



College of
**COMPLEMENTARY HEALTH
PROFESSIONALS OF BC**

Guidelines for Foundational Knowledge in Massage Therapy Educational Programs

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Preface

About the College of Complementary Health Professionals of British Columbia

The College of Complementary Health Professionals of British Columbia (CCHPBC) regulates the profession of massage therapy in B.C. The College acts on behalf of the public to ensure that registered massage therapists (RMTs) in B.C. deliver safe, ethical and effective treatment.

The CCHPBC was established as a separate health regulatory college by the provincial government in 1994, under the *Health Professions Act*. The College is governed by a Board that includes both registered massage therapists and public representatives.

Definition of Massage Therapy in British Columbia

The scope of practice of RMTs in B.C. is defined by the *Massage Therapists Regulation*, which is made pursuant to the *Health Professions Act* of B.C.

"massage therapy" means the health profession in which a person provides, for the purposes of developing, maintaining, rehabilitating or augmenting physical function, or relieving pain or promoting health, the services of

(a) assessment of soft tissue and joints of the body, and

(b) treatment and prevention of physical dysfunction, injury, pain and disorders of soft tissue and joints of the body by manipulation, mobilization and other manual methods.

[am. B.C. Reg. 58/2015, s. 1.]

CCHPBC Entry to Practice Requirements

Registration with CCHPBC indicates an RMT meets entry to practice requirements to consistently provide safe, effective and ethical massage therapy. The Registration Examination assesses knowledge and abilities that are described in the entry to practice requirements.

The following two documents outline entry to practice requirements:

- ❑ ***Inter-Jurisdictional Practice Competencies and Performance Indicators for Massage Therapists at Entry-to-Practice (PCs-PIs, 2016)***, and
- ❑ ***Guidelines for Foundational Knowledge in Massage Therapy Educational Programs (GFK, 2018)***. The GFK sets out foundational knowledge required of new applicants for registration with CCHPBC. It is a companion document to the *Inter-Jurisdictional Practice Competencies and Performance Indicators*, which refers to foundational knowledge requirements in its Preface and in its Appendix.

A description of the *Guidelines for Foundational Knowledge* document

Each section lists performance objectives. In some sections specific content guidelines are also included.

The depth of knowledge required for each performance objective and content item must be sufficient to enable the entry-level massage therapist to demonstrate the practice competencies in the *Inter-Jurisdictional Practice Competencies and Performance Indicators* document.

Entry-level massage therapists have a strong foundational knowledge base common amongst regulated health care professionals in Canada. Massage therapy applies principles of physical, health and social sciences as well as the humanities.

Massage therapy education programs that are accredited to CCHPBC's historical standard demonstrate that their curriculum design effectively delivers the content specifications of these *Guidelines* and the competencies listed in the *Practice Competencies and Performance Indicators* document.

SYSTEMIC ANATOMY, PHYSIOLOGY AND PATHOLOGY

General Anatomy and Physiology

Performance Objectives

- Define and describe levels of structural organization, characteristics of the living human organism and anatomical terminology
- Define and describe the chemical level of organization
- Define and describe the cellular level of organization
- Define and describe the tissue level of organization
- Define and describe the organ level of organization
- Define and describe the system level of organization

Content

- Levels of organization
 - chemical
 - cellular
 - tissue
 - organ
 - system
 - organism
- Characteristics of the living human organism
 - basic life processes
 - metabolism
 - responsiveness
 - movement
 - growth
 - differentiation
 - reproduction
- Homeostasis
 - body fluids
 - feedback systems
 - homeostatic imbalances
- Anatomical terminology
 - anatomical position
 - major divisions of the body
 - major body parts
 - body positions
 - regions of the body

- location terminology
- directional terms
- planes, sections and axes
- body cavities
- abdominopelvic regions and quadrants
- body movements
- Chemical elements
 - ions, molecules, compounds
- Chemical bonds
- Chemical reactions
- Inorganic compounds and solutions
- Organic compounds
- Biological buffer systems, acid/base balance and pH
- Enzymes

Principles of Physiology

Performance Objectives

- Define and describe homeostasis, fluid, electrolyte and acid-base homeostasis

Content

- Homeostasis
- Control of homeostasis
- Fluid compartments and fluid balance
- Electrolytes in fluid balance
- pH and acid-base balance
- Intracellular fluid and extracellular fluid
- Buffer systems

Principles of Histology

Performance Objectives

- Define and describe the types and histological features of the major body tissue types

Content

- Epithelial tissue
 - origins of epithelial tissue

- cell junctions
- arrangement of cell layers and shapes
 - simple epithelium
 - simple squamous
 - simple cuboidal
 - simple columnar (ciliated and non-ciliated)
 - pseudostratified columnar (ciliated and non-ciliated)
 - stratified epithelium
 - stratified squamous (keratinized and non-keratinized)
 - stratified cuboidal
 - stratified columnar
 - transitional
- Connective tissue
 - general features
 - connective tissue cells
 - extracellular matrix
 - classifications
 - embryonic
 - mesenchyme connective tissue
 - mucous connective tissue
 - mature
 - loose connective tissue
 - ❖ areolar connective tissue
 - ❖ adipose tissue
 - ❖ reticular connective tissue
 - dense connective tissue
 - ❖ dense regular connective tissue
 - ❖ dense irregular connective tissue
 - ❖ elastic connective tissue
 - cartilage
 - ❖ hyaline cartilage
 - ❖ fibrocartilage
 - ❖ elastic cartilage
 - bone tissue
 - liquid connective tissue
 - ❖ blood
 - functions and properties of blood
 - formation of blood cells
 - red and white blood cells
 - ❖ lymph
- Nervous tissue
 - neurons
 - neuroglia
 - connective tissue components

