Skeletal System: Articulations  
(Chapter 9)  
Lecture Materials  
for  
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Primary Sources for figures and content:  

Articulation = joint; site where two or more bones meet  
- function: connect bones together but provide mobility in skeleton  

Anatomical/Structural Classification of Joints:  
(based on connecting material)  
1. **Fibrous**: bones joined by fibrous CT with no space  
2. **Cartilaginous**: bones joined by pad or bridge of cartilage  
3. **Synovial**: bones separated by fluid-filled cavity, surrounded by CT  

Physiological/Functional Classification of Joints:  
(based on amount of movement)  
1. Synarthrosis: immovable joint  
   (fibrous or cartilaginous)  
2. Amphiarthrosis: slightly moveable joint  
   (fibrous or cartilaginous)  
3. Diarthrosis: freely moveable joint  
   (always synovial)  

Increased mobility = decreased stability

**Synarthroses**: immovable, strength  
1. **Synostosis**: fused bones  
2. **Suture**: interlocked bones, sealed with dense CT  
3. **Gomphosis**: tooth in alveolar socket, held by periodontal ligament  
4. **Synchondrosis**: hyaline cartilage bridge between bones  

**Amphiarthroses**: slightly moveable, strength with some mobility  
1. **Syndesmosis**: bones connected by ligament ligament = band of dense regular CT  
2. **Sympysis**: bones separated by pad of fibrocartilage

**Diarthroses = Synovial Joint**: great mobility, less strength and stability  

Features (on handout)
Joint Injuries
Sprain - damage to ligament, some collagen torn, slow to heal
Bursitis - inflammation of a bursa due to trauma, infection, or repetitive motion

*synovial joints stabilized by articular capsule and accessory structures to restrict mobility: ↑mobility = ↓stability = ↑chance of dislocation
Luxation = dislocation; joint displacement, usually damages cartilage, ligaments, and capsule, pain receptors in all CT of the joint, except articular cartilage, to prevent actions
Subluxation = partial dislocation; displacement beyond usual anatomical limitation, “double jointed”

Movements at synovial joints
1. Linear movements
   - Gliding: slight movement in any direction
2. Angular movements: one plane of motion
   - Flexion: reduce angle in frontal plane
   - Extension: increase angle in frontal plane
   - Hyperextension: extension past anatomical position
   - Abduction: move away from longitudinal axis in sagittal plane
   - Adduction: move toward longitudinal axis in sagittal plane
   - Circumduction: move in loop without rotation
3. Rotational movements; turn on axis
   - medial rotation: turn in toward body
   - lateral rotation: turn out away from body

Special and Specific Motion:
- Inversion: turn sole inward
- Eversion: turn sole outward
- Dorsiflexion: lift toes
- Plantar flexion: lift heal
- Opposition: thumb across palm
- Pronation: medial rotation of radius
- Supination: lateral rotation of radius
- Protraction: move anterior
- Retraction: move posterior
- Elevation: move superior
- Depression: move inferior

Ranges of Motion
1. Monaxial: movement in 1 plane
2. Biaxial: movement in 2 planes
3. Triaxial: movement in 3 planes
4. Multiaxial: gliding joints, all directions

Types of Synovial Joints (handout)
1. Gliding/Plane Joint: flat surfaces, slide in any direction
   ![Gliding joint](image1)
   ![Eight synovial or multiaxial joints](image2)
   ![Acromioclavicular and gleno-humeral joints](image3)
   ![Intercarpal and interveretal joints](image4)
   ![Carpometacarpal joints](image5)
   ![Distal interphalangeal joint](image6)

2. Hinge Joint: cylindrical projection in trough-shaped surface
   ![Hinge joint](image7)
   ![Hinge joint](image8)
   ![Elbow joint](image9)
   ![Trapezium joint](image10)
   ![Ankle joint](image11)
   ![Interarticular joint](image12)

3. Pivot Joint: round projection in ring shaped depression
   ![Pivot joint](image13)
   ![Pivot joint](image14)
   ![Pivot joint](image15)
   ![Pivot joint](image16)
4. Ellipsoidal joint: oval facet in oval depression

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<th>Type of Spherical Joints</th>
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5. Saddle joint: concave surface into convex surface

6. Ball and socket joint: spherical head into cup-like socket

Age Related Changes:

**Rheumatism** = pain and stiffness of skeletal system

**Arthritis** = rheumatism of synovial joints, caused by damage to articular cartilage
- **osteoarthritis** = age 60+, cumulative wear and tear erodes cartilage
- **rheumatoid arthritis** = autoimmune attack, chronic inflammation and damage to joint
  - **Ankylosis** = ossification of the joint due to untreated RA
- **gouty arthritis** = crystals of uric acid from nucleic acid metabolism form in synovial fluid, damage cartilage