

Study Guide Lecture Exam # 2

1. This lecture exam covers text book chapters 7, 8, 9, and 10. These correspond to Exercise # 10, 11, 13, 14 and 15 of the lab manual.

Chapter 7 – the skeleton: study the chapter summary and memorize it.

2. Definitions of axial skeleton, Appendicular skeleton, number of bones in cranium, face.
3. **Hyoid bone** – the only stand alone in body which does not articulate with any other bone
4. **Regions of vertebral column**, thoracic and lumbar curvatures, the role of fibrocartilage Intervertebral discs as shock absorbers, most weight carried by lumbar vertebrae, differences between cervical, thoracic and lumbar vertebrae, sacrum – its articulation with ileum part of coxal bone (each half of pelvic girdle), Atlas (C₁) is the only ring like vertebra without a body and Axis (C₂) is the only vertebra with Dens in front of body to make a pivot joint with atlas.
5. **True Ribs 1-7 = 7 pairs and false ribs 8-12 = 5pairs**, each vertebral rib articulates with body of a thoracic vertebra via its head and with tubercle of transverse process, 11-12 = 2 pairs are floating ribs
6. Each **pelvic girdle** is formed of an anterior clavicle and a posterior scapula, role of clavicles to attach scapula away from rib cage, clavicles articulate at medial end with sternum and lateral end with acromion of scapula, scapula also has a coracoid process and a spine.
7. **Humerus** has head to articulate with Glenoid cavity of Scapula, proximal humerus has greater and lesser tuberosity, diaphysis has deltoid tuberosity and distal humerus has medial condyle – trochlea to articulate with trochlear notch of Ulna, and lateral condyle to articulate with head of Radius,
8. **Humerus-Ulna** joint is hinge joint, proximal radius rotates over the tuberosity of ulna as a pivot joint, radius is lateral in anatomical position (on thumb side) and ulna is medial (on little finger side)
9. **8 carpals** make Carpus – the wrist joint, radius articulates with Scaphoid and Ulna with Unate carpals respectively. The joint between carpals – plane or non-axial joint.
10. **5 metacarpals** in palm of hand, 2 phalanges in thumb and 14 in 4 fingers of hand.
11. Joint between 1st metacarpal and proximal phalanx of thumb – **Saddle joint**
12. Joint between metacarpal and proximal phalanx of any finger – **Condyloid joint**
13. **Pelvic girdle** is formed of 2 Coxal bones, each coxal bone formed by fusion of a superior Ilium, inferior ischium and a median Pubis, 2 pubis bones anteriorly form pubic symphysis - a cartilaginous joint, posteriorly ilium bones articulate with sacrum, all 3 contribute to form Acetabulum the socket for head of femur, ischium and pubis of each side surround a big Obturator foramen.

14. **Comparison of male and female** pelvis (pelvic girdles)
15. Proximal **femur** has a rounded head and irregular projections Greater and lesser Trochanters, distal femur has 2 condyles to articulate with tibia – a double hinge joint and a patellar surface to articulate with sesamoid bone Patella, therefore the knee joint is most complex (3 in 1) and also the largest joint, Hip joint and knee joint are weight bearing joints of the body.
16. **Tibia** is medial and fibula is lateral, tibia has 2 surfaces and menisci (singular meniscus) cartilages to strengthen hinge joint with femur, the anterior border of tibia is shin, distal tibia articulates with Talus tarsal and has medial malleolus – medial protrusion of ankle
17. **Fibula** is a stick like bone thinner (feeble) than tibia, proximal fibula is head and distal is lateral malleolus, both articulate with lateral side of tibia, lateral malleolus is the lateral protruding bone of ankle.
18. **7 tarsals** form ankle = tarsus, talus articulates superiorly with tibia, Calcaneum is the largest and form the heel
19. **5 metatarsals** form plantar part– sole of foot and **14 phalanges** complete the 30 bones of each leg. The sole of the foot is arched, weight bearing parts are heel or joints between metatarsals and proximal phalanges.

Chapter 8 – Joints: read the chapter summary and memorize it.

