

SYLLABUS

BSC 2085L

Anatomy & Physiology I Lab

Arts & Sciences Department, Homestead Campus



BSC 2085L Human Anatomy and Physiology Lab 1 Syllabus

Days: T (Tuesday) JAN 08 – APR 29 2007

Time: 9.50 am – 11.30 am

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Office Hours: Mondays 10 am – 12 noon, Tuesdays 12 noon – 2 pm, Wednesdays 2-3 pm

Textbook:

- Fundamentals of Anatomy & Physiology by Frederic H. Martini, Ph.D 7th Ed
- The Anatomy Coloring Book by W. Kapit & M. Elson, 3rd Edition

Tuesday Lab Schedule

BSC 2085L

Ref # 440322

Spring 2008

DATE	WK	TENTATIVE TOPIC SCHEDULE	Coloring book <i>Martini chapt</i>
Jan 15	1	<i>SKELETAL SYSTEM</i> - Introduction, Body Organization, Terminology, Overview of the Skeletal System, Axial & Appendicular Divisions, Major Skeletal Bones Axial Skeleton – Skull	1,2,21 <i>Martini 1,6</i> <i>Martini 7</i> 24-26
Jan 22	2	Axial skeleton - Vertebral column, ribs	27-30 <i>Martini 7</i>
Jan 29	3	Appendicular Skeleton – Upper limbs	31- 35 <i>Martini 8, 9</i>
Feb 05	4	Appendicular Skeleton – Lower limbs & Articulations	37- 42 <i>Martini 8, 9</i>
Feb 12	5	EXAM 1 – skeletal system	
Feb 19	6	<i>MUSCULAR SYSTEM</i> – Introduction, head, neck	44-48 <i>Martini 10,11</i>
Feb 26	7	Muscular system - Torso	55-67 <i>Martini 10,11</i>
Mar 05	8	Muscular system – Upper limbs	55-59 <i>Martini 10,11</i>
Mar 11	9	Muscular system – Lower limbs & Articulations	61-67
Mar 18	10	EXAM 2 – muscular system	
Mar 25	11	<i>NERVOUS SYSTEM</i> – Introduction,	70-71 <i>Martini 12</i>
Apr 01	12	Brain & Cranial Nerves	73-76, 83 <i>Martini 14</i>
Apr 08	13	Spinal cord, meninges, CSF	77,81,82,85-89 <i>Martini 13</i>
Apr 15	14	Special senses – Eye	95-99 <i>Martini 17</i>
Apr 22	15	Special senses – Ear	95-99 <i>Martini 17</i>
Apr 28	16	EXAM 3 – nervous system & special senses	

Goals and Objectives:

Upon successful completion of this course the student will demonstrate knowledge of

- 1) skeletal system, muscular system, nervous system, and special senses.
- 2) the correct anatomical and medical terminology for the organ systems named above.

Grading Policy:

Exam 1	33.3%
Exam 2	33.3%
Exam 3	33.3%

Extra Credit:

A potential extra 10% will be added to the final grade, based upon:

- successful completion of all homework assignments and/or short 'pop' quizzes
- maintaining a grade point average > 50%.
 - Homework assignments for each of the 3 units are shown at the end of each unit in this Syllabus

Grading Scale:

A	100 – 90%
B	89 – 80%
C	79 – 70%
D	69 – 60%
F	59 – 0%

Attendance Policy:

Attendance is required. Attendance will be taken at every class meeting.

Make-up Policy:

Make-up examinations are NOT given. See your instructor if you have a conflict with this.

Cheating Policy:

Any student caught cheating on an exam will be assigned a final grade of F.

Teaching and Learning:

Studying is an integral part of achieving a good grade. Do not wait until the last minute to begin studying for an exam, there will be a lot of information to learn. Keep up with the information covered in class this will make studying easier. A learning resource that some students find helpful is their peers, so you may want to form study groups with your classmates. In addition to reading the chapters in your textbook, the text also brings supplemental material, such as a CD and an internet website that offer animations that you may find helpful.

Keep a notebook / binder to include information covered in the laboratory and any handouts provided.

The lab outlines are contained in this syllabus. You must be thoroughly familiar with each of the assigned topics to be successful on examination.

OBJECTIVES FOR HUMAN ANATOMY & PHYSIOLOGY I (BSC 2085L) LABORATORY Spring 2008

UNIT I: SKELETAL SYSTEM

OBJECTIVES

Upon completion the student should be able to:

1. define the terms
 2. identify structures
 3. describe functions
-

SKELETAL TERMINOLOGY (listed alphabetically):

Study terminology before going on to: A. INTRODUCTION

Anatomical planes / sections (e.g. CAT scans, MRIs)

- Sagittal – left & right
 - Midsagittal = median
 - Parasagittal
- Coronal (or frontal) – front & back
- Transverse (or horizontal, axial/transaxial, or cross section) – top & bottom

Anatomical position – body viewed from anterior surface with palms facing forward

Appendicular skeleton – limbs, includes pectoral & pelvic girdles

Articulation – *articulatio* –

- joining or connecting together loosely so as to allow motion between the bones / parts

Axial skeleton – head & trunk

Bilateral symmetry

- E.g. midsagittal section

Condyle

- Rounded articular projection on bone surface – e.g. femur, lateral & medial

Costal

- Rib = costa

Directional terms:

- Anterior (ventral)
- Posterior (dorsal)
- Superior (cranial, cephalic)
- Inferior
- Superficial
- Deep
- Medial
- Lateral
- Proximal (e.g. closest point on limb or root of limb vs. median plane body)
- Distal (e.g. furthest point of limb vs. median plane body)

