

## KRSN BIO2020 – Anatomy and Physiology – 5 credit hours

For specific Institutional Transfer Articulation information visit: [kansasregents.org/institutional-transfer-information](http://kansasregents.org/institutional-transfer-information).

Institution	Course ID	Course Title	Credit Hours
Allen CC	BIO 257	Human Anatomy and Physiology with Lab	5
Barton CC	LIFE 1408	Anatomy and Physiology	5
Butler CC	BI 240	Anatomy and Physiology	5
Cloud County CC	SC 126	Anatomy and Physiology	5
Coffeyville CC	BIOL 203	Anatomy and Physiology	5
Colby CC	BI 278	Anatomy and Physiology with Lab	5
Cowley County CC	BIO 4150	Human Anatomy and Physiology	5
Dodge City CC	ZOO 205	Anatomy Physiology	5
Fort Scott CC	BIO 1255	Anatomy and Physiology with Lab	5
Garden City CC	BIOL 210	Anatomy and Physiology	5
Highland CC	Not Offered	Not Offered	
Hutchinson CC	BI 103	Human Anatomy and Physiology	6
Independence CC	BIO 2045	Anatomy and Physiology	5
JCCC	BIOL 144	Human Anatomy and Physiology	5
KCKCC	BIOL 0143	Human Anatomy and Physiology	5
Labette CC	BIOL 130	Anatomy and Physiology	5
Neosho County CC	BIOL 257 & BIOL 258	Human Anatomy and Physiology and Human Anatomy and Physiology Lab	3 & 2
Pratt CC	BIO 278	Anatomy and Physiology	5
Seward County CC	BI 2115	Anatomy and Physiology Lecture/Lab	5
FHTC	BI 202 & BI 203	Anatomy and Physiology and Anatomy and Physiology Lab	3 & 2
Manhattan Tech	BSC 125 or BSC 125A & BSC 125B	Anatomy and Physiology or Anatomy and Physiology and Anatomy and Physiology	5 2.5 & 2.5
NCK Tech	BIOL 230	Anatomy and Physiology	5
NWKTC	BIO 290	Anatomy & Physiology	5
SATC	BIO 150	Human Anatomy and Physiology	5
WATC	BIO 150	Human Anatomy and Physiology	5
ESU	ZO 362* & ZO 363*	Human Anatomy and Physiology and Human Anatomy and Physiology Lab	3 & 2
FHSU	Not Offered	Not Offered	
KSU	Not Offered	Not Offered	
PSU	BIOL 257 & BIOL 258	Anatomy and Physiology and Anatomy and Physiology Lab	3 & 2
KU	Not Offered	Not Offered	
WSU	BIOL 223 HS 290	Human Anatomy and Physiology Human Anatomy and Physiology	5 5
Washburn	Not Offered	Not Offered	

\* The decision for lower division courses to count toward upper division credit hours required for graduation is at the discretion of the institution.

Revised 06/26/2018

## **Anatomy and Physiology – 5 credit hours - BIO2020 CORE OUTCOMES**

Course Effective Date: Fall 2013

Outcome Approval Date: Fall 2016

Next Outcome Review Date: Fall 2021

**Core Student Learning Outcomes:** *4-8 specific, measurable learning outcomes expected of every student that completes the course. Only student outcomes are included in this report.*

Upon completion of BIO 2020/2021/ 2022 - Anatomy and Physiology (5 credit hours), students will be able to:

Core Outcomes: The modules may be covered in a different sequence from that which is listed here. Content topics need not be taught in single blocks, but may be integrated. Unifying themes, such as homeostasis, are emphasized throughout.

### **Anatomy & Physiology**

#### **A. Body Plan & Organization**

Upon completion of this section the student will be able to demonstrate measurable understanding of descriptive anatomical and directional terminology including the following topics.

- anatomical position
- body planes, sections
- body cavities & regions
- directional terms
- basic terminology
- levels of organization
- survey of body systems

#### **B. Homeostasis**

Upon completion of this section the student will be able to demonstrate measurable understanding of the basic concept of homeostasis and how homeostatic mechanisms apply to body systems including the following topics.

- general types of homeostatic mechanisms
- examples of homeostatic mechanisms
- application of homeostatic mechanisms
- predictions related to homeostatic imbalance, including disease states & disorders

#### **C. Chemistry & Cell Biology Review**

Upon completion of this section the student will be able to demonstrate measurable understanding of basic chemistry and cellular structures and function, including the following topics.

- atoms & molecules
- chemical bonding
- inorganic compounds/solutions (including the concept of pH)
- organic compounds
- energy transfer using ATP
- intracellular organization of nucleus and cytoplasm
- membrane structure & function
- mechanisms for movement of materials across cellular membranes
- organelles
- protein synthesis
- cellular respiration (introduction)
- somatic cell division (mitosis & cytokinesis)
- reproductive cell division
- application of homeostatic mechanisms
- predictions related to homeostatic imbalance, including disease states and disorders

#### **D. Histology**

Upon completion of this section the student will be able to demonstrate measurable understanding of the basic tissues of the body, their location and functions, including the following topics.

