscle torque output
  + Factors that affect muscle force output
    - Physiological factors
      * Fiber type
      * Muscle CSA
    - Neural factors
    - Biomechanical factors
      * Muscle architecture
      * Force-length relationship
        + Active insufficiency, passive insufficiency
        + Be able to show relative position of different exercises on force length relationship
      * Force-velocity relationship
  + Factors that affect muscle moment arm
  + Be able to perform a strength curve analysis