Epicondyle – part above a condyle

- E.g. humerus – lateral & medial

Facet – small smooth area on a bone

- Only T1-T12 vertebrae have facet for ribs

Fontanel – *fonticulus* – membranous interval at angle of cranial bones in infants – ‘soft-spot’

- Fetal – newborn only – flexible joint allows skull to be distorted in birth canal

Foramen – hole (aperture) or perforation through a bone

- E.g. mental - mandible

Fossa – a depression, usually longitudinal

- E.g. olecranon fossa on humerus – ulna’s olecranon fits here

Joints - area where adjacent bones interact, an articulation; 3 functional classifications:

- Synarthroses (fibrous) – nonmovable
- Amphiarthroses (cartilaginous) – slightly movable
- Diarthroses (synovial) – freely movable

Meniscus (menisci) –

- crescent-shaped fibrocartilaginous structure of
 - knee
 - acromio- and sternoclavicular joints
 - temporo-mandibular joint

Phalanx (phalanges) – bones of finger(s)/toe(s)

Sinus – chamber or hollow in a tissue (can also be a large dilated vein)

Suture – fibrous joint / articulation between flat bones of skull - nonmoveable

Torso – trunk, body without relation to head or extremities

Tubercle / tuberculum:

- ✖ slight elevation on bone surface for muscle or ligament attachment
- ✖ e.g. rib tubercle – knob near rib head that articulates with transverse process of a vertebra

Tuberosity –

- ✖ large tubercle or rounded elevation on bone surface (e.g. radius)

Trochanter –

- ✖ 2 large, rough bony prominences at proximal end of femur – greater & lesser

UNIT I: SKELETAL SYSTEM

A. INTRODUCTION

Review "Introduction to the Skeletal System" in the lecture text book, e.g. Martini's Intro to A&P 7th Ed (p.180)

Bone functions:

1. support
2. storage – minerals, lipids
3. synthesis – blood cells (WBCs, RBCs, etc.)
4. protection
5. leverage – change direction & magnitude of skeletal muscle forces

Bone types:

1. long - humerus
2. flat - parietal
3. irregular - vertebrae
4. short - carpals
5. sesamoid – patella
6. sutural (Wormian)

B. AXIAL SKELETON – PART 1

Skull, Part 1: Using the **Intact Skull Model** identify the following features

Part A Cranial Bones (8) – house / protect the brain

Frontal – contains frontal lobes – anterior cranial fossa

Parietal (2)

Temporal (2) – contains temporal lobes, middle cranial fossa

Occipital – contains cerebellum + brain stem – posterior cranial fossa

Sphenoid – floor of cranial cavity (cranium)

Ethmoid – floor of cranial cavity

Part B. Sutures

Sagittal

Coronal

Lambdoidal “λ”

- Wormian or Sutural Bones

Squamous – above temporal/parietal

Frontal (normally only in fetal skull = metopic suture)

Part C. Paranasal Sinuses using the **Sagittal Skull Model**

- **Function: lighten bone; clean, moisten, and warm the air**

Frontal – ‘cold drink effect’

Maxillary – largest – hard to see

Sphenoid – center of skull, behind nose and eyes - access to pituitary via nasal cavity

Ethmoid + air cells – hard to see

Part D. 6 Fontanels using the **Fetal Skull Model**

Frontal – anterior = ‘soft spot’ [largest – know this one]

Mastoid (2) + sphenoidal (2)

Occipital – posterior = ‘soft spot’

C. AXIAL SKELTON – PART 2: Identify the following features:**Part A. Skull – 8 Cranial Bones & Features**

1. Frontal

Orbital plates – roof of orbits (eye sockets)

Supraorbital margin – thickening of frontal bone, protects eye

Zygomatic process – where articulates with zygomatic [facial] bone

2. Parietal (2)

3. Temporal (2)

Squamous portion – convex irregular surface, borders squamous suture

Mastoid process – attachment site for muscles that rotate/extend head

- Contains air cells connected to middle ear cavity – infection - *mastoiditis*

Styloid process – near base of mastoid process

- Attached to ligaments that support hyoid bone and attached to tendons of muscles associated with hyoid bone, tongue, pharynx

Petrous portion – internal, encloses inner ear – hearing & balance

External auditory / acoustic meatus / canal – lateral surface

- Ends at tympanic membrane (disintegrated on dry skull)

Internal auditory / acoustic meatus / canal – begins medial surface of petrous

- Carries blood vessels (BVs) and nerves to inner ear,
- Conveys facial nerve (CN-VII) to stylomastoid foramen

Zygomatic process (part of zygomatic arch = cheek bone)

- Articulates with temporal process (part of zygomatic arch) of zygomatic bone

4. Occipital (1)

Foramen magnum (large opening) – brain / spinal cord connection site

Occipital condyles – articulates with cervical vertebra (atlas C1) – nods head

5. Sphenoid (1)

Sella turcica (Turk's saddle)

- Hypophyseal fossa - depression
 - Supports / holds pituitary gland

Greater wings – cranial floor, posterior wall orbit

Lesser wings – horizontal, anterior to sella turcica

Optic foramen / canal – passage for optic nerve (CN-II) - vision

6. Ethmoid (1)

Cribriform plate

- Olfactory foramina – passage / perforations for olfactory nerves (CN-I), provides sense of smell