- Muscle tissue
 - connective tissue components
 - nerve and blood supply
 - microscopic anatomy
 - muscle proteins

Cell Anatomy, Physiology and Pathology

Performance Objectives

- Define and describe principles of cellular anatomy and physiology as it relates to the body tissues
- Differentiate between external and internal causes of cell damage
- Describe how each of the following may lead to cell and tissue damage: genetic error, ischemia, inappropriate immune responses
- Define apoptosis and necrosis
- Define and describe the changes in extracellular degeneration

Content

- Structure of the cell
 - plasma membrane
 - cytoplasm
 - nucleus
 - organelles
- Transport across the plasma membrane
- Cell division
- Cells and tissue damage, inflammation, healing and repair
- Causes of cell damage
 - internal agents
 - genetic error and enzyme defects
 - ischemia and deprivation of essential supplies
 - hypoxic cell damage
 - inappropriate immune response
 - external agents
- Apoptosis/programmed cell death
- Necrosis
- Extracellular degeneration
 - changes in the matrix
 - changes in fibres
 - fibrosis
 - hyalinization of collagen
 - fibroid necrosis/necrobiosis

Cardiovascular System Anatomy

Performance Objectives

- Define and describe the anatomy of the heart and pericardium
- Locate the major branches of the systemic circulatory routes
- Define and describe the hepatic portal circulation
- Define and describe pulmonary circulation
- Name and locate the major pulses

Content

- Heart location, wall layers, chambers and valves, components of coronary circulation
- Pericardium
- Aorta and its branches
- Circulatory routes
 - systemic circulation
 - hepatic portal circulation
 - pulmonary circulation
- Major pulse points
 - facial artery
 - superficial temporal artery
 - common carotid artery
 - brachial artery
 - abdominal artery
 - femoral artery
 - popliteal artery
 - ulnar artery
 - radial artery
 - dorsalis pedis artery
 - tibialis posterior artery

Cardiovascular System Physiology

Performance Objectives

- Define and describe the physiology of cardiac function
- Define and describe the physiology of cardiac and systemic circulation (blood vessels)

Content

- Cardiac action potentials and self-excitation

- Conduction velocity and refractory periods
- Excitation-contraction coupling
- Cardiac cycle
- Cardiac output
- Intrinsic regulation and autonomic regulation of heart pumping
- Functions and distribution of circulation elements (arteries, veins, arterioles, venules, capillaries, capillary beds)
- Physics of arterial pressures, venous pressures and capacitance
- Control of blood pressure and blood flow
 - role of the cardiovascular centres
 - neural regulation of blood pressure
 - hormonal regulation of blood pressure
 - autoregulation of blood flow
- Role of the kidneys in long-term regulation of arterial pressure and in hypertension
 - regulators of extracellular fluid volume
 - pressure diuresis and natriuresis
 - renin-angiotensin system
- Exercise and the heart

Cardiovascular System Pathology

Performance Objectives

- Define and describe disorders of the cardiovascular system
- Define and describe disorders and diseases of the heart
- Define and describe diseases of the blood vessels

Content

- Disturbances in fluid balance
- Circulatory shock
- Edema
 - exudate
 - transudate
 - cardiac
 - renal
- Mechanisms leading to the formation and destruction of thrombi and thromboses
- Thrombosis
 - arterial
 - venous
- Thrombophlebitis
- Phlebothrombosis

- Embolisms
 - pulmonary
 - arterial
 - thrombo
 - gas
 - fat
 - tumor
- Acquired heart defects
 - endocarditis
 - rheumatic
 - nonbacterial thrombotic
 - acute infective
 - subacute infective
 - myocarditis
 - pericarditis
- Valvular disease
 - mitral incompetence and stenosis
 - aortic incompetence and stenosis
- Ischemia
 - gradual coronary occlusion
 - myocardial ischemia
 - angina pectoris
 - sudden coronary occlusion
 - myocardial infarction
 - acute heart failure
 - cardiac dysrhythmia
- Hypertension
- Hypotension
- Chronic cardiac overloading with hypertrophy
 - cor pulmonale
 - chronic overloading of the left ventricle
- Acute cardiac overload
 - massive pulmonary embolism
- Cardiomyopathy
- Dysrhythmias with disturbance of conduction
 - ectopic beats
 - paroxysmal tachycardia
 - atrial and ventricular fibrillation
 - heart block
- Heart failure
 - right and left ventricular failure
 - congestive heart failure
- Diseases of blood vessels

- arteries
 - arteriosclerosis
 - atherosclerosis
 - arteritis
 - infective arteritis
 - rheumatoid arteritis
 - thromboangiitis obliterans (Buerger's disease)
 - giant cell arteritis (temporal arteritis)
 - polyarteritis nodosa
 - aneurysms
- Frostbite
- Decompression illness
- Decubitus ulcers
- Vasculitis
- Diabetic microangiopathy
- Peripheral vascular disease
 - varicose veins
 - Raynaud's phenomenon/disease
 - deep vein thrombosis
- Anemia
 - idiopathic
 - nutritional
 - hemorrhagic
 - hemolytic
 - aplastic
 - secondary
- Hematomas

Lymphatic System and Immunity – Anatomy

Performance Objectives

- Define and describe the anatomy of the lymphatic system
- Define and describe anatomy of the components of immunity

Content

- Lymph
- Major lymphatic ducts
 - thoracic duct
 - right lymphatic duct
- Primary lymphatic organs

