Kinesiology Notes – Chapters 17-20, 14-16

1. **Chapter 15 – Neck & Trunk**
	1. Vertebral Column
		1. Longitudinal axis of the body
		2. Combined motions of individual vertebrae
		3. Pivot point for motion/support of head @ cervical region
		4. Weight of head, shoulder girdle, UE, and trunk transmitted through vertebral column & S-I joint to LE
		5. Encases spinal cord
		6. Provides shock absorption
	2. Vertebral Curves
		1. Anterior/Posterior (convex/concave) curves
			1. Cervical – convex
			2. Thoracic – concave
			3. Lumbar – convex
			4. Sacral - concave
		2. Provide strength & resiliency 10X
	3. Terminology
		1. Spine/Spinal Column/Vertebral Column
		2. Facet & Facet Joints
	4. Joint Motions – Neck & Trunk
		1. Flexion
		2. Extension
		3. Hyperextension
		4. Lateral Bending
		5. Rotation
	5. Bones & Landmarks (Table 15 – 2: Parts of the Vertebrae)
		1. Occipital Bone & Protuberance
		2. Nuchal Line
		3. Basilar Area
		4. Foramen Magnum
		5. Occipital Condyles
		6. Temporal Bone
		7. Mastoid Process
		8. Vertebrae
			1. Body
			2. Neural Arch
			3. Vertebral Foramen
			4. Pedicle
			5. Lamina
			6. Transverse Process
			7. Vertebral Notches
			8. Intervertebral Foramen
			9. Articular Process
			10. Spinous Process
		9. Intervertebral Disk
			1. Annulus Fibrosis
			2. Nucleus Pulposus
		10. Atlas (C1)
		11. Axis (C2)
			1. Dens (Odontoid Process)
		12. C7 – Easy landmark
		13. Vertebral Foramen – Vertebral Artery passes through
		14. Facet
		15. Demifacet
	6. Joints
		1. Atlanto-Occipital Joint
		2. Atlantoaxial Joint
		3. Facet Joints
	7. Ligaments
		1. Anterior Longitudinal Ligament
		2. Posterior Longitudinal Ligament
		3. Supraspinal Ligament
		4. Interspinal Ligament
		5. Ligamentum Flavum
	8. Muslces of Neck and Trunk
		1. Anterior/Posterior/Lateral (Table 15-3)

|  |  |  |
| --- | --- | --- |
|  | **Neck** | **Trunk** |
| Anterior | Sternocleidomastoid | Rectus Abdominis |
| Scalenes (3) | External Oblique |
| Prevertebral Group (4) | Internal Oblique |
|  | Transverse Abdominis |
| Posterior | Erector Spinae Group (3) | Erector Spinae Group (3) |
| Splenius Capitis  | Transversospinalis Group (3) |
| Splenius Cervicis | Interspinales |
| Suboccipital Group (4) | Intertransversarii |
| Lateral |  | Quadratus Lumborum |

|  |  |  |  |
| --- | --- | --- | --- |
| **Muscle** | **Origin** | **Insertion** | **Action** |
| **Neck** |  |  |  |
| Sternocleidomastoid |  |  |  |
| Scalenes |  |  |  |
| Prevertebral Group (Table 15-4) |  |  |  |
| Splenius Capitis  |  |  |  |
| Splenius Cervicis |  |  |  |
| **Trunk** |  |  |  |
| Rectus Abdominis |  |  |  |
| External Oblique |  |  |  |
| Internal Oblique |  |  |  |
| Transverse Abdominis |  |  |  |
| Erector Spinae Group (3) |  |  |  |
| Transversospinalis Group (3) |  |  |  |
| Interspinales |  |  |  |
| Intertransversarii |  |  |  |
| Quadratus Lumborum |  |  |  |

