Course:	Anatomy & Physiology I		Department:	Biology

Course Description
This is the first part of a two-semester course that presents in a comprehensive manner the structure and function of the human body. Topics include tissues and the integumentary, skeletal, muscular, and nervous systems. A dissection component of the laboratory work is required for successful completion of the course. This course is designed for students in the health programs. Lecture: 3 hours Laboratory: 2 hours

Prerequisite: Grade of 'C-' or better in Biological Principles I (BIOL121) or successful performance on departmental challenge exam, and Preparing for College Reading II (ENGL092), Introductory Writing (ENGL099), and Fundamentals of Mathematics (MATH010), or waiver by placement testing results, or Departmental Approval Anatomy and Physiology I (BIOL201) must be taken before Anatomy and Physiology II (BIOL202).

The individual outcomes listed in the first column answer the question: What must the learner know and be able to do at the end of the course? Items in the third column should answer the question: How do we know? The second column is where teachers can be most creative; it's for pedagogy. Each rectangle in column one contains just one outcome; the corresponding rectangles in columns two and three, however, may contain more than one item.

The code indicates the core competencies being strengthened by the outcomes activities and the assessment tools.
Critical Thinking (CT); technology skills (TS); oral communications (OC); quantitative skills (QS); reading (R); writing (W).

Course Outcomes	Outcomes Activities	Assessment Tools
Use the general steps of the scientific method to form hypotheses, collect and	Conduct experiments in lab, developing hypotheses, collecting data,	• Tests (CT,R,W) • Quizzes (CT,R,W)

evaluate data, and draw conclusions, in order to learn to distinguish between science and pseudoscience, and to evaluate scientific information in both professional journals and the popular press.	interpreting data, drawing conclusions. (CT,R,W,TS,QS) Attend lecture/discussion (W,OC,CT) Conduct experiments stressing importance of controls. (CT,R,W,TS,QS) Read text (CT,R) Read articles in Time, Newsweek etc. and evaluate (R,W,CT) Do study guide (R,W,CT) Discussion using power point presentation regarding characteristics of psueudoscience vs. real science and bad science vs. good science (CT, TS, OC) Do study guide (R,W,CT) Power point presentations (CT,OC,TS) Computer simulations (TS, R, QS) Posters (R,W,OC) Oral presentations (R,W,OC) Lab reports (R, W, TS, QS)	• Short papers (C) • Lab reports (CT,R,W,QS) • Lab exercise sheets • Article reviews (CT,R,W,TS) • Special projects
Relate the unifying themes of the relationship between structure and function and the maintenance of homeostasis to the structure and function of the human body. Give examples for all 11 systems.	Integrated into activities for each system	Integrated into assessments for each system
Body Plan and Organizaton **1.** Describe a person in anatomical position **2.** Describe how to use the terms right and left in anatomical reference.	Exercise 1 The Language of Anatomy (R, W, CT) Exercise 2 Organ Systems Overview (R, W, CT)	Tests (CT,R,W) Quizzes (CT,R,W) Short papers (CT,R,W,TS) Lab reports (CT,R,W,QS) Lab exercise sheets (CT,R,W) Concept maps (CT,R,W)

3. Identify the following planes in which a body might be dissected:. sagittal, frontal, transverse **4.** Describe the appearance of a body presented along various planes. **5.** Describe the location of the following body cavities: dorsal, cranial vertebral, ventral, thoracic, abdominopelvic, and identify the major organs found in each cavity. **6.** Describe the location of the four abdominopelvic quadrants and the nine abdominopelvic regions and list the major organs located in each. **7.** List and define the following major directional terms used in anatomy: anterior, posterior, superior, inferior, lateral, medial, proximal, distal, deep and superficial. **8.** Define the terms anatomy and physiology Give specific examples to show the interrelationship between anatomy and physiology **9.** Describe, in order from simplest to most complex, the major levels of organization in the human organism.	Pla-doh and cookie cutters for sectioning exercise (CT, R) Sectioned injected kidneys (CT,R) Pre-dissected preserved rats, plastic and plasinated cats, torsos - mammalian anatomy (CT,R) Organ ID worksheet including name, body cavity, section type, system. (CT,R,W) Attend Class (CT, OC) Review Notes (CT,R,W) Consult Textbook (CT,R) Do pre- and post- class and lab activities (CT, R, W, QS) Study diagrams (CT, R, QS) Make and use flashcards (R, W) Use appropriate internet sources (CT,R,W, QS,TS) Use assigned course management system (CT,R,W, QS,TS) Work in peer groups (CT,R,W, OC)	Lab practical exams(CT,R,W) Pre- and Post-Labs
Homeostasis	Prepare graphs of data for positive and	Tests (CT,R,W)

1. Define homeostasis 2. List the components of a feedback loop and explain the function of each 3. Compare and contrast positive and negative feedback in terms of the relationship between stimulus and response. 4. Explain why negative feedback is the most commonly used mechanism to maintain homeostasis in the body.	negative feedback (CT,R,W,TS,) Attend Class (CT, OC) Review Notes (CT,R,W) Consult Textbook (CT,R) Do pre- and post- class and lab activities (CT, R, W, QS) Study diagrams (CT, R, QS) Make and use flashcards (R, W) Use appropriate internet sources (CT,R,W, QS,TS) Use assigned course management system (CT,R,W, QS,TS) Work in peer groups (CT,R,W, OC)	Quizzes (CT,R,W) Short papers (CT,R,W,TS) Lab exercise sheets (CT,R,W,TS)
Histology 1. Define the term histology 2. List the four major tissue types 3. Contrast the general features of the four major tissue types 4. Classify the following tissue types based on distinguishing structural characteristics, location and functions: a. simple and stratified squamous, b. simple and stratified cuboidal, c. simple columnar, and d. pseudostratified ciliated columnar epithelial tissue,	Exercise 3 Focusing the Microscope Review only. Use new video when ready ● Exercise 6A Classification of Tissues (R, W, CT, TS) ● Dichotomous Key ● Tissue Notebook ● Tissue Unknown ● Available slides ● simple squamous epithelium (glomerular capsule on kidney slide, alveoli of lung) ● stratified squamous epithelium (also on esophagus slide) ● simple columnar epithelium (also on ileum slide) ● pseudostratified columnar epithelium (also on trache slide) ● simple cuboidal epithelium (kidney slide)	Lab Practical is strongly recommended Tests (CT,R,W) Quizzes (CT,R,W) Dichotomous keys(CT,R,W) Lab practical exams (CT,R,W,TS) Lab exercise sheets (CT,R,W,TS) Graded notebook (CT,R,W,TS) Graded key and tissue unknown (CT,R,W,TS) Pre- and Post-Labs (CT,R,W,TS)

