



**COWLEY COLLEGE
& Area Vocational Technical School**

**COURSE PROCEDURE FOR
PATHOPHYSIOLOGY
BIO 4155 4 Credit Hours**

Student Level:

This course is open to students on the college level in either freshman or sophomore year.

Catalog Description:

BIO 4155 – Pathophysiology (4 Hrs)

This course is designed for students entering the health professions. It focuses on essential mechanisms of disordered physiological function which produce common diseases. Diseases are presented as examples to explain basic processes and functions, rather than an exhaustive list of diseases and disorders.

Prerequisite:

BIO 4150 Human Anatomy and Physiology or BIO4148 Human Anatomy and Physiology I and BIO4149 Human Anatomy and Physiology II (can be concurrently enrolled).

Controlling Purpose:

This course is applicable to current health professionals seeking a broader understanding in their field experiences and for students requiring a basic pathophysiology course before advancing to specific courses in a professional degree program.

Learner Outcomes:

Upon completion of this course, the student will be able to discuss internal and external factors that affect specific physiological states of health and illness. The student will also be able to describe the appropriate epidemiology, etiology, pathophysiology and clinical or laboratory presentations of specific disease processes. Finally, the student will be able to apply basic diagnostic reasoning in assessment and evaluation of others with specific pathophysiological presentations.

Unit Outcomes and Clock Hours of Instruction for Core Curriculum:

The following outline defines the minimum core content, not including the final examination period. Instructors may add other material as time allows.

Evaluation Key:

A = All major and minor goals have been achieved and the achievement level is considerably above the minimum required for doing more advanced work in the same field

- B = All major goals have been achieved, but the student has failed to achieve some of the less important goals. However, the student has progressed to the point where the goals of work at the next level can be easily achieved.
- C = All major goals have been achieved, but many of the minor goals have not been achieved. In this grade range, the minimum level of proficiency represents a person who has achieved the major goals to the minimum amount of preparation necessary for taking more advanced work in the same field, but without any major handicap of inadequacy in his background.
- D = A few of the major goals have been achieved, but the student's achievement is so limited that he is not well prepared to work at a more advanced level in the same field.
- F = Failing, will be computed in GPA and hours attempted.
- N = No instruction or training in this area

Unit 1: Cellular and Genetic Components of Pathophysiology						
Outcome: The student will gain a basic understanding of basic cellular and molecular function as well as genetics and how their dysfunction can manifest disease						
A	B	C	D	F	N	Specific Competencies: Upon completion of this unit, the student will be able to:
						Transcribe DNA to RNA given a strand of coding DNA
						Given an amino acid chart, translate RNA codons into amino acid structure
						Define epidemiology, etiology, pathophysiology, diagnosis, clinical course incidence and prevalence.
						Compare/contrast incidence and prevalence as they relate to disease frequency
						Identify patterns of inheritance including: sex-linked recessive, sex-linked dominant, autosomal-recessive, autosomal-dominant, codominance, polygenic inheritance, incomplete dominance
						Define genotype, phenotype, heterozygous, homozygous dominant, homozygous recessive.
						Given a particular cross, solve for the frequency of a particular genotype or phenotype occurrence
						Define polyploidy and monoploidy, and classify the following aneuploidies: Triple X, Klienfelter's Syndrome, Turner's Syndrome, X Polysomy, Jacob's Syndrome (XYY)
						Identify chromosomal structural abnormalities that occur during cell division including: deletion, translocation, inversion, duplication, ring formation,
						Explain the etiology and pathogenesis of the following disorders as representations of genetic disorder/dysfunction: Marfan Syndrome, Neurofibromatosis, phenylketonuria, tay-sach's disease, fragile X syndrome, cleft lip/cleft palate, down syndrome

Unit 2: Cancer						
Outcome: The student will gain an understanding of the cell cycle and the consequences of its disruption as well as the progression of cancer as a result of disruption.						
A	B	C	D	F	N	Specific Competencies: Upon completion of this unit, the student will be able to:
						Diagram the cell cycle including all major recognized steps and checkpoints
						Define: Proliferation, differentiation, apoptosis, neoplasm, tumor, malignant, benign, oncology
						Identify the tissue a tumor originates from and if it is benign or malignant given its name
						Classify a neoplasm as benign or malignant based on characteristics of cells, growth rate, mode of growth, and metastasis
						Compare normal cell characteristics to cancerous cell characteristics
						Explain the mechanism of tumor metastasis
						Identify the three pathways of cancer spreading: direct invasion and extension, seeding of cancer cells in body cavities, and metastatic spread through vascular and lymphatic pathways.
						Describe various types of cancer-associated genes and cancer-associated molecular pathways
						Identify genetic events and epigenetic factors important to tumorigenesis
						Describe importance of cancer stem cells , angiogenesis, and environment in cancer growth and metastasis
						Characterize the mechanisms in anorexia, cachexia, fatigue, sleeping disorders, anemia and thrombosis experienced by cancer patients as mechanisms for cancer pathogenesis
						Explain the pathogenesis of paraneoplastic syndrome
						Identify the most common types of childhood cancers and compare them to cancers that affect adults