* 1. Anatomical Relationship
		1. Superficial / Deep
		2. Inferior / Superior
		3. Anterior / Posterior
	2. Pathologies
		1. Thoracic Outlet Syndrome
		2. Torticollis
		3. Cervical Sprains
		4. Sciatica
		5. Lordosis
		6. Flat Back
		7. Kyphosis
		8. Scoliosis
		9. Spondylosis
		10. Spinal Stenosis
		11. Herniated Disk
		12. Ankylosing Spondylitis
		13. Spondylolysis
		14. Spondylolisthesis
		15. Osteoporosis
		16. Compression Fracture
		17. Fractures w/ Dislocations
		18. Hangman’s Fracture
	3. Points to Remember (p 231)
1. Chapter 17 – Pelvic Girdle (Pelvis)
	1. Structure
		1. Four bones
			1. Sacrum
			2. Coccyx
			3. Two Hip bones
				1. Ilium
				2. Ischium
				3. Pubis
		2. Joints
			1. Sacroiliac
			2. Symphysis Pubis
			3. Lumbosacral
	2. Function
		1. Supports weight of body through vertebral column
		2. Receives ground forces generated w/ foot-strike
		3. Moves as a unit in all three planes
		4. Supports & Protects Viscera
		5. Provides muscular attachment points
	3. False & True Pelvis (differences between male and female pelvis)
		1. FEMALE
			1. Superior opening more oval
			2. Shorter/less funnel shaped pelvic cavity
			3. Shorter/less curved sacrum
			4. More oblique walls
			5. Acetabula & ischial tuberosities wider
			6. Wider pelvic arch
		2. MALE
			1. Superior opening more heart-shaped
			2. Longer/more funnel shaped pelvic cavity
			3. Longer/more curved sacrum
			4. More vertical walls
			5. acetabula & ischial tuber Sigurd closer together
			6. Narrower pelvic arch
		3. Sacroiliac joint (SI Joint)
			1. Locks surfaces of sacrum and ilium together
			2. Function=transmit weight from upper body & vertebral column to hip bones
	4. Bones
		1. Sacrum
		2. Ilium
		3. Ischium
	5. Landmarks
		1. Iliac Crest
		2. Posterior Superior Iliac Spine (PSIS)
		3. Posterior Inferior Iliac Spine
		4. Anterior Superior Iliac Spine (ASIS)
		5. Anterior Inferior Iliac Spine
		6. Ischial Tuberosity
	6. Pubic Symphysis
		1. Fibrocartilage disk between right & left pubic bones
		2. Little movement until childbirth
	7. Pelvic Girdle Motions
		1. Anterior Tilt (Lumbar Lordosis)
		2. Posterior Tilt (Flat Back)
		3. Lateral Tilt (unsupported hip drops down)
		4. Pelvic Rotation
	8. Muscle Control
		1. Force Couples
			1. Pull in opposite directions to cause tilt
				1. Anterior Tilt of Pelvis (Lumbar Lordosis)

Hip Flexors (Iliopsoas)

Back Extensors (Erector Spinae)

* + - * 1. Posterior Tilt of Pelvis (Flat Back)

Trunk Flexors (Rectus Abdominis)

Hip Extensors (Hamstrings)

1. CHAPTER 18 – Hip Joint
	1. Bones of Lower Extremity
		1. 2 Hip Bones (os coxae)
			1. Ilium
			2. Ischium
			3. Pubis
		2. Sacrum
		3. Coccyx
		4. Femur
		5. Tibia
		6. Fibula
		7. 7 Tarsals
		8. 5 Metatarsals
		9. 14 Phalanges
	2. Joint Structure of Hip
		1. Ball & socket
			1. Femoral head
			2. Acetabulum
		2. Stable
		3. Less Range of Motion than shoulder joint
		4. Triaxial joint
			1. Frontal plane (Hip Abduction/Adduction)
			2. Sagittal plane (Hip Flexion/Extension)
			3. Transverse plane (Hip External/Internal Rotation…Lateral/Medial Rotation)
	3. Bones (see above)
	4. Landmarks
		1. Iliac Fossa
			1. Large
			2. Smooth
			3. Concave
			4. Origin of Iliacus muscle (part of Iliopsoas)
		2. Iliac Crest
			1. Lateral ridge of Pelvis
			2. Between ASIS & PSIS
		3. Anterior Superior Iliac Spine (ASIS)
			1. Origin for TFL, Sartorius, Inguinal Ligament
		4. Anterior Inferior Iliac Spine (AIIS)
			1. Origin of Rectus Femoris
		5. Posterior Superior Iliac Spine (PSIS)
		6. Posterior Inferior Iliac Spine (PIIS)
		7. Ischium
			1. Body
			2. Ramus
			3. Tuberosity
				1. Origin of Biceps Femoris, Semimembranosis, & Semitendinosis
				2. Weight-bearing when sitting (“Bleacher Bone”)
			4. Spine
		8. Pubis
			1. Body
				1. Origin of Obturator Internus
			2. Superior Ramus
				1. Origin of Pectineus
			3. Inferior Ramus
				1. Origin of Adductor Magnus & Brevis, and Gracilis
			4. Symphysis Pubis
				1. Connects two pubic bones anteriorly
			5. Pubic Tubercle
				1. Attachment for Inguinal Ligament
		9. Combination of all Hip Bones
			1. Acetabulum
			2. Obturator Foramen
				1. Opening for blood vessels & nerves
			3. Greater Sciatic Notch
				1. Opening for Sciatic Nerve, Piriformis & other structures
		10. Femur
			1. Head – articulates with Acetabulum
			2. Neck – Between head & trochanters
			3. Greater Trochanter
				1. Insertion for Gluteus Medius, Minimus and most of the “Deep 6” External Rotators
			4. Lesser Trochanter
				1. Insertion of the Iliopsoas
			5. Body/Shaft
			6. Medial Condyle
			7. Lateral Condyle
			8. Lateral Epicondyle
			9. Medial Epicondyle
			10. Adductor Tubercle – Proximal to medial epicondyle
				1. Insertion for Adductor Magnus
			11. Linea Aspera – Ridge along posterior femur
			12. Pectineal Line – Ridge from Lesser Trochanter to Linea Aspera
				1. Insertion for Adductor Brevis
			13. Patellar Surface (Patellar Groove)
		11. Tibia
			1. Tibial Tuberosity
				1. Insertion for Patellar Tendon (AKA Patellar Ligament)
			2. Pes Anserine\*
				1. Insertion for ***S***artorius, ***G***racilis, ***S***emitendinosis
				2. “***S***ay ***G***race before ***T***ea”
			3. Gerty’s Tubercle\*
				1. Insertion for Tensor Fascia Latae & Gluteus Maximus through the Iliotibial Band
	5. Ligaments & Other Structures
		1. Fibrous Joint Capsule reinforced by 3 ligaments
		2. Acetabular Labrum (similar to Glenoid Labrum of Shoulder)
		3. Inguinal Ligament (Top portion of the Femoral Triangle\*)
		4. Iliotibial Band or Tract (IT Band)
	6. Muscles of the Hip