e. areolar, **f.** dense irregular, **g.** dense regular, **h.** adipose, **i.** hyaline cartilage, and bone connective tissue, **j.** smooth, skeletal and cardiac muscle, **k.** neuron. **5.** Be able to find and recognize the tissues using proper microscope technique. **6.** Describe the structure and function of mucous, serous, cutaneous & synovial membranes **7.** Distinguish between exocrine and endocrine glands, structurally and functionally **8.** Classify the different kinds of exocrine glands based on mechanisms of secretion (merocrine and holocrine).	● stratified cuboidal epithelium (sweat glands on skin slide) ● transitional epithelium (not on need to know list, but used by some) ● areolar connective tissue ● dense regular connective tissue ● dense irregular connective tissue (dermis of skin) ● adipose tissue ● hyaline cartilage ● bone ● smooth muscle ● cardiac muscle ● skeletal muscle Exercise 8 Membranes (CT,W,R,TS) ● mucous membrane (ileum, trachea, esophagus) ● serous membrane (visceral peritoneum slide) Attend Class (CT, OC) Review Notes (CT,R,W) Consult Textbook (CT,R) Do pre- and post- class and lab activities (CT, R, W, QS) Study diagrams (CT, R, QS) Make and use flashcards (R, W) Use appropriate internet sources (CT,R,W, QS,TS) Use assigned course management system (CT,R,W, QS,TS) Work in peer groups (CT,R,W, OC)	

Integumentary System **1.** Describe the general functions of the skin **2.** Describe the general functions of the subcutaneous layer (also known as the hypodermis or superficial fascia). **3.** With respect to the epidermis: **a.** Identify and describe the tissue type making up the epidermis **b.** Identify and describe the layers of the epidermis, indicating which are found in thin skin and which are found in thick skin. **c.** Correlate the structure of thick and thin skin with the locations in the body where each are found **d.** Describe the processes of growth and keratinization of the epidermis. **4.** Identify and describe the dermis and its layers, including the tissue types making up each layer. **5.** Identify and describe the subcutaneous tissue, including the tissue type*s* making up	Exercise 7 including test for sweat glands to introduce scientific method Use class data, develop hypothesis, plot data,draw conclusions (CT,R,W,TS,QS) Exercise 8 (CT,R,W,TS) Slides available ● scalp (thin skin with hair) ● palm or sole (thick skin) - primate slide has good melanocytes ● apocrine glands ● Meissner's corpuscles ● Pacinian corpuscles Models ● think skin ● thin skin, axillary skin, thick skin Attend Class (CT, OC) Review Notes (CT,R,W) Consult Textbook (CT,R) Do pre- and post- class and lab activities (CT, R, W, QS) Study diagrams (CT, R, QS) Make and use flashcards (R, W) Use appropriate internet sources (CT,R,W, QS,TS) Use assigned course management system (CT,R,W, QS,TS) Work in peer groups (CT,R,W, OC)	Lab Practical is strongly recommended Tests (CT,R,W) Quizzes (CT,R,W) Short papers (CT,R,W,TS) Lab reports (CT,R,W,QS) Lab exercise sheets (CT,R,W) Lab practical exams(CT,R,W,TS) Pre- and Post-Labs (CT,R,W) Draw and label figures (CT,R,W)

subcutaneous tissue. **6.** With respect to skin color: **a.** Describe the three pigments most responsible for producing the various skin colors **b.** Name the layers of the skin that contain each of these pigments. **7.** With respect to the epidermis: **a.** Describe the functions of the epidermis **b.** Explain how each of the five layers, as well as each of the following cell types and substances, contributes to the functions of the epidermis: stem cells of stratum basale, keratinocytes, melanocytes, Langerhans' cells, Merkel cells and discs, keratin, and extracellular lipids **c.** Explain why the histology of the epidermis is well suited for its functions. **8.** With respect to the dermis **a.** Describe the overall functions of the dermis **b.** Describe the specific		

function of each dermal layer and relate that function to the skin's overall functions. **9.** With respect to the subcutaneous layer: **a.** Describe the functions of the subcutaneous layer **b.** Describe the thermoregulatory role played by adipose tissue in the subcutaneous layer **10.** Identify each of the following structures, describe its location, anatomy and function: **a.** apocrine and eccrine sweat glands, sebaceous glands, nails, hair hair, follicle and **b.** arrector pili muscle and a. sensory receptors (Merkel cell, Meissner's & Pacinian corpuscles, hair follicle receptor, and temperature receptors)		
Skeletal System **1.** Describe the major functions of the skeletal system **2.** List and describe the cellular and extracellular components of bone tissue.	Exercise 9 (CT,R,W,TS) ● include acid-treated and baked bones ● use disarticulated and intact skeletons ● use mini skeletons for some structures	Lab Practical is strongly recommended Tests (CT,R,W) Quizzes (CT,R,W) Short papers (CT,R,W,TS) Lab exercise sheets (CT,R,W,TS)