Perpendicular plate – part of nasal septum

Crista galli – cock's comb – bony ridge proximal to cribriform plate

- Stabilizes brain via *falx cerebri* membrane

Superior nasal concha – breaks up air flow, enables cleaning, warming, smelling

Middle nasal concha - *ditto*

Part B. Skull – 14 Facial Bones & Features

Nasal bones (2) – support superior portion of bridge of nose

- Connected to cartilage that forms distal part of nose

Lacrimal (2) – smallest facial bones – medial wall orbit

- Lacrimal sulcus / groove – location of lacrimal sac – leads to nasolacrimal canal
- Palatines (2) – hard palate (posterior portion), orbit floor
- Zygomatics (2) – orbit rim and lateral wall, part of zygomatic arch
 - Frontal process – articulation with temporal bone
 - Temporal process (part of zygomatic arch)
- Inferior nasal concha (2) –
 - create air turbulence, increase surface area to warm & humidify
- Vomer (1) – bony nasal septum – inferior portion
- Maxillae (2) – largest facial bone, largest sinus, articulates with all facial bs but mandible
 - Alveolar process – supports upper teeth
 - Palatine process – most of hard palate
- Mandible (1) – lower jaw - only moveable bone in skull
 - Condylod process – articular surface TMJ
 - Coronoid process – temporalis muscle inserts here
 - Mandibular foramen – passage for nerves and BVs lower teeth
 - Dentists block here for lower teeth work
 - Mandibular symphysis – fusion of 2 halves of mandible, at chin
 - Body – horizontal portion
 - Ramus – ascending part, begins at angle, contains condyloid & coronoid
 - Alveolar process – supports lower teeth
 - Mental foramen (on anterior surface)
 - opening for nerves carry sensory information from lips and chin
- Hyoid bone (1)
 - supports larynx; attachment site for muscles of tongue, larynx, pharynx
- Auditory ossicles (6) – in middle ear

D. POSTCRANIAL AXIAL SKELETON

Using the Vertebral Column Model, identify the following features:

Part A. The Vertebral Column – 26 bones

mnemonic: 7C, 12T, 5L = breakfast 7 am, lunch 12 noon, dinner 5pm

Cervical (C) vertebrae (C1-C7)

Atlas = C1

Axis = C2

- Dens (odontoid process)

Vertebrae prominens (spinous process of) = C7

Transverse foramen – only found in C

- Passage for vertebral arteries & veins to and from brain

Thoracic (T) vertebrae (T1-T12)

**Spinous process* – posterior – attach muscles

**Transverse process* – lateral or dorsolateral – attach muscles

Rib articulating facets – only found on T vertebrae

Vertebral articulating facets – concave processes for superior/inferior articulation

**Body (centrum)* – transfers weight along axis of vertebral column

- Interconnected by ligaments
- Separated by fibrocartilage pads = intervertebral discs

**Lamina* (joins transverse process & spinous process)

***Pedicle** (joins transverse process & body)

***Intervertebral foramen** – gaps that separate pedicles of adjacent vertebrae

- spinal cord nerves pass through here

***Spinal foramen** (vertebral foramen) – encloses spinal cord

Lumbar (L) vertebrae (L1-L5) – largest vertebrae

- most weight bearing
- massive spinous processes for lower back muscle attachment

Sacrum (S: 5 fused bones)

- protects GI, reproductive, & urinary organs
- attaches axial to appendicular skeleton via pelvic girdle

Sacral foramina (intervertebral foramina) – 4 pairs either side crest

Coccyx (3-5 fused bones)

- attachment sites for ligaments & muscle constrict anal opening

* **Present and well developed on all vertebrae except the coccyx**

Part B. Rib Cage. Use Ribs, Sternum, & Articulated Skeleton

Ribs (12 pairs total)

True (upper 7 pairs) – connect directly to sternum via costal cartilage

False (lower 5 pairs)

- Rib pairs 8-10
 - Indirect sternum connection - costal cartilages fuse with rib pair 7 costal cartilage
- Floating (lower 2 pairs = 11-12)
 - no connection to sternum

Head of Rib – *capitulum* – articulates with vertebrae

Costal cartilage – connect rib to sternum

Neck (constriction below head) – leads to tubercle

Tubercle (bump near neck) – articular facet – contacts transverse process of T

Sternum

Manubrium – articulates with clavicles (collarbones) and rib pair 1

Body (gladiolus) – attaches rib pairs 2-7

Xiphoid process – attaches diaphragm & rectus abdominus muscles

Jugular (suprasternal) notch – shallow indentation between clavicular articulations

E. APPENDICULAR SKELETON (126 bones)

- **Identify the following bones and features using the Specific Bones listed and the Fully Articulated Skeleton Model**

Part A. Upper Appendicular Skeleton (upper limbs = 60 bones)

Humerus (2)

Head

Greater tubercle

Deltoid tuberosity

Olecranon fossa

Medial epicondyle

Lateral epicondyle

Shaft

Lesser tubercle

Coronoid fossa

Capitulum (condyle - articulates with radius)

Trochlea (condyle - articulates with ulna)

Ulna (2)

Olecranon process

Coronoid process

Styloid process

Trochlear (semilunar) notch

Radial notch

Radius (2)

Head

Styloid process

Radial tuberosity

Neck (constriction below head)

Carpals (8 in each hand = 16)

Scaphoid SCARED

Lunate LOVERS

Triquetrum TRY

Pisiform POSITIONS

Trapezium THAT

Trapezoid THEY

Capitate CANNOT

Hamate HANDLE

Metacarpals (I-V) – thumb = I = 10

Phalanges (proximal-middle-distal) except thumb = 28

Clavicle (2)