- red bone marrow
- thymus
- Secondary lymphatic organs
 - regional lymph nodes
 - occipital
 - retroauricular/mastoid
 - parotid
 - buccal/facial
 - submandibular
 - submental
 - anterior cervical
 - superficial cervical
 - retropharyngeal
 - laryngeal
 - tracheal
 - deep cervical nodes
 - axillary nodes
 - anterior/pectoral
 - posterior/subscapular
 - lateral
 - central
 - infraclavicular/deltopectoral
 - apical
 - supraclavicular/cubital nodes
 - nodal lymphatic drainage of the thorax
 - axillary
 - internal thoracic
 - intercostal
 - diaphragmatic
 - brachiocephalic
 - posterior mediastinal
 - tracheobronchial
 - nodal lymphatic drainage of the lower limb
 - superficial inguinal
 - deep inguinal
 - popliteal
 - adenoids/pharyngeal/nasopharyngeal nodes
 - spleen
- Cells and tissues that carry immune responses (ie. antigens)

Lymphatic System and Immunity – Physiology

Performance Objectives

- Define and describe the physiology of the lymphatic system
- Define and describe the physiology of immunity
- Define and describe the causes, characteristics and sequelae of acute and chronic inflammation
- Define the mechanisms through which chronic inflammation leads to fibrosis and cicatrization, contracture and cicatrization, loss of normal function, granulomas, ulceration
- Define and describe the regulation of healing
- Define and describe the pathogenesis of infectious diseases, the factors which influence infectious diseases and the common types of infectious diseases (bacterial, viral and fungal)
- Describe the defenses against infection
- Describe the infection by toxic organisms, invasive organisms, producing local damage or widespread effects
- Describe the mechanism of spread of infection within a host
- Describe how various factors affect the occurrence and spread of infection
- Describe how host factors affect the occurrence and spread of infection
- Define opportunistic infection

Content

- Drainage of interstitial fluids
- Transport of dietary lipids
- Carrying out immune responses
- Innate immunity
 - Skin and mucous membranes
 - physical factors
 - chemical factors
 - Internal defenses
 - antimicrobial proteins
 - natural killer cells
 - phagocytes
 - inflammation
 - fever
- Adaptive immunity
 - cell-mediated immunity
 - antibody-mediated immunity
 - antigens and antigen receptors
 - cytokines
- Stress and immunity
- Auto immunity
- Allergies

- Acute inflammation
 - vascular response
 - cellular exudate
 - sequelae of acute inflammation
 - resolution
 - fibrous organization
 - suppuration
 - abscesses
- Chronic inflammation
 - infection
 - foreign bodies and other irritants
 - hypersensitivity
 - autoimmune diseases
 - consequences
 - fibrosis and pathophysiological scarring
 - contracture
 - loss of normal function
 - granulomas
 - ulceration
- Infectious diseases
 - toxins and infection
 - sources of infection
 - endogenous
 - exogenous
 - defense against infection
 - mechanical integrity of epithelial surfaces
 - decontamination and removal of pathogens
 - spread of infection within a host
 - factors affecting occurrence and spread of infection
 - pathogen factors
 - virulence
 - dose
 - site of infection
 - synergism between and among different pathogens
 - host factors
 - resistance to infection
 - immune competency
 - low leukocyte count
 - necrosis and ischemic tissue
 - opportunistic infection
 - pyogenic bacterial infections
 - suppurative inflammation
 - aerobic toxic infections
 - anaerobic toxic infections

- spirochete infections
- responses to viral infection
 - local
 - widespread
 - immune
- viral diseases
- fungal infections
- histoplasmosis

Lymphatic System and Immunity – Pathology

Performance Objectives

- Define and describe disorders of the lymphatic system and immunity

Content

- Edema
- Lymphagitis
- Lymphedema
- Lymphoma
- Infectious mononucleosis
- Chronic fatigue syndrome
- Human immunodeficiency virus (HIV)/acquired immunodeficiency syndrome (AIDS)
- Systemic lupus erythematosus
- Cancer
 - Hodgkin's disease
 - non-Hodgkin's lymphoma
 - leukemia
- Spirochaete infections
 - lyme disease
 - syphilis
- Viral diseases
 - herpes virus
 - papillomaviruses
 - enteroviruses
 - influenza viruses
 - rhinoviruses
 - poliomyelitis
- Fungal infections
 - superficial mycoses
 - fungal pneumonia – pneumocystis carinii

- yeast infections – candidiasis
- Pyogenic bacterial infections
 - staphylococcus
 - streptococcus
 - pneumococcus
 - gonococcus
 - meningococcus
- Anaerobic toxic infections
 - corynebacterium diphtheria
 - yersina pestis
 - clostridium
 - coliforms
 - wound infections
 - cholera
- Myobacterial infections
 - tuberculosis

Respiratory System Anatomy

Performance Objectives

- Define and describe the anatomy of the respiratory system

Content

- Upper respiratory tract
 - nose
 - pharynx
- Lower respiratory tract
 - larynx
 - structures of voice production
 - trachea
 - bronchi
 - lungs

Respiratory System Physiology

Performance Objectives

- Define and describe the physiology of the respiratory system

Content

- Pulmonary ventilation
- Lung volumes and capacities
- Exchange of oxygen and carbon dioxide
- Transport of oxygen and carbon dioxide
- Control of respiration
- Exercise and the respiratory system

Respiratory System Pathology

Performance Objectives

- Define and describe disorders of the respiratory system

Content

- Respiratory failure type 1 and type 2
 - ventilation/perfusion ratio
 - collapsed lung
- Congenital anomalies
- Respiratory distress syndromes
 - infant respiratory distress syndrome (hyaline membrane disease)
 - adult respiratory distress syndrome
- Pulmonary infections
 - acute and chronic bronchitis
 - upper respiratory tract infections
 - common cold
 - sinusitis
 - tonsillitis
 - otitis media
 - pharyngitis
 - laryngitis
 - lower respiratory tract infections
 - streptococcus pneumonia
 - severe acute respiratory syndrome
 - pneumocystis pneumonia
 - tuberculosis
- Pneumonia
 - bronchial
 - lobar
 - viral
- Carcinomas of the lungs