3. Identify the internal structural components of compact bone and spongy bone. **4.** Identify the types of cartilage tissues found in the skeletal system and explain the functions of each. **5.** Explain the roles of dense regular and dense irregular connective tissue in the skeletal system **6.** Identify the structural components of a long bone, with emphasis on region of longitudinal growth **7.** Explain the functions of those structural components in the context of a whole bone **8.** Explain the roles osteogenic cells play in the formation of bone tissue **9.** Compare and contrast intramembranous and endochondral (intracartilaginous) bone formation **10.** Explain the hormonal regulation of skeleton growth **11.** Explain the roles of calcitonin, parathyroid hormone and calcitriol (Vitamin D) in bone remodeling and blood calcium regulation. **12.** Define the two major divisions of the skeletal system (axial and appendicular) and list the general	Slides available ● ground bone ● developing long bone ● developing cancellous bone ● fibrocartilage ● elastic cartilag ● hyaline cartilage Draw slide specimens (W,TS) Sawed long bone (in fridge or on counter) Preserved joint Models Available ● osteon Attend Class (CT, OC) Review Notes (CT,R,W) Consult Textbook (CT,R) Do pre- and post- class and lab activities (CT, R, W, QS) Study diagrams (CT, R, QS) Make and use flashcards (R, W) Use appropriate internet sources (CT,R,W, QS,TS) Use assigned course management system (CT,R,W, QS,TS) Work in peer groups (CT,R,W, OC)	Lab reports (CT,R,W,QS) Concept maps (CT,R,W) Lab practical exams(CT,R,W) Pre- and Post-Labs (CT,R,W,TS)

bone structures contained within each **13.** Identify the types of bones based on shape and composition (compact vs. spongy), and relate the shapes of bones to their functions. **14.** Describe the development of the normal curvatures of the spine and identify common abnormalities; scoliosis, lordosis, kyphosis **15.** Compare and contrast the adult male and female skeletons **16.** Identify the individual bones and their location within the body. **a.**		
Bone Identification **Identify the following on the skull:** 1. frontal bone 2. parietal bones 3. temporal bones a. external auditory meatus b. Internal auditory meatus c. zygomatic process d. mastoid process e. carotid canal f. jugular foramen 4. occipital bone a. mandibular fossa b. jugular foramen	Exercises 10, 11 (CT,R,W) Bones ● skulls ● articulated skeletons ● disarticulated skeletons ● Beauchene skull ● disarticulated skull ● disarticulated vertebrae Models ● models of vertebral column and vertebrae Worksheet of joint examples (CT,R,W) Attend Class (CT, OC)	Lab Practical is strongly recommended Tests (CT,R,W) Quizzes (CT,R,W)) Lab reports (CT,R,W,QS) Lab exercise sheets (CT,R,W) Lab practical exams(CT,R,W) Pre- and Post-Labs (CT,R,W,TS)

c. carotid canal d. foramen magnum e. occipital condyles 5. sphenoid bone a. sella turcica b. optic canal 6. ethmoid bone a. crista galli b. cribriform plate c. perpendicular plate 7. mandible a. mandibular condyle b. coronoid process c. angle 8. maxillae a. palatine process 9. zygomatic bones 10. lacrimal bones 11. nasal bones 12. palatine bones 13. vomer 14. inferior nasal conchae **Identify the following bone markings of the skull:** 15. sagittal suture 16. coronal suture 17. squamous suture 18. lambdoidal suture **Identify the following vertebrae:** 19. atlas 20. axis	Review Notes (CT,R,W) Consult Textbook (CT,R) Do pre- and post- class and lab activities (CT, R, W, QS) Study diagrams (CT, R, QS) Make and use flashcards (R, W) Use appropriate internet sources (CT,R,W, QS,TS) Use assigned course management system (CT,R,W, QS,TS) Work in peer groups (CT,R,W, OC)	

21. dens (odontoid process) 22. cervical vertebra 23. thoracic vertebra 24. lumbar vertebra 25. sacrum 26. coccyx **Identify the following on a vertebra:** 27. body 28. vertebral arch 29. spinous process 30. transverse process **Identify the following on the vertebral column:** 31. normal curvatures a. cervical b. thoracic c. lumbar d. sacral 32. intervertebral disc 33. vertebral foramen 34. intervertebral foramen 35. three curvature abnormalities: scoliosis, kyphosis, lordosis **Identify the following bones and bone parts of the thorax:** 36. sternum a. manubrium b. body of the sternum c. xiphoid process 37. rib a. vertebrosternal ribs		

b. vertebrocostal ribs c. vertebral ribs d. head of rib e. neck of rib f. shaft of rib g. tubercle of rib **Identify the following on the pectoral girdle** 38. clavicle a. sternal end b. acromial end 39. scapula a. coracoid process b. acromion process c. glenoid cavity d. spine e. three borders **Identify the following on the upper appendage:** 40. humerus a. head of the humerus b. greater tubercle c. lesser tubercle d. deltoid tuberosity e. trochlea f. capitulum g. coronoid fossa h. olecranon fossa 41. ulna a. coronoid process b. olecranon process		

c. trochlear notch d. styloid process 42. radius a. head of the radius b. radial tuberosity c. styloid process 43. carpals 44. metacarpals 45. phalanges **Identify the following on the pelvic girdle:** 46. difference between male and female pelvis 47. coxal bone 48. ilium a. acetabulum b. Iliac crest c. anterior superior iliac spine d. posterior superior iliac spine e. obturator foramen f. greater sciatic notch g. lesser sciatic notch 49. ischium a. ischial tuberosity b. ischial spine 50. pubis a. pubic symphysis 51. true vs false pelvis **Identify the following on the lower appendage:**		

