Lecture Outline: SKELETAL SYSTEM
[Chapters 7, 8]

Introduction
A. Components

B. Functions
1. 
2. 
3. 
4. 

Classification and Parts
A. Bone Shapes
1. Long:
2. Short:
3. Flat:
4. Irregular:
5. Sesamoid:

B. Parts of Long Bone
1. Epiphysis
   - 
   - 
2. Diaphysis
3. Bone (osseous) tissue
   a. compact
   b. spongy
4. Articular cartilage
5. Periosteum

6. Endosteum

7. Medullary cavity

8. Marrow

9. Epiphyseal plate

**Bone Histology**

A. Bone matrix
   1. Inorganic ( )

   2. Organic ( )

B. Bone cells
   1. Osteoblasts
   2. Osteocytes
   3. Osteoclasts

C. Microscopic Structure
   1. Compact Bone
      Osteon (Haversian system)
      - central canal

      - perforating canal

      - osteocyte

      - lacunae

      - bone matrix

      - canaliculi
   2. Spongy Bone
      - trabeculae:
Ossification Processes

A. Bone growth & development
   Begins at 6 weeks
   ----- > adulthood

   "fetal skeleton"
   cartilage template    fibrous CT

   BONE

B. Intramembranous Ossification

   1.

   2. mesenchyme →
      →

   3.

   4.

C. Endochondral Ossification
   - bones begin as

   1.

   2.

   3.

   4.

   5.

   6.

D. Growth at Epiphyseal Plate
   Epiphyseal (   ) plate
   -
   -
   -
1st layer of cells:

2nd layer of cells:

3rd layer of cells:

4th layer of cells:

**Homeostasis of Bone Tissue**

A. Bone Resorption

B. Bone Deposition

C. Factors Affecting Bone Development, Growth, and Repair
   - Nutrition
   - Exposure to Sunlight
   - Hormones
   - Exercise

1. Nutritional Factors
   - Vit. A – Deficiency →
     - Vit. C – Deficiency →
     - Vit. D – Deficiency →

2. Exposure to Sunlight
3. Hormonal Factors
   GH (Growth Hormone) –
   Insufficient GH → Excessive GH →
   Thyroid Hormone (thyroxine) –
   Insufficient thyroxine →
   Sex Hormones –
   PTH (parathyroid hormone) -
   Calcitonin -

4. Exercise Effects
   Physical Stress
   -
   Lack of exercise →

Skeletal Organization

A. Divisions
   1. Axial:

   2. Appendicular:

B. Number of Bones
   206 named bones
   Axial:
   Appendicular: 126
Survey of landmarks:

C. Axial Skeleton =

**Skull** = 8 Cranial bones + 14 facial bones

Cranial bones:
- frontal
- parietal
- occipital
- temporal
- sphenoid
- ethmoid

Facial bones:
- maxillary
- palatine
- zygomatic
- inferior nasal conchae
- lacrimal
- nasal
- vomer
- mandible

Infant Skull
- fontanels

**Vertebral column** (26)
- cervical
- thoracic
- lumbar
- sacrum
- coccyx

Spinal Curvatures
- cervical
- thoracic
- lumbar
- sacral
Primary curvatures

Secondary curvatures

Vertebral Column

Cervical vertebrae -
  atlas =
  axis =
  -
  -
  -

Thoracic vertebrae -
  -
  -

Lumbar vertebrae –
  -
  -

Sacrum:

Coccyx

Thoracic Cage

Ribs
  True ribs
  False ribs
  Floating

Rib structure:
  head
  tubercle
  shaft
Bio 103 Skeletal System

Sternum
- manubrium
- body
- xiphoid process

Pectoral Girdle

Scapulae:

Upper Limbs =
Humerus

Radius (lateral)

Ulna (medial)

Wrist and Hand [lateral → → → medial]
- Carpals (proximal: scaphoid, lunate, triquetrum, pisiform)
- (distal: trapezium, trapezoid, capitate, hamate)
- Metacarpals
- Phalanges
  - proximal, middle, distal

Pelvic Girdle
= 2 fused coxae

Hip bones
- ilium
- ishium
- pubis

- greater pelvis
- lesser pelvis
Female pelvis:

Male pelvis:

**Lower Limbs**

=  

Femur  

Patella  

Tibia  

Fibula  

Ankle and Foot  

Tarsals  

Metatarsal  

Phalanges – proximal, middle, distal

**Lifespan Changes**

- decrease in height  
- calcium levels  
- bones become _________  
- osteoclasts  
- spongy bone  
- bone loss  
- fractures
Clinical Application

Types of fractures:

Joints of the Skeletal System (Chapter 8)

A. Functions
   o Articulations =
   o Bind parts
   o Make bone growth possible
   o

B. Classification of Joints
   Based on structure:
   1. Fibrous Joints

   2. Cartilaginous Joints

   3. Synovial Joints

   Based on function:
   1. Synarthrosis -

   2. Amphiarthrosis -

   3. Diarthrosis –
Fibrous Joints
3 Types:
  o Syndesmosis
  -
  -
  -
  o Suture
  -
  -
  -
  o Gomphosis
  -

Cartilaginous Joints
2 Types:
  o Synchondrosis
  -
  -
  -
  o Symphysis
  -
  -
  -

Synovial Joints
- 
- 
- 
- 
- 

Types of Synovial Joints
  a) Ball and socket joint
     -
  b) Condyloid joint
     -
c) Gliding joint

- 

d) Hinge joint

- 

- 

e) Pivot Joint

- 

- 

f) Saddle Joint

- 

- synovial joints

Types of Joint Movements

abduction / adduction

flexion / extension / hyperextension

dorsiflexion / plantar flexion

rotation / circumduction

supination / pronation

Shoulder Joint

Elbow Joint

Hip Joint

Knee Joint
Life-Span Changes

Clinical Application
Joint Disorders
Sprains
Bursitis
Arthritis
Rheumatoid arthritis
Osteoarthritis
Gouty arthritis
Endocrine/Ageing
Osteoporosis
Osteopenia
Nutritional
Rickets
Osteomalacia