Unit 3: Respiratory System						
Outcome: The student will gain an understanding of the functions of the respiratory system, physiology of respiration and the airways as well as the pathology of common respiratory diseases						
A	B	C	D	F	N	Specific Competencies: Upon completion of this unit, the student will be able to:
						Compare conducting and respiratory airways
						Trace flow of air through airways from nose to respiratory tissues of the lung
						Differentiate function of bronchial and pulmonary circulations for the lung blood supply
						Identify basic properties of gases found in breathable air using partial pressures as well as volume and temperature effects on partial pressures
						Define: intrathoracic, intrapleural, intra-alveolar pressure; inspiratory reserve, expiratory reserve, vital capacity, residual lung volume, FEV1.0

						Compare pulmonary and alveolar ventilation
						Explain significance of a shift to right and a shift to left in an oxygen-hemoglobin dissociation curve
						Compare neural control of respiratory muscles with cardiac tissue
						Trace the cough reflex from stimulus to expulsion of air
						Define dyspnea and list three conditions in which it occurs
						Compare: community-acquired pneumonia, hospital-acquired pneumonia, and pneumonia in immunocompromised people using pathogens, manifestations and prognosis
						List immunologic properties of tubercle bacillus and differentiate primary tuberculosis and reactivated tuberculosis based on pathophysiology
						Describe etiology, pathogenesis and clinical manifestations of: common cold, rhinosinusitis, influenza (including avian and swine), legionnaire disease, histoplasmosis, coccidioidomycosis, blastomycosis
						Compare small cell lung cancer to non-small cell lung cancer in terms of histopathology and prognosis
						Identify three paraneoplastic manifestations of lung cancer
						Describe the role of surfactant in lung function for neonatal children
						List signs of impending respiratory failure for small children
						Describe etiology, pathogenesis and clinical manifestations of: Respiratory Distress Syndrome, bronchopulmonary dysplasia, croup (viral and spasmodic), bacterial trachitis, epiglottitis, Respiratory syncytial virus
						Describe etiology, pathogenesis and clinical manifestations of: hypoxemia, hypercapnia, pleural effusion, hemothorax, pneumothorax, pleuritis, atelectasis, asthma, chronic obstructive pulmonary disease, bronchiectasis, cystic fibrosis, interstitial lung disease (such as coal miner's lung, asbestosis, farmer's lung, etc), and sarcoidosis
						Describe etiology, pathogenesis and clinical manifestations of: pulmonary embolism, pulmonary arterial hypertension, secondary pulmonary hypertension, and cor pulmonale
						Describe pathologic lung changes that occur in acute respiratory distress syndrome
						Describe clinical manifestations of acute respiratory failure

Unit 4: Immune System and Infectious Disease						
Outcome: The student will gain an understanding of the detailed functions of the immune system for protection from infectious diseases as well as clinical manifestations that result from immune responses and abnormal immune responses.						
A	B	C	D	F	N	Specific Competencies: Upon completion of this unit, the student will be able to:
						Define host, infectious disease, colonization, microflora, virulence, pathogen
						Compare the structure of: prions, viruses, bacteria, fungi, protozoans and worms as agents of infectious disease
						Outline the stages of infectious disease after a pathogen enters the body
						Identify systemic manifestations of disease