- metastatic
- Pleural cavity disease
 - pneumothorax
 - pleural effusion
- Pleurisy
- Pneumoconiosis
- Pulmonary embolism
- Pulmonary arterial hypertension
- Pulmonary edema
- Obstructive pulmonary diseases
 - chronic obstructive pulmonary disease
 - chronic bronchitis
 - bronchiolitis
 - bronchiectasis
 - asthma
 - emphysema
- Restrictive lung diseases
- Influenza
- Cystic fibrosis
- Sleep apnea

Gastrointestinal System Anatomy

Performance Objectives

- Define and describe the anatomy of the gastrointestinal system

Content

- Mouth
 - salivary glands
 - tongue
 - teeth
- Pharynx
- Esophagus
- Stomach
- Pancreas, liver, gallbladder (See endocrine system, liver and gallbladder)
- Small intestine
- Large intestine

Gastrointestinal System Physiology

Performance Objectives

- Define and describe the physiology of the gastrointestinal system

Content

- Mechanical and chemical digestion in the mouth
- Deglutition
- Mechanical and chemical digestion in the stomach, small intestine and large intestine
- Absorption in the stomach, small intestine and large intestine
- Phases of digestion

Gastrointestinal System Pathology

Performance Objectives

- Define and describe disorders of the digestive system

Content

- Esophagus
 - gastroesophageal reflux disease
- Stomach
 - hiatus hernia
 - acute gastritis
 - chronic gastritis
 - pyloric stenosis
 - chronic and acute peptic ulceration
 - carcinoma of the stomach
 - adenocarcinoma
- Intestine and colon
 - constipation
 - celiac disease
 - bacterial infections
 - parasitism
 - Crohn's disease
 - malabsorption syndrome
 - ulcerative colitis
 - irritable bowel syndrome
 - ischemic bowel disease
 - diverticulosis

- diverticulitis
- appendicitis
- peritonitis
- gastric volvulus and strangulation
- bowel ischemia
- familial polyposis coli (familial adenomatous polyposis)
- colonic and intestinal bacterial intoxication, infection and parasitism
- carcinoma
 - colorectal
- General
 - peptic ulcer
 - gastroenteritis

Liver and Gallbladder Anatomy

Performance Objectives

- Define and describe the anatomy of the liver and gallbladder

Content

- Liver
 - lobes
 - associated ligaments
 - hilum
 - capsules
 - associated vessels, canals and ducts
- Gallbladder
 - fundus, body, neck
 - associated vessels and ducts

Liver and Gallbladder Physiology

Performance Objectives

- Define and describe the physiological processes of the liver and gallbladder

Content

- Bile production and secretion
- Carbohydrate metabolism

- Lipid metabolism
- Protein metabolism
- Processing of drugs and hormones
- Excretion of bilirubin
- Synthesis of bile salts
- Storage
- Phagocytosis
- Activation of Vitamin D
- Storage and concentration of bile

Liver and Gallbladder Pathology

Performance Objectives

- Define and describe disorders of the liver and gallbladder

Content

- Hepatitis (alcoholic, viral and chronic)
 - viral hepatitis A, B, C, D, E, and G
- Cirrhosis of the liver
- Haemochromatosis
- Wilson's disease
- Primary sclerosing cholangitis
- Primary biliary cirrhosis
- Glycogen storage disease type 2
- Portal hypertension
- Cholelithiasis
- Cholecystitis
- Carcinoma

Kidney and Urinary System Anatomy

Performance Objectives

- Define and describe the anatomy of the kidney and urinary system

Content

- Kidney anatomy
 - external

- internal
- Kidney blood and nerve supply
- Ureters
- Urinary bladder
- Urethra

Kidney and Urinary System Physiology

Performance Objectives

- Define and describe the formation of urine
- Define and describe the mechanisms which regulate body fluids
- Define and describe the mechanisms which regulate acid/base balance of body fluids
- Define and describe the process of micturition

Content

- Urine formation
 - glomerular filtration
 - tubular reabsorption
 - tubular secretion
- Evaluation of kidney function
- Urine transport, storage and elimination
- Regulation of body fluids
- Acid-base balance

Kidney and Urinary System Pathology

Performance Objectives

- Define and describe disorders of the kidney and urinary tract

Content

- Kidney
 - acquired cystic disease
 - acute and chronic pyelonephritis
 - cystic renal dysplasia
 - acute and chronic renal failure
 - glomerulonephritis
 - diabetic nephropathy
 - polycystic kidney disease

- Urinary tract
 - urinary tract infections
 - urolithiasis
 - micturition disorders
 - urinary incontinence
 - cystitis

Endocrine System Anatomy

Performance Objectives

- Define and describe the glands of the endocrine system

Content

- Pituitary gland
- Thyroid gland
- Parathyroid gland
- Adrenal gland
- Pineal gland
- Glands that are not exclusively endocrine glands
 - hypothalamus
 - thymus
 - pancreas
 - ovaries
 - testes
 - kidney
 - stomach
 - liver
 - small intestine
 - skin
 - heart
 - adipose tissue
 - placenta

Endocrine System Physiology

Performance Objectives

- Define and describe the physiology of the glands of the endocrine system

Content

- Hormone secretors
 - anterior and posterior pituitary
 - thyroid
 - parathyroid
 - adrenals
 - pineal
 - hypothalamus
 - thymus
 - pancreas
 - ovaries
 - testes
 - kidney
 - stomach
 - liver
 - small intestine
 - skin
 - heart
 - adipose tissue

