

## Muscle Learning Outcomes

As a result of study the theory and related practical class on muscle you should be able to:

1. Know the major functions of muscle and appreciate that there are three different types of muscle.
2. Describe the macro- and microscopic structure of skeletal muscle and the functional significance of myofibrils, the sarcoplasmic reticulum and transverse (or T-) tubules.
3. Define the subdivision of the nervous system that motoneurons form a part of and be able to describe their structural features.
4. Appreciate the functional significance of the fact that motoneurons have myelinated axons.
5. Describe the structure of the neuromuscular junction and know the functional significance of the major elements.
6. Define the term motor unit and understand the impact of motor unit size on the control of movement.
7. Explain the mechanism by which an action potential in a motoneurone initiates the contraction of skeletal muscle fibres.
8. Understand what is meant by an end-plate potential and how this results in action potential propagation along the length of muscle fibres.
9. Describe the mechanism of excitation-contraction coupling.
10. Understand the temporal relationship between an action potential, the tension generated and the sarcoplasmic  $Ca^{2+}$  levels in a single muscle fibre and be able describe how you could record these.
11. Describe the structure of thin myofilaments.
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13. Explain how thick and thin myofilaments are arranged and why this results in the typically striated appearance of skeletal muscle.
14. Explain what a sarcomere is and how the sarcomere length changes during muscle contraction and relaxation.
15. Describe the molecular interactions between thick and thin filaments that occur during the five distinct stages of the sliding-filament mechanism of muscle contraction.
16. Know what rigor mortis is and be able to explain its molecular basis.
17. Understand why skeletal muscle is sometimes referred to as voluntary muscle and the difference between isotonic and isometric contractions.
18. Understand how the principle of orderly recruitment regulates the force of contraction generated by a skeletal muscle.
19. Explain how action potential frequency is involved in regulating skeletal muscle contraction and how temporal summation contributes to this process.
20. Describe an experiment that you could perform to demonstrate the principle of temporal summation in skeletal muscle.
21. Know the difference between a twitch and tetanic contraction in skeletal muscle.
22. Understand what is meant by the length-tension relationship and how you could demonstrate this experimentally.
23. Explain the physiological-basis of the length-tension relationship.

24. Describe the difference in physiological properties of the two major types of skeletal muscle fibre and the implication of this on athletic performance.
25. Explain the theory behind electromyography.
26. Demonstrate how to record an electromyogram and carry out qualitative and quantitative analyses of the recording.
27. Understand the uses of electromyography in sport and clinical sciences.