Acromial end (flat end)

Sternal end (rounded end)

Scapula (2)

Acromial process

Vertebral border

Axillary border

Glenoid fossa (cavity)

Spine

Coracoid process

Superior border

Subscapular fossa

Infraspinous fossa

Supraspinous fossa

Part B. Lower Appendicular Skeleton – lower limbs = 60 bones

Femur – thigh (2)

Head

Greater trochanter

Lesser trochanter

- Lateral condyle
- Medial condyle
- Neck
- Linea aspera – posterior, muscle attachment
- Tibia – leg (2)
 - Head
 - Medial malleolus
 - Tibial tuberosity
- Fibula – leg (2)
 - Head
 - Lateral malleolus
- Patella – sesamoid bone (2)
- Tarsals (7 in each foot, total = 14)
 - Calcaneous - heel
 - Talus (articulates with tibia & fibula)
 - Navicular
 - Cuboid
 - Medial cuneiform
 - Intermediate cuneiform
 - Lateral cuneiform
- Metatarsals (5 in each foot, total = 10)
- Phalanges (14 in each foot, total = 28)

- Ossa coxae (Innominate bones) (2)
 - Ilium
 - Iliac crest
 - Greater sciatic notch
 - Anterior superior iliac spine
 - Anterior inferior iliac spine
 - Acetabulum – ‘cup-like’ (Greek)
 - Ischium
 - Ischial tuberosity (‘sitting bone region’)
 - Ischial spine
 - Lesser sciatic notch
 - Acetabulum – ‘cup-like’ (Greek)
 - Pubis
 - Obturator foramen (large hole near pubis)
 - Pubic symphysis
 - Acetabulum – ‘cup-like’ (Greek)

LESSONS & REVIEW FOR SKELETAL SYSTEM

AXIAL DIVISION

CONCEPTS TO KNOW

- articulation of bones to form entire skeleton
- functions of bone contours (muscle attachment, nerve/vessel passageway or articulation).

Lesson 1. Identify all skull bones (and contours in parentheses) and the bones that articulate with the selected bones. Describe function of contours(muscle attachment, nerve/vessel passageway or articulation).

Cranial bones

Frontal

Parietals

Occipital (foramen magnum, occipital condyles)

Temporals (mastoid process, external auditory meatus)

Sphenoid (sella turcica)

Ethmoid (olfactory foramina, crista galli)

Facial bones

Nasals

Lacrimals

Zygomatics

Maxilla (infraorbital foramen)

Mandible (mental foramen, coronoid process, condylar process)

Hyoid

Lesson 2. Identify other skull features. Describe functions of sinuses and fontanelles.

Sinuses

frontal

sphenoidal

ethmoidal

maxillary

Sutures

sagittal

coronal

squamousal

lambdoidal

Fontanelles

frontal or anterior

occipital or posterior

sphenoidal or anteriolateral (2)

mastoidal or posteriolateral (2)

Lesson 3. Identify following bones and the bones that articulate with the selected bones.

Describe function of contours (muscle attachment, nerve/vessel passageway or articulation).

all vertebrae (vertebral foramen, transverse process, spinous process, body)

cervical vertebrae (cervical foramen)
C1 or first cervical vertebrae or atlas cervical vertebrae
C2 or second cervical vertebrae or axis cervical vertebrae (dens)
thoracic vertebrae
lumbar vertebrae
sacral vertebrae
coccyx vertebrae
ribs
sternum (xiphoid process, manubrium, body)

APPENDICULAR DIVISION, ARTICULATIONS, MOVEMENTS

BY THE END OF THIS LAB, YOU SHOULD BE ABLE TO:

1. Identify all the assigned bones, their associated contours, sides and **gender** (if applicable).
2. Know the functional and structural classifications of the selected adult articulations.
3. Know the movements of the diarthrotic joints.

CONCEPTS TO KNOW

articulation of bones to form entire skeleton
structural and functional categories of selected joints
movements specific to diarthrotic joints

Lesson 4. Identify bones of the pectoral girdle and appendages and the bones that articulate with the selected bones. Describe function of contours (muscle attachment, nerve/vessel passageway or articulation).

Clavicle

R/L Scapula (glenoid fossa, acromion process, coracoid process, spine)

R/L Humerus (head, greater tubercle, lesser tubercle, deltoid tuberosity, capitulum, trochlea, medial epicondyle, olecranon fossa)

R/L Ulna (olecranon process, trochlear notch, styloid process)

R/L Radius (radial tuberosity, styloid process)

Carpals (know as a group)

Metacarpals (as a group)

Phalanges (as a group)

Lesson 5. Identify of the pelvic girdle and appendages and the bones that articulate with the selected bones. Describe function of contours. Identify gender of pelvic bones.