- overview of histology & tissue types
- microscopic anatomy, location, & functional roles of epithelial, connective, muscular and nervous tissues
- membranes (mucous, serous, cutaneous & synovial) - glands (exocrine & endocrine) - tissue injury & repair

#### E. Integumentary System

Upon completion of this section the student will be able to demonstrate measurable understanding of major gross and microscopic anatomical components of the integumentary system and describe the functions of the system, including the following topics.

- general functions of the skin & the subcutaneous layer
- gross & microscopic anatomy of the skin
- roles of the specific tissue layers of the skin & subcutaneous layer
- anatomy & functional roles of accessory structures
- application of homeostatic mechanisms
- predictions related to homeostatic imbalance, including disease states & disorders

#### F. Skeletal System

Upon completion of this section the student will be able to demonstrate measurable understanding of major gross and microscopic anatomical components of the skeletal system and explain their functional roles in osteogenesis, repair, and body movement, including the following topics.

- general functions of bone & the skeletal system
- structural components – microscopic anatomy
- structural components – gross anatomy
- physiology of embryonic bone formation (ossification, osteogenesis)
- physiology of bone growth, repair & remodeling
- organization of the skeletal system - gross anatomy of bones
- classification, structure & function of joints (articulations)
- application of homeostatic mechanisms
- predictions related to homeostatic imbalance, including disease states & disorders

#### G. Muscular System

Upon completion of this section the student will be able to demonstrate measurable understanding of major gross and microscopic anatomical components of the muscular system and explain their functional roles in body movement, maintenance of posture, and heat production, including the following topics.

- general functions of muscle tissue
- identification, general location, & comparative characteristics of skeletal, smooth, & cardiac muscle tissue
- detailed gross & microscopic anatomy of skeletal muscle
- physiology of skeletal muscle contraction
- skeletal muscle metabolism
- principles & types of whole muscle contraction - nomenclature of skeletal muscles
- location & function of skeletal muscles
- group actions of skeletal muscles
- lever systems
- application of homeostatic mechanisms
- predictions related to homeostatic imbalance, including disease states & disorders

#### H. Nervous System

Upon completion of this section the student will be able to demonstrate measurable understanding of the major gross and microscopic anatomical components of the nervous system and explain their functional roles in communication, control, and integration, including the following topics.

- general functions of the nervous system
- organization of the nervous system from both anatomical & functional perspectives
- gross & microscopic anatomy of the nerve tissue

- neurophysiology, including mechanism of resting membrane potential, production of action potentials, & impulse transmission
- neurotransmitters & their roles in synaptic transmission
- sensory receptors & their roles
- division, origin, & function of component parts of the brain
- protective roles of the cranial bones, meninges, & cerebrospinal fluid
- structure & function of cranial nerves
- anatomy of the spinal cord & spinal nerves
- reflexes & their roles in nervous system function
- physiology of sensory & motor pathways in the brain & spinal cord
- functions of the autonomic nervous system
- comparison of somatic & autonomic nervous systems
- application of homeostatic mechanisms
- predictions related to homeostatic imbalance, including disease states & disorders

### I. Special Senses

Upon completion of this section the student will be able to demonstrate measurable understanding of the major gross and microscopic anatomical components of the eye and ear and explain their functional roles in vision, hearing and equilibrium. Students should also be able to identify and locate the receptors responsible for olfaction and gustation and briefly describe the physiology of smell and taste, including the following topics.

- gross & microscopic anatomy of the eye & ear
- roles of specific tissues of the eye in vision
- roles of specific tissues of the ear in hearing & equilibrium
- olfactory receptors & their role in smell
- gustatory receptors & their role in taste
- general gross & microscopic anatomy of hearing & accessory structures of the ear
- roles of specific tissues of the ear in hearing
- roles of the accessory structures
- role of the ear in equilibrium
- application of homeostatic mechanisms
- predictions related to homeostatic imbalance, including disease states & disorders

### J. Endocrine System

Upon completion of this section the student will be able to demonstrate measurable understanding of the major gross and microscopic anatomical components of the endocrine system and explain the functional roles of their respective hormones in communication, control, and integration, including the following topics.

- general functions of the endocrine system
- chemical classification of hormones & mechanism of hormone actions at receptors
- control of hormone secretion
- control by the hypothalamus & pituitary gland
- identity, source, secretory control, & functional roles of the major hormones produced by the body
- local hormones (paracrines & autocrines) & growth factors
- hormonal response to stress
- application of homeostatic mechanisms
- predictions related to homeostatic imbalance, including disease states & disorders

Note: Since the endocrine system plays a key role in the regulation and integration of body organ systems, detailed aspects of endocrine system function may be emphasized throughout the course.