|  |  |  |  |
| --- | --- | --- | --- |
| Muscle | Origin | Insertion | Action |
| Anteror |  |  |  |
| Iliopsoas |  |  |  |
| Rectus Femoris\* |  |  |  |
| Sartorius |  |  |  |
| Medial |  |  |  |
| Gracilis |  |  |  |
| Pectineus |  |  |  |
| Adductor Magnus |  |  |  |
| Adductor Longus |  |  |  |
| Adductor Brevis |  |  |  |
| Posterior |  |  |  |
| Gluteus Maximus |  |  |  |
| Deep ERs (Deep 6) |  |  |  |
| 1.Piriformis |  |  |  |
| 2.Quadratus Femoris |  |  |  |
| “GOGOs” |  |  |  |
| 3.Gemelis Superior |  |  |  |
| 4.Obturator Internus |  |  |  |
| 5.Gemelis Inferior |  |  |  |
| 6.Obturator Externus |  |  |  |
| Semimembranosus\* |  |  |  |
| Semitendinosus\* |  |  |  |
| Biceps Femoris\* |  |  |  |
| Lateral |  |  |  |
| Gluteus Medius |  |  |  |
| Gluteus Minimus |  |  |  |
| Tensor Fascia Latae |  |  |  |

* 1. Anatomical Relationships
		1. Which muscles are lateral, medial, anterior and posterior? Table 18-2
	2. Common Hip Pathologies
		1. Legg-Calve-Perthes – Femoral head necrosis (tissue death)
		2. Slipped Capital Femoral Epiphysis – “slipped growth plate”
		3. Hip Anteversion – Pigeon Toed
		4. Hip Retroversion – Duck Foot
		5. Iliotibial Band Syndrome
		6. Hip Pointer
	3. Consider Table 18-4 as you are creating your Presentation & Paper
1. Chapter 19 – Knee Joint
	1. Structure of Tibio-Femoral Joint
		1. Supported and maintained by muscles and ligaments
		2. No bony stability
		3. Often exposed to severe stresses
		4. Largest joint
		5. Synovial Hinge Joint
	2. Structure of Patellofemoral Joint
		1. Posterior aspect of patella glides over patellar surface of femur
		2. Function
			1. increase mechanical advantage of quads
			2. protect knee joint
			3. creates greater angular force for quads
	3. Q Angle (patellofemoral angle)
		1. Angle between quads and patellar tendon
		2. Determined by drawing a line from the ASIS to the midpoint of the patella and from the tibial tuberosity to midpoint of patella
		3. Ranges from 13 – 19 degrees normally
		4. Greater in females secondary to wider hips
		5. Patellofemoral pain syndrome common if Q angle is out of “normal” range
	4. Motions
		1. Flexion / Extension
		2. 0 extension – 120/135 flexion degrees
		3. Minimal hyperextension secondary to laxity
		4. Rotational component (accessory motion)
		5. Open chain (non-weight bearing)
			1. Tibia moves on femur
		6. Closed chain (weight-bearing)
			1. Femur moves on tibia
		7. Spin (rotation) secondary to length of femoral condyles
			1. Screw Home Mechanism: Femur rotates medially on tibia as the knee moves into the last few degrees of extension
	5. Bones & Landmarks
		1. Femur (landmarks identified in earlier chapter)
		2. Tibia
			1. Intercondylar Eminence
			2. Medial Condyle
			3. Lateral Condyle
			4. Plateau
			5. Tibial Tuberosity
			6. Medial Malleolus
		3. Fibula
			1. Head
			2. Lateral Malleolus
		4. Patella
			1. Base
			2. Apex
		5. Calcaneus (provides insertion point for gastrocnemius through Achilles tendon)
	6. Ligaments & Other Structures
		1. Anterior Cruciate Ligament
		2. Posterior Cruciate Ligament
		3. Medial Collateral Ligament
		4. Lateral Collateral Ligament
		5. Medial & Lateral Menisci
		6. Popliteal Space
		7. Pes Anserine (Say Grace before Tea)
		8. Bursae