R/L Pelvic bones (acetabulum, pubic symphysis)

Ilium (greater sciatic notch)

Ischium (ischial tuberosity, ischial spine)

Pubis (obturator foramen)

R/L Femur (head, greater trochanter, lesser trochanter, linea aspera)

Patella

R/L Tibia (tibial tuberosity, anterior crest, medial malleolus)

Fibula (lateral malleolus)

Tarsals (calcaneous, talus, others as a group)

Metatarsals (as a group)

Phalanges (as a group)

UNIT II: MUSCULAR SYSTEM – skeletal muscle only

OBJECTIVES

Upon completion the student should be able to:

- 1 define the terms
- 2 identify structures
- 3 describe functions

MUSCLE TERMINOLOGY (alphabetically listed):

Study terminology before going on to: A. INTRODUCTION

Abduction (bye-bye)

Adduction

Antagonist and 'agonist' see 'Prime Mover'

Belly

Dorsiflexion

Extension

Fixator

Flexion – note you '**flex**' a muscle but a joint movement opposite to extension is called '**flexion**'

Insertion

Levers

1st class

2nd class

3rd class

Origin

Plantar flexion

Prime mover/agonist

Pronation

Supination

Synergist

A. INTRODUCTION**UNIT II: MUSCULAR SYSTEM**

Review "Introduction to the Muscular System" in the lecture text book, e.g. Martini's Intro to A&P 7th Ed (p.284); Chapter 11 p 326

NOTE:

***Know origin (o), insertion (i), and function/action of all 20 muscles identified with an asterisk (*)**

Part A. General Principles

Origin
Insertion
Belly

Part B. Muscle Action

By pulling – flexion, extension, supination, pronation, dorsiflexion, plantar flexion, abduction, adduction
Prime movers (agonist)
Antagonists
Synergists
Fixators

Part C. Muscles as levers

First class lever
Second class lever
Third class lever

B. MUSCLES OF THE HEAD *On the Muscle Head Model, identify the following:*

***Masseter**
Temporalis
Orbicularis oris (mouth)
Orbicularis oculi (eye)
Occipitofrontalis (frontal portion = frontalis)
***Sternocleidomastoideus**
Platysma (thin, broad neck muscle ---shown on *Frohse Chart*)
Occipitofrontalis (occipital portion = occipitalis)
Risorius (grin)
Zygomaticus (smile)
Triangularis / Depressor anguli oris (frown)
Buccinator

C. MUSCLES OF THE TORSO *On the Torso Model & Frohse Chart 2 “Muscular System” identify the following:*

Part A. Anterior View

***Pectoralis major**

Pectoralis minor

Serratus anterior

External intercostals

Internal intercostals

External abdominal oblique

Internal abdominal oblique

Rectus abdominis

Transversus abdominis (inside)

Iliopsoas (Iliacus and Psoas major)

Part B. Posterior View

***Trapezius**

***Latissimus dorsi**

Teres major

Diaphragm

Serratus posterior (inferior)

Rhomboidius

Levator scapulae

Erector spinae – as a group

Gluteus maximus

Gluteus medius

Gluteus minimus

Part C. Rotator Cuff

***Supraspinatus**

***Infraspinatus**

***Teres minor**

***Subscapularis** (Not shown on Torso Model, see Arm Model – Note #6)

D. MUSCLES OF ARM & LEG *Identify the following:*

Part A. Arm Model

***Deltoid**

***Biceps brachii**

Brachialis

Carpiflexors – hand flexors

Palmaris longus

Brachioradialis

***Triceps brachii**

Carpixtensors – hand extensors

Extensor digitorum

Teres major

Teres minor

Pronator teres - pronates

Rotator cuff

Supraspinatus

Infraspinatus

Teres minor

Subscapularis

Carpal tunnel – *for interest only*

Part B. Leg Model

***Quadriceps**

Rectus femoris

Vastus lateralis

Vastus medialis

Vastus intermedius (remove *rectus femoris* to see this)

Sartorius

Adductor magnus

Adductor longus

Tibialis anterior

Gluteus maximus

Gluteus medius

***Hamstrings**

Biceps femoris - *lateral*

Semitendinosus

Semimembranosus - *medial*

***Gastrocnemius**

Soleus (remove gastrocnemius)

Gracilis

KNOW FUNCTIONS OF SELECTED MUSCLES LISTED BELOW

Muscles of the Head (12)	FUNCTION/S
1. * Masseter	Elevate mandible
2. Temporalis	Elevate mandible
3. Orbicularis oris	“Pucker” or close lips or ‘kiss’
4. Orbicularis oculi	“Squint” or close eyes
5. Frontalis	Elevate eyebrows, wrinkle brow
6. * Sternocleidomastoid	Flex and rotate head
7. Platysma	Depress lower lip, depress mandible
8. Buccinator	Compress cheek
9. Occipitalis	Draw scalp backwards
10. Zygomaticus	Smile
11. Triangularis (<i>depressor anguli oris</i>)	Depress corner of mouth/frown
12. Risorius	Draw angle of mouth lateral (tenseness, grin)

Muscles of Arms & Forearms (8)	FUNCTIONS
1. Deltoid	Abduct arm (humerus)
2. Biceps brachii	Flex arm and forearm
3. Brachialis	Flex forearm
4. Brachioradialis	Flex forearm
5. Triceps brachii	Extend arm and forearm
6. Palmaris longus (carpi flexor)	Flex wrist
7. Extensor digitorum (carpi extensor)	Extend wrist and fingers
8. Pronator teres	Pronate forearm

Muscles of Rotator cuff (4)	FUNCTIONS
1. Subscapularis	Medially rotate humerus
2. Supraspinatus	Stabilize joint/abduct humerus
3. Infraspinatus	Rotate humerus laterally
4. Teres minor	Rotate humerus laterally

Muscles of the torso - Anterior view (10) FUNCTION/S

1.	*Pectoralis major	Adduct/flex humerus
2.	Pectoralis minor	Downward rotation of scapula
3.	Serratus anterior	Abduct scapula, elevate ribs, <u>inhale</u>
4.	External intercostals	Elevate ribs
5.	Internal intercostals	Depress ribs
6.	External oblique	Compress abdomen/rotation of trunk
7.	Internal oblique	Compress abdomen/rotation of trunk
8.	Rectus abdominis	Compress abdomen/flex trunk
9.	Transversus abdominis	Compress abdomen
10.	Diaphragm	Enlarge thorax