Endocrine System Pathology

Performance Objectives

- Define and describe disorders of the endocrine system

Content

- Pancreas
 - pancreatitis acute and chronic
 - carcinoma
 - diabetes mellitus types 1 and 2
 - pancreatic insufficiency
 - cystic fibrosis
- Pituitary gland
 - acromegaly
 - hyperpituitary disorders
 - hypopituitarism
 - pituitary tumors
 - empty sella syndrome
 - Cushing's syndrome
- Adrenal glands

- primary adrenal insufficiency
 - Addison's disease
- primary aldosteronism
 - Conn's syndrome
- Thyroid gland
 - hyperthyroidism
 - Grave's disease
 - hypothyroidism
 - Hashimoto's disease
- Parathyroid gland
 - hyperparathyroiditis

Integumentary System Anatomy

Performance Objectives

- Define and describe the anatomy of the integumentary system

Content

- Structure of the skin
- Accessory structures of the skin
- Types of skin
 - thin skin
 - thick skin

Integumentary System Physiology

Performance Objectives

- Define and describe the physiology of the integumentary system

Content

- Functions of the skin
- Wound healing

Integumentary System Pathology

Performance Objectives

- Define and describe disorders of the integumentary system

Content

- Bacterial
 - impetigo
 - ecthyma
 - cellulitis
 - erysipelas
 - folliculitis
 - furuncles
 - carbuncles
 - hidradenitis suppurativa
- Fungal
 - tinea infections
 - candidiasis
 - tinea versicolor
- Parasitic
 - pediculosis
 - pediculus humanus capitis
 - pediculus humanus corporis
 - pthirus pubis
 - scabies
 - mites
- Viral
 - warts
 - molluscum contagiosum
 - herpes simplex
 - herpes zoster
- Hair follicles and sebaceous glands
 - acne vulgaris
 - acne rosacea
 - pseudofolliculitis barbae
 - alopecia
- Psoriasis
- Inflammatory reactions from drugs
- Dermatitis (acute, subacute and chronic)
- Types of dermatitis
 - primary irritant contact
 - atopic
 - phototoxic
 - photoallergic
 - allergic contact

- stasis
- neurodermatitis
- seborrheic
- perioral
- Carcinomas
 - basal cell
 - basosquamous cell
 - cutaneous papilloma
 - malignant melanoma
 - sebaceous gland neoplasm
- Urticaria
- Corns
- Ichthyosis
- Vitiligo
- Burns
- Open wounds and sores
- Pathophysiological scars
 - Post-surgical
 - Burns
 - Keloid
 - Hypertrophic

Reproductive System Anatomy

Performance Objectives

- Define and describe the anatomy of the female and male reproductive systems

Content

- Ovaries
- Uterine tubes
- Uterus
- Vagina
- Vulva
- Perineum
- Mammary glands
- Testis and scrotum
- Reproductive system ducts in the male
- Accessory sex glands
- Semen
- Penis

Reproductive System Physiology

Performance Objectives

- Define and describe the physiology of the female and male reproductive systems

Content

- Ovarian and endometrial cycles
- Female reproductive hormones
- Endocrine regulation of female reproduction
- Pregnancy
- Parturition
- Sexual arousal
- Spermatogenesis
- Endocrine regulation of male reproduction

Reproductive System Pathology

Performance Objectives

- Define and describe disorders of the reproductive system

Content

- Male reproductive system
 - testicular disorders
 - trauma
 - torsion
 - carcinoma
 - germ cell tumor (germinoma)
 - teratoma
 - embryonal cell tumor
 - epididymitis
 - hypogonadism
 - orchiditis
 - prostatic carcinoma
 - benign prostatic hyperplasia
- Female reproductive system
 - vulva and vagina
 - cervix
 - cervicitis
 - cervical dysplasia

- eversion
 - polyps
 - carcinoma
- uterus
 - endometrial hyperplasia
 - endometriosis
 - fibroids
 - pelvic inflammatory disease
 - carcinoma
- uterine tubes
 - salpingitis
- ovaries
 - Stein-Leventhal syndrome
 - ovarian cysts
 - carcinoma
- breasts
 - chronic cystic mastitis
 - fat necrosis of the breast
 - fibrocystic breast disease
 - fibroadenoma
 - carcinoma
- pregnancy
 - morning sickness
 - preeclampsia
 - eclampsia
 - ectopic pregnancy
 - miscarriage
 - placenta previa
 - hydatidiform mole
 - gestational diabetes
- sexually transmitted diseases
 - chlamydia
 - gonorrhea
 - genital herpes
 - human papillomavirus
 - syphilis
 - genital warts
 - trichomoniasis
 - genital candidiasis
 - bacterial vaginosis
 - trichomoniasis
 - vulvodynia

MUSCULOSKELETAL ANATOMY, PHYSIOLOGY & PATHOLOGY

General Objectives

- Thorough working knowledge of the musculoskeletal system (osteology, arthrology and myology) of the human body
- Within each area there will be a balance between what is required on an academic level and what structures are examined by palpation:
 - Where the capital letter “P” appears in parentheses, i.e. (P), that item should be palpable on the living body
 - Where a capital letter “P” appears in parentheses next to a major structure and that structure contains subsections, all subsections are considered to be palpable
 - Where a capital letter “P” appears in parentheses next to a joint, that joint should be palpable in stasis and/or in movement