					Define culture, serology, and antigen
					Identify the different steps that would be taken to diagnose an infectious disease such as in serology and PCR
					Outline the function of the immune system
					Compare/contrast the properties of innate and adaptive immunity
					Identify and characterize the chemical mediators that signal the immune response (Interleukins, TNF- α , Chemokines, interferons, CSFs)
					List the leukocytes involved in innate and adaptive immunity and their function
					Describe the function of the complement cascade and the three ways it can be activated
					Compare/contrast T and B cell lymphocytes
					Describe the significance and function of major histocompatibility complex
					Explain the transfer of passive immunity from mother to fetus in utero and during breast feeding
					Compare naturally acquired passive immunity to: artificially acquired passive immunity, artificially acquired active immunity, naturally acquired active immunity
					Outline development of active immunity from infant to child
					Explain how a vaccination triggers immunity for an individual
					List the four types of inflammatory mediators and their functions
					Describe vascular changes that occur during acute inflammatory responses
					Describe the role of adhesion molecules, chemokines and cytokines in: leukocyte adhesion, migration, phagocytosis
					Trace the steps of wound-healing process through the inflammatory, proliferative and remodeling phases
					Identify the negative impact of: malnutrition, ischemia, oxygen deprivation, immune and inflammatory impairment, infection, wound separation and foreign bodies on wound healing processes
					Describe etiology, pathogenesis and clinical manifestations of selected: primary and secondary B cell immunodeficiencies (X-linked hypogammaglobulinemia, nephrotic syndrome); primary and secondary T cell immunodeficiencies (DiGeorge syndrome, hyper IgM syndrome, Hodgkin disease, T cell suppression due to viral infection such as HIV-AIDS); combined B and T cell primary and secondary immunodeficiencies (SCID, Wiskott-Aldrich syndrome, irradiation immune suppression and cytotoxic drugs); Complement system disorders; disorders of phagocytosis (Chediak-Higashi syndrome, drug induced diabetes mellitus)
					Describe immune response involved in development of: type I hypersensitivity, type II hypersensitivity, type III hypersensitivity, type IV hypersensitivity
					Describe pathogenesis of common hypersensitivity reactions: allergic rhinitis, food allergy, serum sickness, arthus reactions, contact dermatitis, hypersensitivity pneumonitis
					Discuss the need for HLA/MHC matching in organ transplanation
					Describe mechanisms and manifestations of graft vs host disease

						Discuss failure of self-tolerance and how this may manifest as autoimmune diseases
						Identify possible mechanisms for autoimmune diseases

Unit 5: Cardiovascular System						
Outcome: The student will gain an understanding of the normal physiological functions of the heart and circulations as well as the pathology of common cardiovascular diseases.						
A	B	C	D	F	N	Specific Competencies: Upon completion of this unit, the student will be able to:
						Compare the function and distribution of blood flow and pressure in systemic and pulmonary circulations
						Identify the relationships between blood volume and pressure in arteries, veins and capillaries
						Describe the impact blood pressure, vessel radius, vessel length, vessel cross-section and blood viscosity has on blood flow
						Define compliance and use it to describe arterial and venous blood vessels.
						Explain the relationships between wall tension, intraluminal pressure and vessel radius using Laplace's law.
						Identify structural components and functions of pericardium, myocardium, endocardium, heart valves, fibrous skeleton
						Use the formula for cardiac output to explain effects that venous return, cardiac contractility and heart rate have on cardiac output.
						Define preload and afterload in relation to the cardiac cycle
						Compare/contrast arteries and veins in terms of structure and function
						Explain the regulation of blood pressure using the equation $BP=CO \times PR$
						Characterize mechanisms that are responsible for both short and long term regulation of blood flow
						Explain forces that control the fluid exchange between capillaries and the interstitial space
						Explain the regulation of circulatory and cardiac function provided by the CNS, baroreceptors and chemoreceptors as well as parasympathetic and sympathetic nervous systems
						Describe etiology, pathogenesis and clinical manifestations of selected cardiovascular diseases: atherosclerosis, vasculitis, aortic aneurysms, hyperlipidemia, polyarteritis nodosa, acute arterial occlusion, atherosclerotic occlusive disease, buerger disease, raynaud's phenomenon, varicose veins, venous thrombosis, pericarditis, pericardial effusion myocardial infarction, coronary artery disease, endocarditis, rheumatic fever
						Compare the types of chronic ischemic heart disease
						Define cardiomyopathy for both mechanical and electrical function of myocardium
						Differentiate the different pathophysiological changes that occur during: hypertrophic cardiomyopathy, arrhythmogenic right ventricular cardiomyopathy, dilated cardiomyopathy and myocarditis