52. femur a. head of femur b. linea aspera c. greater trochanter d. lesser trochanter e. lateral condyle f. medial condyle g. lateral epicondyle h. medial epicondyle 53. tibia a. lateral condyle b. medial condyle c. tibial tuberosity d. medial malleolus 54. fibula a. lateral malleolus 55. patella 56. tarsals 57. calcaneus 58. talus 59. metatarsals 60. phalanges		
Articulations **2.** With respect to classification of joints: **3.** Describe the functional classification, based on degree of movement allowed - synarthrotic, amphiarthrotic, and diarthrotic – and provide examples of each	Exercise 13 (CT,R,W) preserved joint (CT,R) Slides available (CT,R,TS) ● hyaline cartilage ● fibrocartilage ○ pink-stained slides show bone, hyaline cartilage	Complete table of different joints, their structures, and their types of movement. Lab Practical is strongly recommended Tests (CT,R,W) Quizzes (CT,R,W)) Lab reports (CT,R,W,QS) Lab exercise sheets (CT,R,W)

type. **4.** Describe the anatomical classification, based on structure - fibrous, cartilaginous, and synovial – and provide examples of each type **5.** Explain how the functional and anatomical classifications are related. **6.** Identify the structural components of the synovial joint, including accessory structures like bursae, tendon sheaths, and ligaments. **7.** For each of the six structural types of synovial joints: **a.** Describe the anatomical features of that structural type. **b.** Describe locations in the body where each structural type can be found **c.** Predict the kinds of movements that each structural type will allow.	and fibrocartilage (pubic symphysis) ● elastic cartilage Attend Class (CT, OC) Review Notes (CT,R,W) Consult Textbook (CT,R) Do pre- and post- class and lab activities (CT, R, W, QS) Study diagrams (CT, R, QS) Make and use flashcards (R, W) Use appropriate internet sources (CT,R,W, QS,TS) Use assigned course management system (CT,R,W, QS,TS) Work in peer groups (CT,R,W, OC)	Lab practical exams(CT,R,W,TS) Pre- and Post-Labs (CT,R,W,TS)
Muscle System **Histology and Anatomy** **1.** Describe the major functions of muscle tissue **2.** Describe the general function of the muscle system.	Interactive Physiology Modules (CT,R,W,TS) ● Muscular System: Anatomy Review: Skeletal Muscle Tissue ● Muscular System: The Neuromuscular Junction	Lab Practical is strongly recommended Tests (CT,R,W) Quizzes (CT,R,W)) Lab reports (CT,R,W,QS) Lab exercise sheets (CT,R,W)

3. Compare and contrast the structural and functional characteristics of skeletal, cardiac and smooth muscle. Provide examples of the location of each in the body. **4.** Describe the organization of muscle tissue from cell to whole muscle to groups of muscles **5.** Name the connective tissue layers that surround each cell, fascicle, muscle, and group of muscles and indicate the specific type of connective tissue that composes all of these layers **6.** Describe a skeletal muscle fiber including the transverse (T) tubules, sarcoplasmic reticulum and myofibrils **7.** Explain the organization of a myofibril. **8.** Name, and describe the function of, each of the contractile, regulatory, and structural protein components of a sarcomere. **9.** Describe the anatomy of the neuromuscular junction.	● Show movie on muscle introduction (Muscles and Exercise; 22 min) ● Exercises 14 and 15 ● PhysioEx Histology Module ● Practice Anatomy Lab (PAL) Modules: ● Histology Slides available (CT,R,W,TS) ● smooth muscle ● cardiac muscle ● skeletal muscle ● tendon (white fibrous tissue, dense regular connective tissue) Draw and label slides (R,W,TS,CT) Attend Class (CT, OC) Review Notes (CT,R,W) Consult Textbook (CT,R) Do pre- and post- class and lab activities (CT, R, W, QS) Study diagrams (CT, R, QS) Make and use flashcards (R, W) Use appropriate internet sources (CT,R,W, QS,TS) Use assigned course management system (CT,R,W, QS,TS) Work in peer groups (CT,R,W, OC)	Lab practical exams(CT,R,W,TS) Pre- and Post-Labs (CT,R,W,TS)
Muscle System Physiology	Interactive Physiology Modules: (CT,R,W,TS)	Lab Practial is strongly recommended Interactive Physiology Study Sheets and Worksheets

1. Explain the sliding filament theory of muscle contraction **2.** Describe the sequence of events involved in the contraction cycle of skeletal muscle. **3.** Explain how an electrical signal from the nervous system arrives at the neuromuscular junction. **4.** Describe, in order, the events that occur at the neuromuscular junction that elicit an action potential in the muscle fiber. **5.** Explain what is meant by the expression "excitation-contraction coupling **6.** List the sources of energy stored in a typical muscle fiber. **7.** Describe the mechanisms that muscle fibers use to obtain ATP for muscle contraction. **8.** Explain the factors that contribute to muscle fatigue. **9.** Summarize the events that occur during the recovery period of muscle contraction. **10.** Interpret a myogram of a twitch contraction with respect to the duration of the latent, contraction and relaxation periods and describe the events that occur in each period	● Muscular System: Sliding Filament Theory ● Muscular System: Muscle Metabolism ● Muscular System: Contraction of Motor Units ● Muscular System: Contraction of Whole Muscle A&PFlix Animations (CT,R,W,TS) ● Events at the Neuromuscular Junction ● Excitation-Contraction Coupling ● The Cross Bridge Cycle Show movie on muscle introduction (Muscles and Exercise; 22 min) (CT,TS) Exercise 16B PhysioEx Skeletal Muscle Physiology (CT,R,W,TS) Special Projects (CT,R,W,TS,OC) ● videos including animated cartoons ● trifolds ● posters Sequencing exercises (CT,R,W)	Gradable A&PFlix Quizzes Tests (CT,R,W) Quizzes (CT,R,W) Short papers (CT,R,W,TS) Lab reports (CT,R,W,QS) Lab exercise sheets (CT,R,W) Concept maps (CT,R,W) Lab practical exams(CT,R,W) Pre- and Post-Labs (CT,R,W, TS)