Osteology Performance Objectives

- List and locate the bones within each of the divisions (axial and appendicular) of the skeletal system
- List the functions of the skeletal system
- List and define the type of bone classification (long, short, flat, irregular, sesamoid and sutural/wormion) into which each bone in the skeletal system belongs
- List and define bony landmarks/bony surface markings as specified
- Identify the parts of a long bone
- Define and describe the structure of bone
- Identify and palpate all bony landmarks listed on a skeletal model as well as on the living body (see above) where specified

Arthrology Performance Objectives

- Identify the structural and functional classifications of joints, the types of joints, and joint functions within each type
 - fibrous [suture, syndesmosis, gomphosis], cartilaginous [symphysis, synchondrosis] and synovial [plane/gliding, hinge, pivot, condyloid, ellipsoid, saddle, ball-and-socket]
 - synarthrosis [suture, syndesmosis, gomphosis], amphiarthrosis and diarthrosis [uniaxial/monaxial, multiaxial, biaxial, triaxial]
- Identify the point/s of articulation at each joint

- Identify and palpate, where accessible, each joint listed and its associated ligaments and structures
- Identify and perform all movements possible (actions and reverse actions) within the normal limits of each of the joints listed
- Identify and measure the range/s of motion and limitations (limiting elements) of each joint listed

Myology Performance Objectives

- Identify the arrangements of muscle fascicles
 - parallel, fusiform, circular, triangular, pennate [unipennate, bipennate, multipennate]
- Identify agonists, antagonists, synergists, and fixators
- Identify skeletal muscle nomenclature including name, position of muscle belly/ies, direction/s of muscle fasciculi, course of the muscle, origin/s, insertion/s, innervation and action/s (and where applicable reverse action/s)
- Palpate all accessible muscles throughout their ranges of motion, their tendon/s and supporting fascia as individual muscles, relative to surrounding muscles and/or structures
- Identify procedures required and perform a ‘muscle test’ evaluating the muscle’s ability to perform its primary function
- Identify, trace and palpate (where accessible) the units and courses of the peripheral nervous system and vascular system as they relate to each of the muscles listed in this section

Musculoskeletal Anatomy

Content:

Osteology of the Skull

NOTE:

Where the letter “P” appears in parentheses (P) in this and subsequent sections, it indicates that the item should be palpable on the living body.

- **Cranial Bones**

- frontal
 - external landmarks
 - superciliary/supraorbital arch (P)
 - superciliary/supraorbital ridge/margin (P)

- supraorbital notch/foramen (P)
 - supratrochlear foramen (P)
 - frontal squamous (squamous portion/part) (P)
 - frontal tuberosity/eminence (P)
 - glabella (P)
 - superior temporal line (P)
 - inferior temporal line (P)
 - orbital surface
- internal landmarks
 - frontal crest
 - frontal sinuses
 - groove for superior sagittal sinus
- occipital
 - external landmarks
 - superior nuchal line (P)
 - inferior nuchal line (P)
 - external occipital protuberance (inion) (P)
 - external occipital crest (P)
 - foramen magnum
 - jugular foramen
 - occipital condyles
 - occipital articulating facets
 - basiocciput
 - occipital squamous (P)
 - clivus
 - internal landmarks
 - internal occipital protuberance
 - internal occipital crest
 - occipital squamous
 - grooves for venous sinuses
 - ❖ superior sagittal
 - ❖ transverse
 - ❖ sigmoid
 - ❖ inferior petrosal
 - ❖ occipital
- parietal
 - external landmarks
 - superior temporal line (P)
 - inferior temporal line (P)
- temporal
 - external landmarks

- temporal squamous (P)
- mastoid portion/part (P)
- styloid process (P)
- zygomatic process (P)
- external auditory/acoustic meatus (P)
- temporal fossa (P)
- mandibular fossa (P)
- articular tubercle (P)
- jugular foramen
- internal landmarks
 - internal auditory/acoustic meatus
 - temporal squamous
 - mastoid portion/part
 - jugular foramen
 - petrous
 - groove for sigmoid sinus
- ethmoid
 - internal landmarks
 - crista galli
 - cribriform plate
 - perpendicular plate
 - superior nasal concha
 - middle nasal concha
 - ethmoid sinus
- sphenoid
 - external landmarks
 - greater wing (P)
 - orbital surface
 - pterygoid process
 - ❖ medial pterygoid plate
 - ❖ hamulus
 - ❖ lateral pterygoid plate
 - optic foramen
 - inferior orbital fissure
 - superior orbital fissure
 - internal landmarks
 - lesser wing
 - jugum
 - chiasmic/prechiasmic groove/sulcus
 - sella turcica
 - sphenoid sinuses
 - inferior orbital fissure

- superior orbital fissure
- optic canal

- **Facial Bones**

- maxilla

- external landmarks

- alveolar process (P)
 - ❖ incisive fossa
 - ❖ canine eminence
 - ❖ canine fossa
- frontal process (P)
- zygomatic process (P)
- orbital surface/plate
- infraorbital foramen (P)
- anterior nasal spine (P)
- nasal notch (P)
- inferior orbital fissure

- internal landmarks

- maxillary sinuses
- incisive foramen
- incisive canal
- palatine process
- inferior orbital fissure

- zygomatic

- external landmarks

- frontal process (P)
- maxillary process (P)
- temporal process (P)
- orbital surface

- palatine

- external landmarks

- horizontal plate (P)