							Describe etiology, pathogenesis and clinical manifestations of selected valve diseases: Mitral valve stenosis, mitral valve regurgitation, mitral valve prolapse, aortic stenosis, aortic regurgitation
							Describe etiology, pathogenesis and clinical manifestations of selected cardiovascular diseases of children and infants: Kawasaki disease, congenital heart defects
							Describe cardiac conduction, including five phases of cardiac action potential
							Draw and label an ECG and state the origin of the components
							Characterize effects of atrial arrhythmias, first, second, and third-degree heart blocks, ventricular tachycardia and ventricular fibrillation
							Explain how the Frank-Starling mechanism, sympathetic nervous system, renin–angiotensin–aldosterone mechanism, natriuretic peptides, endothelins, and myocardial hypertrophy and remodeling function as adaptive and maladaptive mechanisms in heart failure
							Describe etiology, pathogenesis and clinical manifestations of heart failure (chronic, acute, right-side, high output, low output, left side, systolic, diastolic) and circulatory failure (cardiogenic, hypovolemic, obstructive and distributive, septic shock)

Unit 6: Vascular System and Blood Disorders

Outcome: The student will gain an understanding of the physiological functions of blood, the creation of blood, and the regulation of blood pressure by the vascular system as well as the pathology of common vascular and blood disorders.

A	B	C	D	F	N	Specific Competencies: Upon completion of this unit, the student will be able to:
						Define systolic, diastolic, pulse pressure, and mean arterial pressure
						Relate cardiac output and peripheral vascular resistance to systolic and diastolic blood pressure
						Describe etiology, pathogenesis and clinical manifestations of selected vascular diseases: primary hypertension, systolic hypertension, secondary hypertension, renal hypertension, pheochromocytoma, coarctation of the aorta, high blood pressure during pregnancy, orthostatic hypotension
						Identify mechanisms that respond to maintain blood pressure when moving from supine to standing.
						Describe composition and function of plasma and the formed elements
						List the steps of hematopoiesis
						Describe the three stages of hemostasis and the purpose of blood coagulation, clot retraction and clot dissolution
						Compare normal and abnormal clotting
						Describe cause/effect of increased platelet function
						Describe etiology, pathogenesis and clinical manifestations of selected clotting disorders: antiphospholipid syndrome, thrombocytopenia, von Willebrand disease, hemophilia A, DIC
						Describe function of iron in the formation of hemoglobin
						Explain the formation, transport and elimination of bilirubin

							Describe etiology, pathogenesis and clinical manifestations of selected blood disorders: transfusion reactions, anemias, sickle cell disease, thalassemias, polycythemia, hyperbilirubinemia in neonates, hemolytic disease of the newborn
							Trace development of white blood cells from origin in bone marrow stem cells to circulation
							Describe etiology, pathogenesis and clinical manifestations of selected white blood cell disorders: Neutropenia, infectious mononucleosis, non-Hodgkin lymphomas, Hodgkin lymphoma, leukemias, multiple myeloma

Unit 7: Gastrointestinal System							
Outcome: The student will gain an understanding of the physiological function of the gastrointestinal tract and accessory organs in digestion and elimination, including hormones involved and dietary guidelines as well as pathologies of selected diseases							
A	B	C	D	F	N	Specific Competencies: Upon completion of this unit, the student will be able to:	
							Describe the anatomic features of the upper, middle and lower gastrointestinal tract including the four walls and the peritoneum
							Explain the interaction of interstitial smooth muscle cells, enteric and autonomic nervous systems to cause tonic and peristaltic movements in the GI tract
							Describe the function of the gastric mucosal barrier, gut flora, and saliva
							Compare the digestion and absorption of carbohydrates, fats and proteins
							Identify the relationship between anorexia, nausea, retching and vomiting
							Describe neural structures involved with vomiting and their mediators
							Describe etiology, pathogenesis and clinical manifestations of selected gastrointestinal tract diseases: gastroesophageal reflux disease, esophageal cancer, <i>Helicobacter pylori</i> gastritis, peptic ulcers, stomach cancer, irritable bowel syndrome, inflammatory bowel diseases (crohn's and ulcerative colitis), bacterial infections (<i>E. coli</i> O157:H7, <i>C. difficile</i>), acute/chronic diarrhea, celiac disease, colorectal cancer
							Compare the causes of: dysphagia, odynophagia, achalasia
							Identify function of liver in terms of carbohydrate, protein and fat metabolism
							Describe mechanism of bile formation and elimination
							Describe etiology, pathogenesis and clinical manifestations of selected liver, gallbladder and pancreatic diseases: jaundice, viral hepatitises, primary and secondary biliary cirrhosis, nonalcoholic fatty liver disease, cirrhosis, ascites, hepatocellular carcinoma, cholelithiasis, acute/chronic cholecystitis, choledocholithiasis, pancreatitis, pancreatic cancer
							Define calorie, metabolism, catabolism, anabolism, basal metabolic rate, thermogenesis
							Explain the dietary standards utilized to formulate dietary guidelines
							Identify hormone interactions in both short and long term mechanisms of food intake control