Muscles of the torso - Posterior view (11) FUNCTIONS

11.	*Trapezius	Rotate/adduct scapula, extend neck
12.	*Latissimus dorsi	Extend/adduct humerus
13.	Teres major	Extend/adduct humerus
14.	Teres minor	Lateral rotation of arm
15.	Rhomboideus	Adduct/rotate scapula
16.	Levator scapulae	Elevate scapula
17.	Gluteus maximus	Extend thigh, abduct & laterally rotate thigh
18.	Gluteus medius	Abduct thigh, medially rotate thigh
19.	<i>[Gluteus minimus - no]</i>	<i>[Abduct thigh, medially rotate thigh]</i>
20.	Erector spinae	Extend trunk
21.	Serratus posterior (inferior)	Draw ribs outward & downward, <u>exhale</u> (depress the 4 lower ribs – see D/G chart)

Muscles of the Leg/Thigh (10) FUNCTIONS

1.	Quadriceps	
	Rectus femoris	Flex thigh, extend leg
	Vastus lateralis	Extend leg
	Vastus medialis	Extend leg
	Vastus intermedius	Extend leg
2.	Sartorius	Flex thigh and leg
3.	Adductor magnus	Adduct and extend thigh
4.	Adductor longus	Adduct, flex and laterally rotate thigh
5.	Tibialis anterior	Dorsiflex foot
6.	Hamstrings	
	a. Biceps femoris	Flex leg, extend thigh
	b. Semitendinosus	Flex leg, extend thigh
7.	Gastrocnemius	Flex leg, plantar flex foot, stand on tip-toe
8.	Soleus	Plantar flex foot
9.	Iliopsoas	Flex and laterally rotate thigh
10.	Gracilis	Adduct thigh and flex leg

UNIT III: NERVOUS SYSTEM

OBJECTIVES

Upon completion the student should be able to:

1. define the terms,
2. identify (ID) structures,
3. describe functions

NERVE TERMINOLOGY:

Study terminology before going on to: A. INTRODUCTION

1. Afferent
2. Autonomic nervous system (ANS)
3. Brain stem
4. Central nervous system (CNS)
5. Cortex
6. Decussation
7. Effector
8. Efferent
9. Fasciculus (Fasciculi)
10. Fissure
11. Funiculus (Funiculi)
12. Ganglion
13. Gray matter
14. Gyrus (Gyri)
15. Innervation
16. Medulla
17. Meninx (Meninges)
18. Neuron
 - a. Motor
 - b. Interneuron (association)
 - c. Sensory
19. Paralysis
20. Parasympathetic system/division (ANS)
21. Peripheral nervous system (PNS)
22. Plexus (Plexuses)
23. Process
24. Ramus (Rami)
25. Receptor (sensor)
26. Somatic nervous system (SNS)
27. Spinal tract
28. Sulcus (Sulci)
29. Sympathetic system/division (ANS)
30. Synapse
31. Tracts
32. White matter

A. INTRODUCTION**UNIT III: NERVOUS SYSTEM****Divisions of the Nervous System****Central Nervous System (CNS)**

- (a) Brain
- (b) Spinal cord

Peripheral Nervous System (PNS)

- (a) Cranial nerves *
- (b) Spinal nerves #

Somatic Nervous System (SNS)

- includes motor nerves that control skeletal muscles
 - voluntary

Autonomic Nervous System (ANS)

- includes nerves that control smooth & cardiac muscles and glandular secretions
 - involuntary

* **Cranial nerves** may be **sensory, motor, or mixed** (both sensory and motor)

Spinal nerves are **all mixed** (i.e. have both afferent and efferent fibers)

NERVOUS SYSTEM CHARTS & MODELS IN LAB

1. STRIATED MUSCLE FIBER WITH MOTOR END-PLATE MODEL
2. NEURON MODEL
3. NERVOUS SYSTEM OF MAN
4. SPINAL CORD WITH SPINAL CANAL (1)
5. GIANT 4-PART BRAIN SERIES
6. TORSO WITH DETACHABLE HEAD & DETACHABLE VERTEBRAE WITH SPINAL NERVES
7. LIFE-SIZE BRAIN WITH ARTERIAL BLOOD SUPPLY
8. MUSCLE HEAD – SAGITTAL SECTION
9. 5TH CERVICAL VERTEBRA WITH SPINAL CORD & ORIGIN OF NERVES
10. FROHSE CHART 3 – NERVOUS & CIRCULATORY SYSTEMS
11. FROHSE CHART 5 – HUMAN EAR & EYE – SPECIAL SENSES
12. EYE IN ORBIT – SPECIAL SENSES
13. GIANT 3-PART EAR – SPECIAL SENSES
14. LABYRINTH – HUMAN AUDITORY ORGAN – SPECIAL SENSES
15. ENLARGED NOSE MODEL – SPECIAL SENSES

Multipolar neuron (Martini Chapter 12 – neural tissue)**Identify the following structures in the neuron model:**

- Cell body (“A” on model = perikaryon = cytoplasm around nucleus)
- Axon
- Dendrites
- Nucleus
- Myelin sheath (colored **yellow** on axon model)
- Node of Ranvier
- Schwann cell nucleus (satellite cell in PNS)
 - equivalent glial cell in CNS = oligodendrocyte
- Neurofibrils (shown as brown lines in cell body = # 16 ‘neurotubules’ on model key)
- Synapse