- internal landmarks

- horizontal plate
- perpendicular plate
- posterior nasal spine

- lacrimal

- external landmarks

- orbital surface/plate
- lacrimal fossa

- internal landmarks

- lacrimal canal

- nasal (P)
- inferior nasal concha
- vomer
- mandible
 - external landmarks
 - condylar process (condyle) (P)
 - ❖ head
 - ❖ neck
 - coronoid process (P)
 - alveolar process (P)
 - mandibular notch (P)
 - ramus (P)
 - angle (P)
 - body (P)
 - oblique line (P)
 - incisive fossa (P)
 - canine eminence (P)
 - canine fossa (P)
 - mental foramen (P)
 - mental tubercle (P)
 - mental protuberance (P)
 - symphysis menti
 - internal landmarks
 - condylar process (condyle)
 - ❖ head
 - ❖ neck
 - coronoid process
 - alveolar process
 - mandibular notch
 - rami
 - mandibular foramen
 - mylohyoid groove
 - lingula
 - angle
 - body
 - submandibular fossa
 - sublingual fossa
 - digastric fossa
 - mental/genial spines
 - mylohyoid line

Sutures, associated landmarks, special features of the skull and temporomandibular joint

- Sutures (fibrous – synarthroses)
 - four major sutures (P)
 - coronal
 - sagittal
 - lambdoid/lambdoidal
 - squamosal/squamous/temporoparietal
 - other sutures named by the bones forming their articulations eg. zygomatico-maxillary, internasal
- Associated Landmarks (P)
 - bregma
 - lambda
 - asterion
 - nasion
 - pterion
- Special Features
 - fontanelles/fontanel
 - anterior
 - posterior
 - mastoid
 - sphenoidal - temporal fossa
- Temporomandibular joint (P)
 - synovial – hinge [modified hinge] – diarthrotic – uniaxial/monaxial
 - articular surfaces
 - articular disc
 - articular tubercle
 - mandibular fossa
 - mandibular condyle
 - accessory ligaments
 - fibrous capsule (medial and lateral collateral ligaments)
 - temporomandibular ligament
 - stylomandibular ligament
 - sphenomandibular ligament
 - movements (P)
 - elevation
 - depression
 - protraction/protrusion
 - retraction
 - lateral deviation

Muscles of the Cranium, Facial Expression and Mastication

- Muscles of the Cranium
 - occipitofrontalis/epicranium
 - temporoparietalis
 - anterior auricularis
 - superior auricularis
 - posterior auricularis
- Muscles of Facial Expression
 - circumorbital and palpebral musculature
 - orbicularis oculi
 - corrugator supercilii
 - nasal musculature
 - procerus
 - nasalis
 - depressor septi nasi
 - buccolabial musculature
 - levator labii superioris alaeque nasi
 - levator labii superioris
 - zygomaticus minor
 - levator anguli oris
 - zygomaticus major
 - mentalis
 - depressor labii inferioris
 - depressor anguli oris
 - buccinator
 - orbicularis oris
 - risorius
- Muscles of Mastication
 - masseter
 - temporalis
 - medial/internal pterygoid
 - lateral/external pterygoid
- Special Features
 - gallea aponeurotica

Osteology of the Cervical Spine and the Hyoid Bone

- Cervical Vertebrae
 - typical vertebrae (C3-C6)
 - body
 - uncinat process
 - transverse process (P)
 - anterior tubercle
 - posterior tubercle

- costotransverse bar
 - pedicle
 - transverse foramen/foramen transversarium
 - superior articular processes and facets
 - inferior articular processes and facets
 - articular pillar (P)
 - lamina (P)
 - spinous process (P)
 - superior vertebral notches
 - inferior vertebral notches
 - intervertebral foramen
 - vertebral foramen
- atypical vertebrae (C1, C2 and C7)
 - atlas (C1)
 - anterior arch
 - ❖ articular facet for dens/odontoid process
 - ❖ anterior tubercle
 - ❖ fovea dentalis
 - lateral mass
 - ❖ tubercle for transverse ligament
 - ❖ superior articular facet
 - ❖ transverse foramen (foramen transversarium)
 - ❖ transverse process (P)
 - ❖ inferior articular facet
 - posterior arch
 - ❖ posterior tubercle (P)
 - ❖ groove for vertebral artery
 - intervertebral foramen
 - vertebral foramen
 - axis (C2)
 - dens/odontoid/odontoid process
 - body
 - anterior articular facet (facet for anterior arch of C1)
 - posterior articular facet (groove for transverse ligament of C1)
 - impression of alar ligament
 - transverse process (P)
 - transverse foramen
 - superior articular facet
 - inferior articular process and facet
 - lamina (P)
 - spinous process (P)
 - intervertebral foramen
 - vertebral foramen

- vertebra prominens (C7) (P)
- Hyoid bone (P)
 - body
 - greater cornus/horn
 - lesser cornus/horn

Arthrology of the Cervical Spine

- Atlanto-occipital joints
 - synovial – condyloid – diarthrotic – triaxial
 - articular surfaces
 - occipital condylar facet
 - facet of lateral mass
 - accessory ligaments
 - see below
 - movements
 - flexion
 - extension
 - lateral flexion
 - circumduction
 - (rotation)
- Medial atlanto-axial joint
 - synovial – pivot – diarthrotic – uniaxial/monaxial
 - articular surfaces
 - articular facet of dens
 - fovea dentalis of C1 (facet for dens)
 - ring formed by anterior arch of C1 and the transverse ligament of C1
 - accessory ligaments
 - see below
 - movement
 - rotation
- Lateral atlanto-axial joints
 - synovial – plane/gliding – diarthrotic – uniaxial/monaxial
 - articular surfaces
 - inferior facet of C1
 - superior facet of C2
 - accessory ligaments
 - see below
 - movement
 - gliding
- Note special ligaments of the occipito-atlantoaxial region
 - nuchal ligament (P)
 - posterior atlanto-occipital membrane
 - articular capsules