			1. Anterior (4)
			2. Posterior (5)
			3. Lateral (2)
			4. Medial (1)
	7. Muscles

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Muscle** | **Origin** | **Insertion** | **Action** | **1 or 2 joint muscle** |
| Anterior |  |  |  |  |
| Vastus Lateralis |  |  |  |  |
| Vastus Medialis |  |  |  |  |
| Vastus Intermedialis |  |  |  |  |
| Rectus Femoris | Identified in previous section |
| Posterior |  |  |  |  |
| Biceps Femoris (short) | Identified in previous section |
| Popliteus |  |  |  |  |
| Biceps Femoris (long) | Identified in previous section |
| Semimembranosis | Identified in previous section |
| Semitendinosis | Identified in previous section |
| Multi Joints |  |
| Anterior:Sartorius | Identified in previous section |
| Medial:Gracilis | Identified in previous section |
| Posterior:Gastrocnemius |  |  |  |  |
| Lateral:Tensor Fascia Latae | Identified in previous section |

* 1. Anatomical Relationships
		1. Anterior or Posterior knee crossing?
		2. Superficial or Deep?
		3. Lateral or Medial
		4. Deepest?
	2. Common Knee Pathologies
		1. Genu Valgum
		2. Genu Varum
		3. Genu Recurvatum
		4. Patellar Tendinitis
		5. Osgood-Schlatter Disease
		6. Popliteal Cyst (Baker’s Cyst)
		7. Patellofemoral Pain Syndrome
		8. Chondromalacia Patella
		9. Prepatellar Bursitis
		10. Terrible Triad (Unhappy Triad)
1. Chapter 20 – Ankle & Foot
	1. Bones and Landmarks
		1. Tibia
			1. Medial Condyle
			2. Lateral Condyle
			3. Crest
			4. Medial Malleolus
		2. Fibula
			1. Head
			2. Lateral Malleolus
		3. Interosseous Membrane between Tibia and Fibula
		4. Tarsals (7)
			1. Calcaneus
				1. Calcaneal Tuberosity
			2. Talus
			3. Navicular
				1. Navicular Tuberosity
			4. Cuboid
			5. Cuneiforms
				1. First (Medial)
				2. Second (Middle)
				3. Third (Lateral)
		5. Metatarsals (5)
			1. Base
			2. Head
			3. 1st: Shortest and thickest
			4. 2nd: Longest
			5. 3rd:
			6. 4th:
			7. 5th has tuberosity
		6. Phalanges (14)
			1. Great Toe
	2. Functional Aspects of the Foot
		1. Three parts
			1. Hindfoot (rearfoot)
				1. Talus
				2. Calcaneus
			2. Midfoot
				1. Navicular
				2. Cuboid
				3. Three Cuneiforms
			3. Forefoot
				1. Five Metatarsals & Phalanges
		2. Ankle Joint & Foot
			1. Shock Absorber
			2. Adapts to ground surface
			3. Base of Support
	3. Motions
		1. Ankle Joint (Sagittal Plane about the Frontal Axis)
			1. Plantar Flexion
			2. Dorsiflexion
		2. Sub-Talar Joint (Frontal Plane about the Sagittal Axis)
			1. Inversion
			2. Eversion
		3. Combination
			1. Supination
			2. Pronation
		4. Position, not motion
			1. Valgus
			2. Varus
	4. Joints
		1. Superior Tibiofibular Joint
		2. Inferior Tibiofibular Joint (Location of High Ankle Sprain)
		3. Ankle Joint (Talocrural Joint)
		4. Metacarpophalangeal (MTP)
		5. Proximal Interphalangeal (PIP)
		6. Distal Interphalangeal (DIP)
	5. Ligaments and Other Structures
		1. Medial
			1. Deltoid Ligament
		2. Lateral
			1. Anterior Talofibular Ligament
			2. Calcaneofibular Ligament
			3. Posterior Talofibular Ligament
		3. Arches
			1. Medial Longitudinal Arch
			2. Lateral Longitudinal Arch
			3. Transverse Arch
		4. Spring Ligament
		5. Long Plantar Ligament
		6. Short Plantar Ligament
		7. Plantar Fascia
	6. Muscles