Brain and Cranial Nerves (Chapter 14 Martini)**Identify the following on: brain, head, torso, and/or spinal cord models and charts:****BRAIN:****Cerebrum**

- Hemispheres (halves)
- Lobes
 - Frontal
 - Parietal
 - Temporal
 - Occipital
- Sulci (fissures or depressions)
 - Longitudinal fissure
 - Separates L and R cerebrum
 - Transverse fissure
 - Separates cerebrum from cerebellum
 - Central sulcus
 - Separates frontal from parietal lobes
 - Lateral (cerebral) sulcus (fissure)
 - Separates frontal from temporal lobes
 - Parieto-occipital sulcus
 - Separates parietal from occipital lobes
- Gyri (convolutions, prominent rounded elevations)
 - Precentral gyrus - motor
 - Postcentral gyrus - sensory
- Corpus callosum
 - Transmits impulses from gyri in one cerebral hemisphere to corresponding gyri in opposite cerebral hemisphere

Cerebellum

- 4th ventricle
- Arbor vitae

Diencephalon

Thalamus
 Hypothalamus
 Hypophysis (pituitary gland)
 Third ventricle

- walls are formed by both left & right thalami
- floor is formed by the hypothalamus

Brain Stem – term for all brain parts when cerebrum and cerebellum are removed

Medulla oblongata
 Pons
 Midbrain (mesencephalon)

CRANIAL NERVES:

Cranial Nerve I

Name: OLFACTORY
 Type: Sensory
 Function: Smell

Cranial Nerve II

Name: OPTIC
 Type: Sensory
 Function: Vision

Cranial Nerve III

Name: OCULOMOTOR
 Type: Motor
 Function: 4 extrinsic and all intrinsic eye muscles

Cranial Nerve IV

Name: TROCHLEAR
 Type: Motor
 Function: 1 extrinsic eye muscle (superior oblique)

Cranial Nerve V

Name: TRIGEMINAL
 Type: Mixed
 Function: Facial sensation & mastication

Cranial Nerve VI

Name: ABDUCENS
 Type: Motor
 Function: 1 extrinsic eye muscle (lateral rectus)

Cranial Nerve VII

Name: FACIAL
 Type: Mixed
 Function: Taste, salivation, lactation, & facial expression

Cranial Nerve VIII

Name: AUDITORY / VESTIBULOCOCHLEAR
 Type: Sensory
 Function: Hearing and equilibrium

Cranial Nerve IX

- Name: GLOSSOPHARYNGEAL
 Type: Mixed
 Function: Taste, salivation, & pharyngeal muscles
 Cranial Nerve X
- Name: VAGUS
 Type: Mixed
 Function: Visceral sensation, abdominal smooth muscles & myocardium
 Cranial Nerve XI
- Name: [SPINAL] ACCESSORY
 Type: Motor
 Function: Trapezius and sternocleidomastoid
 Cranial Nerve XII
- Name: HYPOGLOSSAL
 Type: Motor
 Function: Tongue movement

No.	Name		Type - Receptor	Sensory Pathway	Effector or function
I	Olfactory	S	Sensory - Olfactory epithelium	directly to temporal lobe [Only CN that does this]	Smell
II	Optic	S	Sensory - Retina	through thalamus to occipital lobe	Sight
III	Oculomotor	M	Motor - eyeball muscle proprioception	thalamus to midbrain	Eyelid and 4/6 eyeball muscles, lens (focusing), pupil (constriction), muscle sense
IV	Trochlear	M	Motor - eyeball muscle proprioception	thalamus to midbrain	eyeball muscle movement, muscle sense
V	Trigeminal (3 branches)	B	Mixed - Chewing muscles proprioception, cutaneous touch and pain receptors for face, jaw and teeth	thalamus to pons, then to somatosensory area	chewing muscles, sensations from organs of face
VI	Abducens	M	Motor - eyeball muscle proprioception	Thalamus to midbrain	eyeball muscle, muscle sense
VII	Facial	B	Mixed - Facial muscle proprioception, tongue taste bud receptors	thalamus to pons then somatosensory area and/or to gustatory area (taste)	facial expression muscles, secretion of saliva and tear glands, muscle sense, taste
VIII	Auditory or Vestibulocochlear	S	Sensory - Hearing and equilibrium / balance organs	thalamus to pons then to temporal lobe	Hearing, balance, posture
IX	Glossopharyngeal	B	Mixed - arterial chemoreceptors and baroreceptors, tongue taste receptors, tongue muscle	thalamus to medulla/pons	saliva glands, tongue muscles (swallowing), muscle sense, taste (aids in regulation of

			proprioception		breathing and BP)
X	Vagus	B	Mixed - arterial chemoreceptors and baroreceptors, pharyngeal taste receptors, pressure/pain receptors in thoracic and abdominal organs	thalamus to medulla/pons	Swallowing and speaking muscles, smooth muscle and secretory glands in GI tract, Heart muscle, (aids in regulation of breathing, BP and slows HR), visceral sensations
XI	Accessory	M	Motor- Neck and shoulder muscle Proprioception	thalamus to medulla	swallowing muscles, head and neck moving muscles, muscle sense
XII	Hypoglossal	M	Motor - Swallowing and speaking muscle Proprioception	thalamus to medulla,	Swallowing and speaking muscle, muscle sense