20. Fibrous joints – sutures are best examples, bones joined by fibrous tissue, no cavity present, most joints are fixed
21. **Cartilaginous joints** – joints made by hyaline or fibrocartilage, pubic symphysis – hyaline c. and intervertebral discs – fibrocartilage are best examples, no cavity present.
22. **Synovial or Freely moving joints** – bones have articular surface (hyaline c.), a synovial cavity lined by synovial membrane and filled with synovial fluid filtered from blood, has WBC in it and lubricates the joint, fibrous capsule and ligaments enforce the joint, bigger synovial joints have additional sacs = Bursae (singular bursa) filled with synovial fluid to protect against wear tear of rubbing tendons or ligaments of the joint
23. **6 Types of synovial joints** page 173 lab manual.
24. **Movements of joints** – activity 5 and 6 and fig 13.5 page 174-5 lab manual.
25. Selected joints – shoulder joint – designed for maximum mobility and stabilized by tendon of biceps brachii and rotator cuff muscles (check back movement of shoulder), if get stiff cause freezing of shoulder; knee joint – covered above in bones, elbow joint – covered above in bones.
26. **Joint problems** – Sprain, dislocation, arthritis – especially osteoarthritis.

Chapter 9 – Muscles and Muscular Tissue: read summary 1-22 points only and memorize it.

27. Consult study guide on website.
28. **Figures for labeling** are from this chapter only and include Fig 9.2a or 14.4a lab manual, fig 9.3b/c or 14.1b/c of lab manual and fig 9.5 or 14.2 of lab manual. I have used 1 label the figure question. Pay attention a single arrow indicates a Z-line or M-line but an arrow attached to a space, indicate a A-zone, I-zone, H-zone or a sarcomere. All other labeling indicates individual structures.
29. **I-band** is formed of thin filaments only and has Z-line at its center. Thin filaments are fixed to z-line at outer end but free at middle end of sarcomere. It shortens during contraction.
30. **A-band** is formed of thick filaments (myosin), free at both ends, but also has thin filaments. It remains same size during contraction or relaxation.
31. **H-zone** is at the middle of A-band and has only thick filaments. It shortens or disappears during contraction.
32. **Study fig 9.10 and 6 steps of muscle contraction.**
33. **Remember the sites for ATP and Ca^{2+} .** Ca^{2+} is stored in Terminal cisternae of Sarcoplasmic Reticulum and released during depolarization of muscle fiber and binds to Troponin complex.
34. **Tropomyosin** covers the binding sites of Actin sub-units during muscle relaxation. The attachment of Ca^{2+} to troponin brings conformational change and the binding sites are exposed.
35. **Myosin head** has the binding site for ATP.
36. **source of energy** for muscle contraction: 1st = ATP; 2nd = C – P creatine phosphate; when both are consumed cell must generate more ATP aerobic (using oxygen) /anaerobic (without using oxygen) breakdown of glucose or glycogen. Fig 9.20
37. **Remember the definitions** of terms action potential = depolarization, resting potential = polarization, repolarization, motor unit, twitch, summation, twitch Fig 9.15, isotonic and isometric muscle contractions.
38. **Polarization** has more – charged ions inside, Na^+ dominate outside.
39. **Depolarisation** is caused by inward pumping of Na^+ ions and more + charges inside.
40. **Repolarisation** is caused by outward active pumping of K^+ .
41. Skeletal muscle fibers vary from fast to slow contracting types. Cardiac are only slow type but Smooth muscle fibers contract always very slowly. Only cardiac muscles can contract without a signal from nervous system.

Chapter 10 – The Muscular System:

42. **Study only from lab manual.**
43. **Types of muscles** – page 197; **Naming of muscles** – page 198 and fig 15.1
44. Remember **origins and insertions** of biceps brachii and triceps brachii.
45. Study the **3 classes of levers** and their examples page Fig 10.3
46. 1st class levers have Fulcrum at middle. Posterior movement – extension of neck.
47. 2nd class levers have load at middle. Rising on toes – forceful plantar flexion of foot to push body weight superiorly.
48. 3rd class levers have effort at middle. Flexion of arm.
49. Memory aid 'FLE'.
50. Prepare well for the exam to score good grades.