							Using the body mass index, identify clinical classifications of overweight and obese
							Identify causes and preventions for obesity
							Compare eating disorders (anorexia nervosa, bulimia nervosa, binge-eating disorder) and the complications related to each
							Identify the effects of malnutrition on the body

Unit 8: Renal System							
Outcome: The student will gain an understanding of the physiological functions of the kidney in regulation of acid-base balance, urine production, absorption of ions, blood volume balance, and creation of blood as well as common diseases/disorders that affect the kidneys and bladder directly or impact other areas of the body as a result of their pathophysiology.							
A	B	C	D	F	N	Specific Competencies: Upon completion of this unit, the student will be able to:	
							Explain why the kidneys require such a large percentage of cardiac output
							Describe the mechanisms for regulating renal blood flow
							Describe structure and function of the glomerulus and tubular components of the nephron
							Identify the requirements for producing concentrated or dilute urine
							Explain the endocrine functions of the kidney including the renin-angiotensinogen-aldosterone mechanism, the regulation of RBC production via erythropoietin, and calcium metabolism via vitamin D activation
							Explain the glomerular filtration rate concept
							Explain the use of urine-specific gravity tests, serum creatinine, and blood urea nitrogen levels in evaluating renal function
							Compare intracellular and extracellular fluid compartments with respect to distribution/composition of water, electrolytes and osmotically active solute
							Describe control of cell volume and the effects of isotonic, hypotonic, and hypertonic solutions on diffusion, osmosis and cell size
							Explain the physiological mechanisms controlling water levels and sodium concentration (effective circulating volume, sympathetic NS, renin-angiotensin-aldosterone, antidiuretic hormone)
							Describe the effects of increased antidiuretic hormone on the reabsorption of water
							Describe etiology, pathogenesis and clinical manifestations of: diabetes insipidus, inappropriate antidiuretic hormone syndrome, hyponatremia, hypernatremia, hypokalemia, hyperkalemia, hypoparathyroidism, hyperparathyroidism, hypocalcemia, hypercalcemia, hypophosphatemia, hyperphosphatemia, hypomagnesemia, hypermagnesemia
							Explain the regulation of potassium levels in the body
							Describe the regulation of calcium, phosphorous and magnesium levels with intestinal absorption, renal elimination, bone storage, vitamin D, parathyroid hormone
							Describe the three forms of carbon dioxide transport and their contribution of acid-base balance in the blood

							Describe the mechanisms for buffering changes in body pH
							Compare the roles of kidneys and respiratory system to regulation of the acid-base balance
							Describe etiology, pathogenesis and clinical manifestations of selected acid-base balance disorders: metabolic acidosis, metabolic alkalosis, respiratory acidosis, respiratory alkalosis
							Describe etiology, pathogenesis and clinical manifestations of selected kidney diseases: polycystic kidney disease, kidney stones, urinary tract infections, nephritic syndromes, rapidly progressive glomerulonephritis, nephroci syndrome, asymptomatic glomerular disorders, chronic glomerulonephritis, tubular acidosis, pyelonephritis, Wilms tumor, renal cell carcinoma
							List four common causes of a urinary tract obstruction
							Identify the causes of acute renal injury and compare to chronic kidney disease
							List the causes of chronic kidney diseases in children and the unique problems in this population vs older adults
							Trace the neuronal pathways that control the urinary sphincters and the micturition reflex
							Define incontinence and compare stress incontinence, overactive bladder/urge incontinence and overflow incontinence
							Describe etiology, pathogenesis and clinical manifestations of two types of bladder cancer

Unit 9: Endocrine System							
Outcome: The student will gain an understanding of the physiological functions of hormones and endocrine glands as well as disease/disorder that results from the over or underproduction of selected hormones							
A	B	C	D	F	N	Specific Competencies: Upon completion of this unit, the student will be able to:	
						Identify the function of a hormone receptor and the difference between cell-surface and intracellular receptors	
						Describe the role of the hypothalamus in regulating the pituitary gland and endocrine function as a whole	
						Describe positive and negative feedback control mechanisms in the body, giving an example of each.	
						Identify mechanism of action for the following hormones: ACTH, TSH, LH, FSH, GH, T3 and T4, mineralocorticoids, glucocorticoids, insulin, glucagon	
						Differentiate between hypofunction and hyperfunction; primary, secondary and tertiary endocrine disorders	
						Describe etiology, pathogenesis and clinical manifestations of selected endocrine disorders: dwarfism, giantism, acromegaly, hypothyroidism, hyperthyroidism, Graves' disease, Addison disease, Cushing syndrome, diabetes mellitus (type 1, type 2, gestational diabetes,), diabetic ketoacidosis, hypoglycemia, diabetic neuropathy	