### K. Cardiovascular System

Upon completion of this section the student will be able to demonstrate measurable understanding of the major gross and microscopic anatomical components of the cardiovascular system and explain their functional roles in transport and hemodynamics, including the following topics. Topics include:

- general functions of the cardiovascular system
- general functions of the cardiovascular system

- composition of blood plasma - identity, microscopic anatomy, numbers, formation, & functional roles of the formed elements of the blood
- hemostasis, including coagulation of the blood
- ABO & Rh blood grouping
- gross & microscopic anatomy of the heart, including the conduction system - physiology of cardiac muscle contraction - blood flow through the heart
- conduction system of the heart & the electrocardiogram
- cardiac cycle
- regulation of cardiac output, stroke volume & heart rate
- anatomy & functional roles of the different types of blood vessels
- pattern of blood circulation throughout the body, including systemic, pulmonary, coronary, hepatic portal, & fetal circulations
- blood pressure & its functional interrelationships with cardiac output, peripheral resistance, & hemodynamics
- application of homeostatic mechanisms
- predictions related to homeostatic imbalance, including disease states & disorders

#### L. Lymphatic System & Immunity

Upon completion of this section the student will be able to demonstrate measurable understanding of the major gross and microscopic anatomical components of the lymphatic system and explain their functional roles in fluid dynamics and immunity, including the following topics.

- general functions of the lymphatic system
- general functions of the lymphatic system
- lymph & lymphatic vessels
- lymphatic cells, tissues, & organs
- introduction to innate (nonspecific) defenses & adaptive (specific) defenses
- innate (nonspecific) defenses
- overview of adaptive (specific) defenses
- antigens & antigen processing
- lymphocytes & their role in adaptive immunity
- antibodies & their role in adaptive immunity
- applied immunology
- application of homeostatic mechanisms
- predictions related to homeostatic imbalance, including disease states & disorders

#### M. Respiratory System

Upon completion of this section the student will be able to demonstrate measurable understanding of the major gross and microscopic anatomical components of the respiratory system and explain their functional roles in breathing/ventilation and in the processes of external and internal respiration, including the following topics.

- general functions of the respiratory system
- gross & microscopic anatomy of the respiratory tract & related organs
- mechanisms of pulmonary ventilation - pulmonary air volumes & capacities
- mechanisms of gas exchange in lungs & tissues
- mechanisms of gas transport in the blood
- control of pulmonary ventilation
- application of homeostatic mechanisms
- predictions related to homeostatic imbalance, including disease states & Disorders

#### N. Digestive System

Upon completion of this section the student will be able to demonstrate measurable understanding of the major gross and microscopic anatomical components of the digestive system and explain their functional roles in digestion, absorption, excretion and elimination, including the following topics.

- general functions of the digestive system
- gross & microscopic anatomy of the alimentary canal
- gross & microscopic anatomy of the accessory glands & organs
- peritoneum & mesenteries

- motility in the alimentary canal
- mechanical & chemical processes of digestion
- processes of absorption
- hormonal & neural regulation of digestive processes
- application of homeostatic mechanisms
- predictions related to homeostatic imbalance, including disease states & disorders

#### O. Metabolism

Upon completion of this section the student will be able to demonstrate measurable understanding of the functional relationship among cellular, tissue and organ level metabolism, the role nutrition plays in metabolism, and the mechanisms by which metabolic rate is regulated in the body, including the following topics.

- nutrition
- introduction to metabolism
- cellular respiration & the catabolism & anabolism of carbohydrates, lipids, & proteins
- metabolic roles of body organs
- energy balance & thermoregulation
- application of homeostatic mechanisms
- predictions related to homeostatic imbalance, including disease states & disorders

#### P. Urinary System

Upon completion of this section the student will be able to demonstrate measurable understanding of the major gross and microscopic anatomical components of the urinary system and explain their functional roles, including the following topics.

- general functions of the urinary system
- gross & microscopic anatomy of the urinary tract, including detailed histology of the nephron
- functional processes of urine formation, including filtration, reabsorption, secretion, & excretion
- factors regulating & altering urine volume & composition, including the renin- angiotensin system and the roles of aldosterone& antidiuretic hormone
- endocrine activities of the kidneys, such as vitamin D activation & secretion of erythropoietin
- innervation & control of the urinary bladder

#### Q. Fluid/Electrolyte& Acid/Base Balance

Upon completion of this section the student will be able to demonstrate measurable understanding of the physiology of the homeostatic mechanisms that control fluid/electrolyte and acid/base balance, including the following topics.

- regulation of water intake & output
- description of the major fluid compartments, including intracellular, extracellular, intravascular, & interstitial
- volume & chemical composition of major compartment fluids
- movements between the major fluid compartments, causal forces, volumes, & electrolyte balance
- buffer systems & their roles in acid/base balance
- role of the respiratory system in acid/base balance
- role of the urinary system in acid/base balance

#### R. Reproductive Systems

Upon completion of this section the student will be able to demonstrate measurable understanding of the major gross and microscopic anatomical components of the reproductive system and explain their functional roles in reproduction and inheritance, including the following topics.

- general functions of the male & female reproductive systems
- gross & microscopic anatomy of the male & female reproductive systems
- gametogenesis
- specific roles of the female reproductive organs
- specific roles of the female reproductive organs - regulation of reproductive functions
- conception, pregnancy, & embryological & fetal development
- parturition & labor
- mammary gland anatomy & physiology