11. Define the terms tension and contraction, with respect to muscles **12.** Define the term motor unit and explain its importance in muscle contraction. **13.** Interpret a myogram or graph of tension vs. stimulus frequency and explain the physiological basis for the phenomena of, summation and tetanus. **14.** Interpret a myogram or graph of tension vs. stimulus intensity and explain the physiological basis for the phenomenon of recruitment. **15.** Demonstrate isotonic and isometric contraction	Attend Class (CT, OC) Review Notes (CT,R,W) Consult Textbook (CT,R) Do pre- and post- class and lab activities (CT, R, W, QS) Study diagrams (CT, R, QS) Make and use flashcards (R, W) Use appropriate internet sources (CT,R,W, QS,TS) Use assigned course management system (CT,R,W, QS,TS) Work in peer groups (CT,R,W, OC)	
Muscle System **Muscle Identification** **Identify the origin, insertion and action of the following major skeletal muscles:** 1. frontalis 2. orbicularis oculi 3. zygomaticus 4. orbicularis oris 5. temporalis 6. masseter 7. platysma	Exercises 14 and 15 (CT,R,W) Practice Anatomy Lab (PAL) Modules: ● Anatomical Models ● Dissections Model Muscles with clay on mini skeletons (CT,R,W,OC) ● give oral presentations ● demonstrate origin insertions Special Projects (CT,R,W,TS,OC) ● videos including animated cartoons	Lab Practical is strongly recommended Tests (CT,R,W) Quizzes (CT,R,W)) Lab reports (CT,R,W,QS) Lab exercise sheets (CT,R,W) Lab practical exams(CT,R,W) Pre- and Post-Labs (CT,R,W,TS)

8. sternocleidomastoid 9. occipitalis 10. trapezius 11. pectoralis major 12. pectoralis minor 13. serratus anterior 14. external intercostals 15. internal intercostals 16. rectus abdominis 17. external oblique 18. internal oblique 19. transverse abdominis 20. latissimus dorsi 21. trapezius 22. deltoid 23. infraspinatus 24. supraspinatus 25. subscapularis 26. teres major 27. teres minor 28. triceps brachii 29. biceps brachii 30. brachialis 31. brachioradialis 32. pronator teres 33. flexor carpi radialis 34. palmaris longus 35. flexor carpi ulnaris 36. extensor carpi ulnaris 37. extensor digitorum 38. extensor carpi	● trifolds ● posters Models (CT,R,W) ● torsos ● upper appendages ● lower appendages ● muscle cells model Put labels on muscle models (CT, R) Attend Class (CT, OC) Review Notes (CT,R,W) Consult Textbook (CT,R) Do pre- and post- class and lab activities (CT, R, W, QS) Study diagrams (CT, R, QS) Make and use flashcards (R, W) Use appropriate internet sources (CT,R,W, QS,TS) Use assigned course management system (CT,R,W, QS,TS) Work in peer groups (CT,R,W, OC)	

39. radialis longus 40. extensor carpi 41. radialis brevis 42. iliopsoas 43. pectineus 44. gluteus medius 45. gluteus maximus 46. tensor fasciae latae 47. adductor longus 48. gracilis 49. sartorius 50. adductor magnus 51. biceps femoris 52. semitendinosus 53. semimembranosus 54. rectus femoris 55. vastus lateralis 56. vastus medialis 57. gastrocnemius 58. soleus 59. tibialis anterior		
Nervous System **Anatomy and Histology** **1.** Describe the major functions of the nervous system **2.** Describe the nervous system as a control system, identifying nervous system elements that are sensory receptors, the afferent pathway, control centers, the efferent	Exercise 17 (CT,R,W,TS) Available slides ● cross section of spinal cord ● spinal cord smear ● nerve long and cross section ● cerebellum - Purkinje cells ● cerebrum - pyramidal cells Models	Lab Practical is strongly recommended Tests (CT,R,W) Quizzes (CT,R,W)) Lab reports (CT,R,W,QS) Lab exercise sheets (CT,R,W) Lab practical exams(CT,R,W,TS) Pre- and Post-Labs (CT,R,W, TS)

pathway, and effector organs. **3.** Differentiate between the somatic and autonomic divisions of the nervous system **4.** List the parts of the nervous system that constitute the central nervous system (CNS) and those that constitute the peripheral nervous system (PNS **5.** With respect to the three structural types of neurons (unipolar, bipolar & multipolar): **a.** Identify each type of neuron. **b.** Identify soma (cell body), axon, and dendrites **c.** State which parts of each type of neuron receive information, which parts integrate information, and which parts conduct the output signal of the neuron. **d.** Describe the location of the cell bodies of each type of neuron within the nervous system. **e.** State a function of each type of neuron **6.** Describe the structure and function of glial cells of the CNS and PNS: **7.** Define the term nerve and	● neuron Interactive Physiology Modules: (CT,R,W,TS) ● Nervous System I: Orientation ● Nervous System I: Anatomy Review ● Nervous System II: Anatomy Review Attend Class (CT, OC) Review Notes (CT,R,W) Consult Textbook (CT,R) Do pre- and post- class and lab activities (CT, R, W, QS) Study diagrams (CT, R, QS) Make and use flashcards (R, W) Use appropriate internet sources (CT,R,W, QS,TS) Use assigned course management system (CT,R,W, QS,TS) Work in peer groups (CT,R,W, OC)	

differentiate between a nerve and a tract		

Nervous System **1. Physiology** **2.** Explain how ion channels affect neuron selective permeability **3.** Contrast the relative concentrations of sodium, potassium and chloride ions inside and outside of a cell. **4.** Differentiate between a concentration gradient and an electrical potential. **5.** Define electrochemical gradient **6.** With respect to ion channels: **7.** Differentiate between passive and active ion channels. **8.** Explain how passive ion channels cause development of the resting membrane potential in neurons. **9.** Differentiate between voltage-gated and chemically-gated ion channels. **10.** Describe the voltage-gated ion channels that are essential for development of the action potential. **11.** Discuss the sequence of events that must occur for an action potential to be generated **12.** Describe the role of the sodium-potassium exchange pump in maintaining the resting membrane	Interactive Physiology Modules: (CT,R,W,TS) ● Nervous System I: Orientation ● Nervous System I: Anatomy Review ● Nervous System I: Ion Channels ● Nervous System I: The Membrane Potential ● Nervous System I: The Action Potential ● Nervous System II: Anatomy Review ● Nervous System II: Ion Channels ● Nervous System II: Synaptic Transmission ● Nervous System II: Synaptic Potentials and Cellular Integration A&PFlix Animations: (CT,R,W,TS) ● Resting Membrane Potential ● Generation of an Action Potential ● Propagation of an Action Potential PhysioEx: Exercise 18B Neurophysiology of Nerve Impulses (CT,R,W,TS) Attend Class (CT, OC) Review Notes (CT,R,W) Consult Textbook (CT,R) Do pre- and post- class and lab activities (CT, R, W, QS)	Lab Practical is strongly recommended Tests (CT,R,W) Quizzes (CT,R,W)) Lab reports (CT,R,W,QS) Lab exercise sheets (CT,R,W) Lab practical exams(CT,R,W,TS) Pre- and Post-Labs (CT,R,W,TS)