Unit 10: Musculoskeletal System						
Outcome: The student will gain an understanding of the formation and maintenance of bone, the healing of fractures and soft tissue injuries, and the pathology of selected diseases that impact muscles and bones.						
A	B	C	D	F	N	Specific Competencies: Upon completion of this unit, the student will be able to:
						Describe the characteristics of elastic cartilage, hyaline cartilage and fibrocartilage including locations of each
						List the four types of bone cells and their function
						Describe the function of parathyroid hormone, calcitonin, and vitamin D in the creation of bone and its metabolism
						Explain the referral of pain in all joints in an extremity when the disease process only impacts one joint
						Describe the process of healing for soft tissue and fracture injuries
						Identify the 7 different types of fractures
						Describe etiology, pathogenesis and clinical manifestations of selected musculoskeletal disease/disorders: complex regional pain syndrome, thromboemboli, fat embolism syndrome, osteomyelitis, tuberculosis of the bone, osteonecrosis, neoplasms (benign, osteosarcoma, Ewing sarcoma, chondrosarcoma), metastatic bone disease, scoliosis, torsional deformities of the legs, blount disease, flatfoot, osteogenesis imperfecta, Legg-Calve-Perthes disease, Osgood-Schlatter disease, osteoporosis, osteomalacia, rickets Paget disease
						Describe the function of the epiphyseal growth plate during skeletal development and growth
						Describe etiology, pathogenesis and clinical manifestations of selected rheumatic diseases: rheumatoid arthritis, systemic lupus erythematosus, scleroderma, ankylosing spondylitis, psoriatic arthritis, osteoarthritis syndrome, gout, juvenile idiopathic arthritis

Unit 11: Integumentary System						
Outcome: The student will gain an understanding of the types of skin cells and accessory organs along with their functions and the pathology of selected skin disorders and cancers						
A	B	C	D	F	N	Specific Competencies: Upon completion of this unit, the student will be able to:
						Trace the changes a keratinocyte goes through from creation in the basal lamina to arrival at the outer surface of the skin
						Describe the function of the following skin accessory glands: sebaceous gland, eccrine gland, apocrine gland, nails, hair
						Identify the sensory and immunity functions provided by the skin
						Identify the function of the following cells: keratinocytes, melanocytes, merkel cells, Langerhans cells, papillary dermis, reticular dermis

							Describe the common skin rashes and lesions: macule, patch, papule, plaque, nodule, tumor, wheal, vesicle, bulla, pustule
							Describe the causes of pruritus (itching) and dry skin
							Describe etiology, pathogenesis and clinical manifestations of selected primary skin disorders: vitiligo, albinism, superficial fungal infections (ex. <i>Candida albicans</i> , ringworm/tinea), impetigo, cellulitis, warts, herpes simplex and zoster, acne vulgaris, rosacea, allergic/contact dermatitis, atopic/nummular eczema, urticaria, psoriasis, scabies, pediculosis
							Compare first, second, and third degree burns in terms of tissue involvement and clinical manifestations
							Identify potential systemic complications of burns
							Cite two causes of pressure ulcers
							Describe the origin of moles and draw a relationship to skin cancers
							Describe etiology, pathogenesis and clinical manifestations of selected skin cancers: basal cell carcinoma, squamous cell carcinoma, malignant melanoma

