Objectives:
The student should be able to:
1. Describe the role and innervation of:
   a. excitatory interneurons;
   b. inhibitory interneurons.
2. Define the neurotransmitters involved in:
   a. excitation;
   b. inhibition.
3. Identify which reflexes are monosynaptic and which are polysynaptic.
4. Define the classes of reflexes
5. State examples of reflexes of cutaneous and muscle origin.

Outline:
I. Signals impinging upon the $\alpha$-motorneurons
   A. Dorsal root ganglion (DRG) afferents from sensory nerves
      1. excitatory (monosynaptic, i.e.,
         direct synaptic connection)
      2. inhibitory (polysynaptic,
         involve interneurons)
B. Higher motor centers

1. Classification
   a. intertract/intersegmental (propriospinal)
   b. cerebellar

2. Connections - all interneuron mediated
   a. excitatory
   b. inhibitory

C. Renshaw cells - inhibitory interneurons to “focus” a response
II. DRG afferent nerve activity

A. Muscle spindle origin
1. Anatomy and origin
   a. nuclear chain fibers
   b. nuclear bag fibers
2. Type Ia afferent nerves
   a. chain and bag origin
   b. usually annulospiral endings (often called primary endings)
   c. responds to length and velocity
3. Type II afferent nerves
   a. chain, and sometimes bag origin
   b. annulospiral and “flower-spray” endings (often called secondary endings)
   c. responds to length

B. Golgi tendon organ origin
1. Anatomy
2. Type Ib afferent nerves

C. Other proprioceptors
III. Circuits and connections

A. α-motorneuron efferent/sensory afferents

B. γ-motorneuron efferent/sensory afferents

1. Dynamic - nuclear bag fibers
2. Static - nuclear bag and chain fibers

C. Propriospinal (intersegmental)
IV. Reflexes

A. Myotatic (stretch) reflex
   1. Monosynaptic
   2. Dynamic and static (for damping)
   3. Reciprocal inhibition
   4. Clinical implications
      a. knee jerk
      b. ankle clonus - requires brain activity

B. Golgi tendon reflex
   1. Inhibitory function
   2. Balances load
   3. Safety mechanism

C. Flexor reflex

D. Crossed extensor reflex

E. Other (stepping, gallop, scratch)