potential and making continued action potentials possible **13.** Define threshold **14.** Interpret a graph showing the voltage vs. time relationship of an action potential, and relate the terms depolarize, repolarize, and hyperpolarize to the events of an action potential. **15.** With respect to the refractory periods **a.** Define absolute and relative refractory periods **b.** Explain the physiological basis of the absolute and relative refractory periods **c.** Discuss the consequence of a neuron having an absolute refractory period. **16.** With respect to impulse conduction: **a.** Describe how local circuit currents cause impulse conduction in an unmyelinated axon. **b.** Explain how axon diameter and myelination affect conduction velocity **c.** Describe saltatory conduction **17.** Identify the presynaptic and	Study diagrams (CT, R, QS) Make and use flashcards (R, W) Use appropriate internet sources (CT,R,W, QS,TS) Use assigned course management system (CT,R,W, QS,TS) Work in peer groups (CT,R,W, OC)	

postsynaptic cells at a synapse. **18.** List the structures that comprise a chemical synapse **19.** Describe the synaptic (axon) terminal. **20.** Restate the steps that lead from the action potential arriving in the synaptic terminal to the release of neurotransmitter from synaptic vesicles. **21.** Discuss the relationship between a neurotransmitter and its receptor **22.** Explain how the receptors for neurotransmitters are related to chemically-gated ion channels **23.** Describe the events of synaptic transmission in proper chronological order **24.** Define excitatory postsynaptic potential (EPSP) and inhibitory postsynaptic potential (IPSP) and interpret graphs showing the voltage vs. time relationship of an EPSP and an IPSP **25.** Explain temporal and spatial summation of synaptic potentials **26.** Explain how movement of sodium ions alone, or movement of both sodium and potassium ions, across the postsynaptic cell membrane can excite a neuron		

27. Explain how movement of potassium or chloride ions across the postsynaptic cell membrane can inhibit a neuron **28.** Compare and contrast synaptic potentials with action potentials **29.** Explain how a single neurotransmitter may be excitatory at one synapse and inhibitory at another		
Brain **1.** Correlate functions with each major area of the adult brain. **2.** Describe the orientation of the brain relative to bones of the skull **3.** Identify the five lobes of the cerebral cortex and describe how the motor and sensory functions of the cerebrum are distributed among the lobes **4.** Discuss the concept of cerebral hemispheric specialization and the role of the corpus callosum in connecting the two halves of the cerebrum **5.** Identify the meninges and describe their functional relationship to the brain and cranial bones **6.** Describe the functions of cerebrospinal fluid, as well as	Exercise 19 (CT,R,W,TS) Sheep brain dissection Available slides • cerebellum • cerebrum Models • torsos • brain models Sectioned preserved human brains - labeled Attend Class (CT, OC) Review Notes (CT,R,W) Consult Textbook (CT,R) Do pre- and post- class and lab activities (CT, R, W, QS) Study diagrams (CT, R, QS) Make and use flashcards (R, W)	Lab Practical is strongly recommended Tests (CT,R,W) Quizzes (CT,R,W)) Lab reports (CT,R,W,QS) Lab exercise sheets (CT,R,W) Lab practical exams(CT,R,W,TS) Pre- and Post-Labs (CT,R,W,TS)

the details of its production, its circulation within the central nervous system, and its ultimate reabsorption into the bloodstream **7.** Describe the structural basis for, and the importance of the blood brain barrier	Use appropriate internet sources (CT,R,W, QS,TS) Use assigned course management system (CT,R,W, QS,TS) Work in peer groups (CT,R,W, OC)	
Cranial Nerves **1.** List the cranial nerves by name and number **2.** Describe the specific functions of each of the cranial nerves and classify each as sensory, motor or mixed	Name, Identify, Give Function (CT,R,W) Locate on diagrams and brain models (CT,R) Attend Class (CT, OC) Review Notes (CT,R,W) Consult Textbook (CT,R) Do pre- and post- class and lab activities (CT, R, W, QS) Study diagrams (CT, R, QS) Make and use flashcards (R, W) Use appropriate internet sources (CT,R,W, QS,TS) Use assigned course management system (CT,R,W, QS,TS) Work in peer groups (CT,R,W, OC)	Lab Practical is strongly recommended Tests (CT,R,W) Quizzes (CT,R,W)) Lab reports (CT,R,W) Lab exercise sheets (CT,R,W) Lab practical exams(CT,R,W) Pre- and Post-Labs (CT,R,W,)
Nervous Systerm **Sensory Receptors** **1.** Describe exteroceptors, interoceptors and proprioceptors in terms of the general location of each in the body and the origin of	Exercises 22 and 23 (selected parts on reflexes and sensory reception and adaptation) (CT,R,W,TS) Demonstrate a stretch reflex (e.g., patellar or plantar)	Lab Practical is strongly recommended. Tests (CT,R,W) Quizzes (CT,R,W) Short papers (CT,R,W,TS) Concept maps (CT,R,W) Lab exercise sheets (CT,R,W,TS)