Unit 12: Reproductive System							
Outcome: The student will gain an understanding of the development of male and female reproductive organs, the function of those organs, hormones that impact the development/function of the organs, and pathogenesis of diseases affecting the reproductive system as well as common STIs.							
A	B	C	D	F	N	Specific Competencies: Upon completion of this unit, the student will be able to:	
							Describe the embryonic development of the male reproductive organs and genitalia
							Identify the structure/function of the testes, scrotum, genital ducts, accessory organs, and penis
							List the steps of spermatogenesis
							Diagram the secretion, action site and feedback control of GNRH, LH, FSH, and inhibin in the male reproductive system
							Describe the effects of testosterone secretion on the male body
							Describe etiology, pathogenesis and clinical manifestations of selected male reproductive disorders: hypogonadism, hypospadias, epispadias, peyronie disease, erectile dysfunction, epididymitis, cryptorchidism, testicular cancer, benign prostatic hyperplasia, prostate cancer
							Identify the autonomic and nonautonomic nerve system control of: erection, emission, ejaculation
							Explain the physiology of penile erection and relate it to erectile dysfunction and priapism
							List the signs of penile cancer and describe the cell types involved in seminoma, embryonal carcinoma, teratoma and choriocarcinoma tumors of the testes
							Compare the pathology and symptoms of acute bacterial prostatitis, chronic bacterial prostatitis, chronic prostatitis/pelvic pain syndrome

							Name the three layers of the uterus and describe their function
							State the location of the ovaries in relation to uterus and uterine tubes
							Describe feedback control of estrogen and progesterone levels by means of GNRH, LH, FSH and ovarian follicle function
							Relate FSH and LH levels to stages of follicular development and estrogen/progesterone production
							Discuss the risks/benefits of hormonal replacement therapy in post-menopausal women
							Discuss abnormalities associated with: Bartholin cysts, non-neoplastic epithelial disorders, vulvodynia and cancers of the vulva
							Describe etiology, pathogenesis and clinical manifestations of selected female reproductive disorders: vaginitis, cervical cancer, endometriosis, endometrial cancer, pelvic inflammatory disease, ectopic pregnancy, polycystic ovarian syndrome, ovarian cancer, dysfunctional menstrual cycles (including amenorrhea, dysmenorrhea), PMS, mastitis, breast cancer
							Identify the function of the supporting ligaments and pelvic floor muscles in maintaining position of pelvic organs including uterus, bladder and rectum and relate to failure such as: cystocele, rectocele, enterocele, uterine prolapse
							Provide a definition of infertility and list male/female factors that contribute to infertility
							Describe etiology, pathogenesis and clinical manifestations of selected STIs: genital warts, herpes, candidiasis, trichomoniasis, bacterial vaginosis, chlamydia, gonorrhoea, syphilis

Unit 13: Nervous System							
Outcome: The student will gain an understanding of the CNS, PNS, special senses, transmission of impulses throughout the body and disease/disorders that affect the nervous system, brain, and special senses							
A	B	C	D	F	N	Specific Competencies: Upon completion of this unit, the student will be able to:	
							Distinguish between functions of neurons and neuroglial cells of the nervous system
							Describe the structure and function of the three parts of a neuron
							Identify the metabolic requirements of nervous tissue
							Diagram the three phases of an action potential and relate the functional importance of ion channels to each phase
							Characterize the role of EPSPs and IPSPs as they relate to spatial and temporal summation of membrane potentials
							Diagram and explain how neurotransmitters are stored, released, inactivated and synthesized
							Describe the organization of the nervous system using terms afferent, efferent, ganglia, association neuron, cell column, tract, dorsal and ventral root

						Describe structures innervated by segmental nerves containing afferent and efferent processes
						Describe the function of spinal cord reflexes and diagram a general reflex
						Identify the structures of the brainstem, cerebral cortex, cerebellum and their functions
						Describe location and function of the twelve cranial nerves
						Compare the sensory and motor components of the ANS to those of the CNS
						Compare location of sympathetic and parasympathetic nervous systems
						Identify neurotransmitter synthesis, release, degradation and receptor function in sympathetic and parasympathetic nervous systems
						Describe the organization of the somatosensory system in terms of first, second and third order neurons
						Summarize the structure and function of the dorsal root ganglion neurons in terms of conduction velocity, spinal cord projections, and sensory receptors
						Compare tactile, thermal and position in terms of receptors, stimuli necessary, pathways used, and central integrative mechanisms
						Discuss difference among specificity, pattern, gate control, and neuromatrix theories of pain
						Discuss difference between the different types of pain and pain perception
						Explain transmission of pain signals with reference to the neospinothalamic, paleospinothalamic, and reticulospinal pathways including chemical mediators and factors that modulate pain
						Describe the characteristics and cause of neuropathic pain, trigeminal neuralgia, postherpetic neuralgia and complex regional pain syndrome
						Discuss a possible mechanism for phantom limb pain
						Describe etiology, pathogenesis and clinical manifestations of selected headaches: migraine, cluster, tension headaches, headache caused by TMJ syndrome, chronic daily headache,
						Identify the most common cause of TMJ pain
						Define "motor unit" and characterize its mechanism of controlling skeletal muscle movement
						Compare the effect of upper and lower motor neuron lesions on the spinal cord stretch reflex functions and muscle tone
						Compare peripheral mononeuropathies with polyneuropathies with respect to cause and manifestation
						Describe etiology, pathogenesis and clinical manifestations of selected muscular disorders/diseases: Muscular dystrophy, <i>Clostridium botulinum</i> toxin (botulism), Myasthenia gravis, carpal tunnel syndrome, Guillain-Barre Syndrome, herniated disk
						Describe etiology, pathogenesis and clinical manifestations of selected disorders of the cerebellum: Parkinson's disease, basal ganglia movement disorders (such as tremor, ataxia, chorea, dyskinesia, etc)
						Identify the three general efferent pathways leading out of the cerebellum and their function
						Describe etiology, pathogenesis and clinical manifestations of selected upper motor neuron disorders: Lou Gehrig disease, multiple sclerosis, acute spinal cord injury

