terms you should encounter along the way:

Donald Hebb, convergence, divergence, synaptic efficacy, plasticity, synaptic potentiation, synaptic depression, long-term potentiation, long-term depression, synapse shape, ionotropic receptors, co-activity pattern, fragile-X mice, mature vs. immature synaptic spine, spike-timing dependent plasticity, neuromodulatory systems, Pavlovian fear conditioning, association (associative learning), foot-shock, freezing, conditioned stimulus, unconditioned stimulus, lateral amygdala, central amygdala, labile memories, extinction

procedural memory, declarative memory, episodic memory, working memory, associative memory, reach-to-grasp task, ‘more is better’, ACh-dependent alteration of motor cortex and auditory topographic representations, motor skill learning, perceptual skill learning, place strategy vs. response strategy, relative ACh release in hippocampus and basal ganglia, retrospective place coding, prospective place coding, ‘delay’ task, delay activity, cue+delay activity, delay+action activity, prefrontal-dependent delay activity in parietal cortex

intrafusal muscle, extrafusal muscle, tendon, ventral vs. dorsal spinal cord, slow-twitch vs. fast-twitch muscle fibers, motor neuron, motor cortex neuron, muscle synergies, fixed action pattern, spinal cord interneuron, reticulospinal, rubrospinal, cerebellocospinal, motor cortex neuron directional tuning, robo-monkey, premotor cortex, premotor action-specific activity, premotor planning activity, premotor sequence-dependent activity, premotor mirror activity

prefrontal cortex, attention, episode ‘marking’, interval tracking, counting, category mapping, efferent projections of prefrontal cortex, conditional probability / hazard function, attention index
principles of the week:

fire together – wire together:
This pertains to the idea that the strength of a connection between a presynaptic and postsynaptic neuron (measured by examining the degree of depolarization in the postsynaptic neuron resulting from a single action potential in a presynaptic neuron) can change (i.e., wire together) as a function of whether or not the two neurons are co-active (i.e., fire together).

implicit vs. explicit memory:
There are many types of memory (associative, procedural, declarative, episodic, working). For some types (declarative, episodic), it is possible to consciously know the content of the memory (for example, the sky is blue or “I ate breakfast at Denny’s this morning) while, for others, it is not consciously known what the memory is exactly (as in procedural memories like remembering how to swim – a motor skill memory).

the population code:
This pertains to the idea that perceptions (e.g., awareness of present spatial position) and actions are both realized by ‘patterns’ of activity among large populations of neurons as opposed to activation of single neurons. With respect to the motor system, the population firing rate vector (a list of the firing rates for a large set of motor cortex neurons) bears direct relation to the present on-going action (itself a pattern of muscle synergies).

top-down processing:
This pertains to the idea that structures such as the prefrontal cortex may, to some extent, control or bias activity patterns in other brain structures. Prefrontal cortex may, for instance, be responsible for delay activity in the parietal cortex. Similarly, prefrontal cortex can control ACh release in structures such as the visual cortex thereby changing how the visual cortex responds to visual input.
concepts:

- plasticity
- synaptic ‘efficacy’ or synaptic ‘strength’
- spike timing dependent plasticity ‘curve’
- conditioned vs. unconditioned stimulus
  ‘labile’ memories
- ‘types’ of memories
- strategy competition
- ‘delay’ or ‘working memory’ activity
- prefrontal control of delay activity in parietal cortex
  muscle ‘synergy’
- action ‘related’ activity that doesn’t reflect actual motor actions (e.g., mirror neurons)
- attention enhancement vs. suppression of stimulus-induced activity
- conditional probability (the ‘hazard function’)

‘tables’:

1. listing of information pertaining to the features of plasticity in synaptic strengths (or efficacy
2. properties of spinal cord interneurons
3. indirect roles of premotor cortex in motor control
4. forms of prefrontal firing that reflect abstract variables (e.g., time or category)