the stimuli **2.** Describe each of the following types of receptors, indicating what sensation it detects and giving an example of where it can be found in the body: **3.** pain receptors (nociceptors), temperature receptors, mechanoreceptors (including proprioceptors and barorceptors/ pressoreceptors), chemoreceptors, and photoreceptors that each receives	Available slides ● Meissner's corpuscles ● Pacinian corpuscles Exercise 23 Equipment for sensory testing: ● calipers or toothpicks and rulers ● ice water ● hot water bath and mall probes ● washable markers ● dish of coins Attend Class (CT, OC) Review Notes (CT,R,W) Consult Textbook (CT,R) Do pre- and post- class and lab activities (CT, R, W, QS) Study diagrams (CT, R, QS) Make and use flashcards (R, W) Use appropriate internet sources (CT,R,W, QS,TS) Use assigned course management system (CT,R,W, QS,TS) Work in peer groups (CT,R,W, OC)	Lab practical exams(CT,R,W, TS) Pre- and Post-Labs (CT,R,W,TS)
Reflexes **1.** Define the term reflex **2.** Describe reflex responses in terms of the major structural and	Exercise 22 selected parts (CT,R,W,TS,QS) Equipment for reflex testing	Lab Practical is strongly recommended Tests (CT,R,W) Quizzes (CT,R,W))

functional components of a reflex arc **3.** Distinguish between each of the following pairs of reflexes: intrinsic (inborn) reflexes vs. learned reflexes, somatic vs. visceral reflexes, monosynaptic vs. polysynaptic reflexes, and ipsilateral vs. contralateral reflexes **4.** Describe a stretch reflex and name all components of each reflex arc.	● reflex hammers ● response time rulers ● pen lights ● reflex timing experiments on the web Attend Class (CT, OC) Review Notes (CT,R,W) Consult Textbook (CT,R) Do pre- and post- class and lab activities (CT, R, W, QS) Study diagrams (CT, R, QS) Make and use flashcards (R, W) Use appropriate internet sources (CT,R,W, QS,TS) Use assigned course management system (CT,R,W, QS,TS) Work in peer groups (CT,R,W, OC)	Lab reports (CT,R,W,QS) Lab exercise sheets (CT,R,W,TS,QS) Lab practical exams(CT,R,W) Pre- and Post-Labs (CT,R,W,TS,QS)
Nervous System **Spinal Cord** **1.** Describe the gross anatomy of the spinal cord and spinal nerves and specify their location relative to the anatomy of the skeletal system **2.** Identify the anatomical features seen in a cross sectional view of the spinal cord **3.** Contrast the relative position of gray matter and white matter in the spinal cord with the corresponding	Exercise 21 (CT,R,W,TS) Available Slides ● spinal cord section ● spinal cord smear ● cerebral cortex ● cerebellum ● spinal ganglion ● nerve fiber ls. and xs. Model ● sectioned spinal cord Attend Class (CT, OC)	Lab Practical is strongly recommended Tests (CT,R,W) Quizzes (CT,R,W)) Lab reports (CT,R,W,QS) Lab exercise sheets (CT,R,W,TS) Lab practical exams(CT,R,W,TS) Pre- and Post-Labs (CT,R,W,TS)

arrangement of gray and white matter in the brain **4.** Identify the dorsal root ganglia, dorsal and ventral roots, and spinal nerves **5.** Discuss how the structures root, nerve, ramus, plexus, tract and ganglion relate to one another **6.** List the four spinal nerve plexuses and give examples of nerves that emerge from each **7.** Distinguish between ascending and descending tracts in the spinal cord	Review Notes (CT,R,W) Consult Textbook (CT,R) Do pre- and post- class and lab activities (CT, R, W, QS) Study diagrams (CT, R, QS) Make and use flashcards (R, W) Use appropriate internet sources (CT,R,W, QS,TS) Use assigned course management system (CT,R,W, QS,TS) Work in peer groups (CT,R,W, OC)	

Nervous System **Autonomic Nervous System** **1.** Describe the two divisions of the autonomic nervous system and the general physiological roles of each **2.** Contrast the anatomy of the parasympathetic and sympathetic systems, including central nervous system outflow locations, ganglia locations, pre- and post-ganglionic neuron relative lengths, and ganglionic and effector neurotransmitters **3.** Describe examples of specific effectors dually innervated by the two branches of the autonomic nervous system and explain how each branch influences function in a given effector **4.** Describe examples of effectors innervated by only the sympathetic branch or the parasympathetic branch of the nervous system and explain how that branch by itself influences function in a given effector **1.** Differentiate between cholinergic and adrenergic nerve fibers and discuss the physiological interactions of transmitters released by these neurons with	Exercise 21 (CT,R,W,TS) Attend Class (CT, OC) Review Notes (CT,R,W) Consult Textbook (CT,R) Do pre- and post- class and lab activities (CT, R, W, QS) Study diagrams (CT, R, QS) Make and use flashcards (R, W) Use appropriate internet sources (CT,R,W, QS,TS) Use assigned course management system (CT,R,W, QS,TS) Work in peer groups (CT,R,W, OC)	Lab Practical is strongly recommended Tests (CT,R,W) Quizzes (CT,R,W)) Lab reports (CT,R,W,QS) Lab exercise sheets (CT,R,W) Lab practical exams(CT,R,W) Pre- and Post-Labs(CT,R,W)

specific cholinergic and adrenergic receptor subtypes **2.** Describe major parasympathetic and/or sympathetic physiological effects on target organs. **3.** Distinguish between the effectors of the somatic and autonomic nervous systems **4.** Name the neurotransmitters released at synapses with effector organs in the somatic and autonomic motor pathways and classify each effector response as excitatory or inhibitory		
Special Senses **Eye** **1.** Identify the accessory eye structures, the tunics, the optical components and the neural components of the eye. **2.** Describe the functions of the accessory structures of the eye. **3.** Describe the structure of the retina and the cells that compose it. **4.** Compare and contrast the function of rods and cones in vision.	Exercise 24 (eye dissection) Model: eyeball Dissection: cow eye Available slides ● retina Equipment and supplies ● Snellen eye charts ● Ishihara color blindness test charts ● penlights ● peripheral vision test ● pins ● test tubes Attend Class (CT, OC)	Lab Practical is strongly recommended Tests (CT,R,W) Quizzes (CT,R,W)) Lab reports (CT,R,W,QS) Lab exercise sheets Lab practical exams(CT,R,W) Pre- and Post-Labs