						Identify the characteristics of the levels of consciousness
						Determine the mechanisms that control intracranial pressure
						Compare cytotoxic, vasogenic, and interstitial cerebral edema
						Describe the effects of primary and secondary brain injury
						Summarize the different types of hematomas that can occur in the brain
						Differentiate between focal and diffuse brain injuries
						Identify the major vessels in cerebral circulation
						Describe etiology, pathogenesis and clinical manifestations of selected brain injuries or diseases: hydrocephaly, ischemic stroke, hemorrhagic stroke, arteriovenous malformation, meningitis, encephalitis, brain tumors, primary CNS lymphoma, seizures (focal and generalized)
						Discuss the stress-diathesis theory and the role of trauma in the development of psychiatric disorders
						Identify the effect of the following brain neurochemicals: Ach, dopamine, norepinephrine and epinephrine, serotonin, GABA, corticotropin-releasing hormone, cortisol, DHEA
						Describe etiology, pathogenesis and clinical manifestations of selected psychiatric disorders: schizophrenia, major depression/dysthymia, bipolar disorder, panic disorder, generalized anxiety disorder, OCD, social phobia
						Describe etiology, pathogenesis and clinical manifestations of selected memory/cognition disorders: Alzheimer's, dementia, Creutzfeldt-Jakob disease, Wernicke-korsakoff syndrome, Huntington disease
						Describe etiology, pathogenesis and clinical manifestations of selected diseases/disorders of the special senses: ptosis, blepharitis, dry eye, dacryocystitis, conjunctivitis, keratitis, glaucoma, cataracts, colorblindness, retinitis pigmentosa, retinopathy, retinal detachment, macular degeneration, retinoblastoma, strabismus, amblyopia, otitis externa, otitis media (acute and with effusion), hearing loss (conductive and sensorineural), tinnitus, nystagmus, vertigo, Meniere disease
						Trace the pathway of light as it enters the eye
						Explain how a sound wave enters the ear and is transmitted to the brain as sound

Project Required: Instructor determined

Textbook: Contact Bookstore for current textbook.

Materials/Equipment Required: None

Attendance Policy: Students should adhere to the attendance policy outlined by the instructor in the course syllabus.

Grading Policy: The grading policy will be outlined by the instructor in the course syllabus.

Maximum class size: Based on classroom occupancy

Course Time Frame:

The U.S. Department of Education, Higher Learning Commission and the Kansas Board of Regents define credit hour and have specific regulations that the college must follow when developing, teaching and

assessing the educational aspects of the college. A credit hour is an amount of work represented in intended learning outcomes and verified by evidence of student achievement that is an institutionally-established equivalency that reasonably approximates not less than one hour of classroom or direct faculty instruction and a minimum of two hours of out-of-class student work for approximately fifteen weeks for one semester hour of credit or an equivalent amount of work over a different amount of time. The number of semester hours of credit allowed for each distance education or blended hybrid courses shall be assigned by the college based on the amount of time needed to achieve the same course outcomes in a purely face-to-face format.

Refer to the following policies:

[402.00 Academic Code of Conduct](#)

[263.00 Student Appeal of Course Grades](#)

[403.00 Student Code of Conduct](#)

Disability Services Program:

Cowley College, in recognition of state and federal laws, will accommodate a student with a documented disability. If a student has a disability which may impact work in this class and which requires accommodations, contact the Disability Services Coordinator.