Mnemonics for learning the cranial nerves:

1. For naming in order of number: (I-XII)

- **On Old Olympus' Towering Top, A Finn And German Viewed Some Hops**

2. For naming in order of type: M = Motor, B = Both (Mixed), S = Sensory

- **Some Say Marry Money, But My Brother Says "Bad Business Marry Money!"**

SPINAL CORD & SPINAL NERVES (Chapter 13 Martini)

Use Models:

- Nervous system of man (coronal section)
- Spinal cord, spinal nerves, & spinal reflexes
- Fifth cervical (C5) vertebrae with spinal cord & origin of nerves
- Torso – vertebral pull out section

Spinal Cord (flat Spinal Cord model)

Longitudinal anatomy:

Length = 18 inches

Terminates at lower border of L2 vertebra

Conus medullaris (medullary cone)

Cauda equina

Relationship to Vertebral column (see dorsal spinal cord section on torso models):

Vertebra

Spinous process

Transverse process

Transverse foramen

Intervertebral foramen

- Spinal nerve

Cross sectional anatomy (see also: Figures 13-3, 13-5 in Martini text book)

- Central canal
- Gray matter
 - Horns (gray columns)
 - Anterior (ventral)
 - Posterior (dorsal)
 - Lateral
- T1-L2 cord levels only
- White matter

Spinal meninges

Epidural space
 Dura mater
 Subdural space
 Arachnoid space
 Pia mater
 Denticulate ligaments

Spinal Nerves (spinal cord model, Frohse chart)

Dorsal root

Contains only sensory (afferent) fibers

Ventral root

Contains only motor (efferent) fibers

Spinal nerves

Numbers (1 pair per cord level; 31 pairs of spinal nerves)

Cervical = 8
 Thoracic = 12
 Lumbar = 5
 Sacral = 5
 Coccygeal = 1

Plexuses

Cervical plexus
 Phrenic nerve
 Brachial plexus
 Radial nerve
 Median nerve
 Ulnar nerve
 Lumbar plexus
 Femoral nerve
 Sacral plexus
 Sciatic nerve

Meninges and Cerebrospinal Fluid (CSF)

Ventricles

Third (III) ventricle
 Cerebral aqueduct (aka: Aqueduct of Sylvius)
 Fourth (IV) ventricle

Subarachnoid space = CSF

Arachnoid

UNIT IV: SPECIAL SENSES - Martini Chapter 17

OBJECTIVES

Upon completion the student should be able to:

1. define the terms,
2. ID structures,
3. describe functions

SPECIAL SENSES TERMINOLOGY:

- 1) Accomodation
 - 2) Aqueous humor
 - 3) Audioreceptors
 - 4) Audition
 - 5) Bony labyrinth
 - 6) Chemoreceptors
 - 7) Conduction
 - 8) Convergence
 - 9) Crista (cristae)
 - 10) Endolymph
 - 11) Extrinsic
 - 12) Gustation (gustatory)
 - 13) Intrinsic
 - 14) Macula (maculae)
 - 15) Membranous labyrinth
 - 16) Olfaction
 - 17) Organ of Corti
 - 18) Perilymph
 - 19) Photoreceptors - Cones, Rods
 - 20) Reflection
 - 21) Refraction
 - 22) Special Senses
 - 23) Vision
 - 24) Vitreous humor
-

The Ear – hearing & equilibrium:

- On the Ear Model, identify these stuctures

Part A. External ear

Auricle (pinna)

External auditory / acoustic canal – in temporal bone

- aka: External auditory meatus

Part B. Middle Ear (tympanic cavity)

Tympanic membrane

Auditory ossicles

Malleus

Incus

Stapes

Eustachian tube (auditory tube)

Part C. Inner Ear**Semicircular canals**

- Bony labyrinth (cream-colored on model)
 - Membranous labyrinth (fluid-filled canals on model)
 - Ampullae
 - Cochlea
 - Vestibule
 - Vestibulocochlear (auditory) nerve CN-VIII
-

The Eye – vision:

- On the **Eye Model**, identify these structures

Part A. Extrinsic eye muscles (see page 339, Martini text book)

- Superior rectus
 - CN-III, oculomotor
 - Eye rotates up and to midline
- Inferior rectus
 - CN-III, oculomotor
 - Eye rotates down and to midline
- Lateral rectus
 - CN-VI, abducens
 - Away from midline
- Medial rectus
 - CN-III, oculomotor
 - To midline
- Superior oblique
 - CN-IV, trochlear
 - Eye down
- Inferior oblique
 - CN-III, oculomotor
 - Eye up, and away from midline

Part B. Eyeball**Outer layer**

Sclera
Cornea

Middle layer

Choroid – purple on model
Iris (intrinsic eye muscle)
Pupil – opening in iris
Ciliary body & ciliary process (intrinsic eye muscle)

Inner layer

Retina – white inner layer surrounding flexible eyeball
Rods – microscopic, not visible on model
Cones – ditto-
Macula lutea – yellow spot

- Note: may have different color on model!!
- Best area for vision/acuity

Fovea centralis – central spot of macula lutea
Optic disc (blind spot) – white spot – may have different color on model

Anterior Cavity – between cornea and lens, composed of 2 chambers:

- 1) anterior chamber – part of the anterior cavity which lies between the cornea and iris, contains aqueous humor
- 2) posterior chamber – part of the anterior cavity which lies between iris and lens, also contains aqueous humor

Posterior Cavity – between lens and retina, contains vitreous humor