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Muscle** | **Origin** | **Insertion** | **Action** | **Where Crosses Joint** |
| Posterior Group |
| Superficial Posterior Group (Compartment) |
| Gastrocnemius | Identified in previous section |
| Soleus |  |  |  |  |
| Plantaris |  |  |  |  |
| Deep Posterior Group (Compartment) – “Tom, Dick, A N Harry” |
| Tibialis Posterior |  |  |  |  |
| Flexor Digitorum Longus |  |  |  |  |
| Flexor Hallucis Longus |  |  |  |  |
| Anterior Group (Compartment) |
| Tibialis Anterior |  |  |  |  |
| Extensor Hallucis Longus |  |  |  |  |
| Extensor Digitorum Longus |  |  |  |  |
| Lateral Group (Compartment) |
| Peroneus Longus |  |  |  |  |
| Peroneus Brevis |  |  |  |  |
| Peroneus Tertius |  |  |  |  |

* 1. Common Ankle Pathologies
		1. Shin Splints (Medial Tibial Stress Syndrome)
		2. Equinus Foot
		3. Pes Cavus
		4. Pes Planus
		5. Hammer Toe
		6. Mallet Toe
		7. Metatarsalgia
		8. Morton’s Neuroma
		9. Morton’s Toe\*
		10. Turf Toe
		11. Ankle Sprain
		12. Fracture
		13. Plantar Fasciitis
		14. Achilles Tendinitis
		15. Achilles Tendon Rupture
1. Chapter 14 – Temporomandibular Joint (TMJ)
	1. **Structure (not a true hinge joint)**
		1. 2 bones
			1. Mandible
			2. Temporal Bone
		2. 1 disk
		3. Joint capsule
		4. 4 ligaments
	2. **Motions (5)**
		1. Depression/Elevation
		2. Protrusion/Retrusion (protraction/retraction)
		3. Lateral Deviation
	3. **Bones and Landmarks**
		1. **Mandible** articulates with temporal bone on both sides of face
			1. Angle
			2. Body
			3. Condyle
			4. Coronoid Process
			5. Mental Spine
			6. Neck
			7. Notch
			8. Ramus
		2. **Temporal Bone**
			1. Articular Tubercle
			2. Articular Fossa
			3. Postglenoid Tubercle
			4. Styloid Process
			5. Mastoid Process
			6. External Auditory Meatus
			7. Zygomatic Process
		3. **Zygomatic Bone**
			1. Temporal Process
			2. Zygomatic Arch
		4. **Maxilla/Maxillary Bone**
		5. **Hyoid Bone**
		6. **Thyroid Cartilage**
	4. **Muscles**

|  |  |  |  |
| --- | --- | --- | --- |
| **Muscle** | **Origin** | **Insertion** | **Action** |
| Temporalis |  |  |  |
| Masseter |  |  |  |
| Medial Pterygoid |  |  |  |
| Lateral Pterygoind |  |  |  |
| Mylohyoid  |  |  |  |
| Geniohyoid |  |  |  |
| Stylohyoid |  |  |  |
| Digastric |  |  |  |
| Sternohyoid |  |  |  |
| Sternothyroid |  |  |  |
| Thyrohyoid |  |  |  |
| Omohyoid |  |  |  |

* 1. **Anatomical Relationship**
		1. Superficial/Deep