	Review Notes (CT,R,W) Consult Textbook (CT,R) Do pre- and post- class and lab activities (CT, R, W, QS) Study diagrams (CT, R, QS) Make and use flashcards (R, W) Use appropriate internet sources (CT,R,W, QS,TS) Use assigned course management system (CT,R,W, QS,TS) Work in peer groups (CT,R,W, OC)	
Special Senses **Ear** **1.** Identify the hearing structures of the outer, middle and inner ear. **2.** Describe how the various structures of the outer, middle and inner ear function in hearing. **3.** Describe the sound conduction pathway from the auricle to the fluids of the inner ear and the path of nerve impulses from the spiral organ to various parts of the brain **4.** Describe the role of the auditory tube in drainage and equalization of pressure in the middle ear.	Exercise 25 Models: ● ear ● inner ear Available slides: ● cochlea Attend Class (CT, OC) Review Notes (CT,R,W) Consult Textbook (CT,R) Do pre- and post- class and lab activities (CT, R, W, QS) Study diagrams (CT, R, QS) Make and use flashcards (R, W) Use appropriate internet sources (CT,R,W, QS,TS) Use assigned course management system (CT,R,W, QS,TS) Work in peer groups (CT,R,W, OC)	Lab Practical is strongly recommended Tests (CT,R,W) Quizzes (CT,R,W)) Lab reports (CT,R,W,QS) Lab exercise sheets Lab practical exams(CT,R,W)
Apply the basic principles of biology to	Read text (CT,R)	Tests (CT,R,W)

the function of cells and cell membranes in the human body in order to be able to predict the nature of processes involving membrane transport, receptors, surface area, and energy, thus learning from understanding rather than memory.	Attend lecture/discussion (W,OC,CT) Do study guide (R,W,CT) Build models of the cell membrane (CT,TS,QS) Conduct experiments on diffusion · osmosis and active processes (CT,R,W,OC,TS,QS) Look at electron micrographs of various cell membrane junctions and specializations.(CT,TS) Construct models of junctions and specializations (CT,TS,W,QS) Attend Class (CT, OC) Review Notes (CT,R,W) Consult Textbook (CT,R) Do pre- and post- class and lab activities (CT, R, W, QS) Study diagrams (CT, R, QS) Make and use flashcards (R, W) Use appropriate internet sources (CT,R,W, QS,TS) Use assigned course management system (CT,R,W, QS,TS) Work in peer groups (CT,R,W, OC)	Quizzes (CT,R,W) Short papers (CT,R,W,TS) Lab reports (CT,R,W,QS) Article reviews (CT,R,W,TS) Lab practical exams (CT,R,W,TS)
Describe the results of homeostatic imbalance of the same important variables in order to relate changes to the underlying causes of disease	Read text (CT,R) Attend lecture/discussion (W,OC,CT) Do study guide (R,W,CT) Power point and video presentations (CT,OC,TS) Computer simulations (CT,R, QS, TS) Short papers (R,W)	Tests (CT,R,W) Quizzes (CT,R,W) Short papers (CT,R,W,TS) Lab reports (CT,R,W,QS) Article reviews (CT,R,W,TS) Lab practical exams (CT,R,W) Poster presentations (CT, R, OC, W)

	Poster presentations (R, W, CT, OC, TS) Lab reports (R, W, CT, TS,) Review Notes (CT,R,W) Consult Textbook (CT,R) Do pre- and post- class and lab activities (CT, R, W, QS) Study diagrams (CT, R, QS) Make and use flashcards (R, W) Use appropriate internet sources (CT,R,W, QS,TS) Use assigned course management system (CT,R,W, QS,TS) Work in peer groups (CT,R,W, OC)	Oral presentations (CT, R, OC,W) Pre- and Post-Labs (CT,R,W,TS)
Present and interpret data from charts and graphs in order to develop skills in using charts and graphs to convey information, to be able to read and understand professional journals and to understand data used in the workplace and presented at meetings and conferences	Read text (CT,R) Attend lecture/discussion (W,OC,CT) Do study guide (R,W,CT) Power point presentations (CT,OC,TS) Computer simulations (TS, R, QS) Posters (R,W,OC) Oral presentations (R,W,OC) Lab reports (R, W, TS, QS) Review Notes (CT,R,W) Consult Textbook (CT,R) Do pre- and post- class and lab activities (CT, R, W, QS) Study diagrams (CT, R, QS) Make and use flashcards (R, W) Use appropriate internet sources (CT,R,W, QS,TS) Use assigned course management	Tests (CT,R,W) Quizzes (CT,R,W) Short papers (CT,R,W,TS) Lab reports (CT,R,W,QS) Article reviews (CT,R,W,TS) Oral presentations (R,W,OC) Poster presentations (R,W,OC) Pre- and Post-Labs

	system (CT,R,W, QS,TS) Work in peer groups (CT,R,W, OC)	
Communicate accurately and clearly both in writing and orally in order to educate patients (for students entering allied health fields) and communicate with professional colleagues.	Lecture and lab discussions (W,OC,CT) Do study guide (R,W,CT) Power point and video (CT,OC,TS) Lab reports (R,W,TS, QS) Posters (R,W,OC) Short papers (R, W, TS,) Oral presentations in class and lab (CT,OC,)	Tests (CT,R,W) Quizzes (CT,R,W) Short papers (CT,R,W,TS) Research papers Lab reports (CT,R,W,QS) Article reviews (CT,R,W,TS) Oral presentations (R,W,OC) Poster presentations (R,W,OC)