- tectorial membrane
- cruciate/cruciform ligament of the dens
- alar ligament of the dens
- apical odontoid ligament
- anterior longitudinal ligament
- anterior atlanto-occipital membrane
- Facet/Zygapophyseal/Apophyseal joints
 - synovial – plane/gliding – diarthrotic / uniaxial/monaxial
 - articular surfaces
 - inferior condylar facet of superior vertebra
 - superior condylar facet of inferior vertebra
 - accessory ligaments
 - articular capsule
 - supraspinous
 - interspinous
 - ligamentum nuchae/nuchal ligament
 - ligamentum flavum
 - intertransverse
 - movement
 - gliding
- Intervertebral joints
 - symphysis type amphiarthrosis
 - articular surfaces
 - inferior body of superior vertebra
 - superior body of inferior vertebra
 - intervertebral disc (annulus/annulus fibrosis and nucleus pulposus)
 - accessory ligaments
 - anterior longitudinal
 - posterior longitudinal

Cervical Musculature

- Superficial cervical muscles
 - platysma
 - trapezius
 - sternocleidomastoid
- Suprahyoid muscles
 - mylohyoid
 - digastric
 - geniohyoid
 - stylohyoid
- Infrahyoid muscles
 - thyrohyoid
 - omohyoid

- sternohyoid
- sternothyroid
- Paraspinals
 - transversospinalis group
 - semispinalis
 - semispinalis capitis
 - semispinalis cervicis
 - multifidus
 - multifidus cervicis
 - rotatores
 - rotatores cervicis longus
 - rotatores cervicis brevis
 - erector spinae /sacrospinalis
 - spinalis
 - spinalis capitis
 - spinalis cervicis
 - longissimus
 - longissimus capitis
 - longissimus cervicis
 - iliocostalis
 - iliocostalis cervicis
- Deep anterior cervical muscles
 - longus colli
 - longus capitis
 - rectus capitis anterior
 - rectus capitis lateralis
- Lateral cervical muscles
 - anterior scalene
 - middle scalene
 - posterior scalene
 - levator scapulae
- Deep posterior cervical muscles
 - splenius capitis
 - splenius cervicis
- Interspinalis group
 - interspinalis cervicis
- Intertransversarii group
 - intertransversarius cervicis
- Suboccipital group
 - rectus capitis posterior major
 - rectus capitis posterior minor
 - obliquus capitis superior
 - obliquus capitis inferior

Osteology of the Thorax

- Thoracic Vertebrae
 - typical vertebrae (T2-T8)
 - body
 - pedicle
 - transverse process (P)
 - spinous process (P)
 - superior articular process and facet
 - inferior articular process and facet
 - lamina (P)
 - superior vertebral notch
 - inferior vertebral notch
 - intervertebral foramen
 - vertebral foramen
 - atypical vertebrae (T1, T9-T12)
- Ribs (P)
 - true ribs (vertebrosternal ribs) (R1-R7)
 - false ribs (vertebrochondral ribs) (R8-R10)
 - floating ribs (vertebral ribs) (R11-R12)
 - typical ribs (R3-R9)
 - anterior/sternal end
 - posterior/vertebral end
 - head
 - articular facets
 - interarticular crest
 - neck
 - crest
 - external surface
 - internal surface
 - tubercle
 - articular facet
 - shaft
 - angle
 - costal groove
 - atypical ribs (R1, R2, R10-R12)
 - R1
 - articular facet on head
 - scalene tubercle for attachment of anterior scalene muscle
 - grooves for subclavian artery and subclavian vein
 - rough area for attachment of middle scalene muscle

- R2
 - rough area for attachment of posterior scalene muscle
 - costal cartilage
- Sternum
 - manubrium
 - anterior surface (P)
 - posterior surface
 - superior border (P)
 - inferior border (P)
 - lateral border (P)
 - suprasternal/jugular notch (P)
 - costal notch (P)
 - clavicular notch (P)
 - sternal angle, sternal angle of Louis, manubriosternal joint (P)
 - body
 - sternal angle (P)
 - superior border (P)
 - inferior border (P)
 - lateral border (P)
 - costal notches (P)
 - anterior surface (P)
 - posterior surface
 - infrasternal angle, xiphisternal joint, subcostal joint (P)
 - xiphoid process/xiphoid
 - infrasternal angle (P)
 - anterior surface (P)
 - posterior surface
 - superior border (P)
 - lateral border (P)
 - costal notches (P)

Arthrology of the Thorax

- Facet/Zygapophyseal/Apophyseal joints
 - synovial – plane/gliding – diarthrotic – uniaxial/monaxial
 - articular surfaces
 - see cervical spine
 - accessory ligaments
 - see cervical spine but no ligamentum nuchae
 - movements
 - see cervical spine
- Intervertebral joints
 - symphysis type of amphiarthrosis
 - articular surfaces

- see cervical spine
 - accessory ligaments
 - see cervical spine
- Costovertebral joints (P)
 - synovial – plane/gliding – diarthrotic – uniaxial/monaxial
 - articular surfaces
 - facet or demifacet on vertebral body
 - rib head facets and interarticular crest where present
 - accessory ligaments
 - fibrous capsule
 - radiate (anterior costovertebral)
 - intra-articular
 - movements
 - gliding
- Costotransverse joints (P)
 - synovial – plane/gliding – diarthrotic – uniaxial/monaxial
 - articular surfaces
 - transverse costal facet
 - articular facet on tubercle
 - accessory ligaments
 - fibrous capsule
 - superior costotransverse
 - costotransverse
 - lateral costotransverse
 - intertransverse
 - movements
 - gliding
- Sternocostal joint (P)
 - 1st: cartilaginous synchondrosis
 - 2nd – 7th: synovial – plane/gliding – diarthrotic - uniaxial/monaxial
 - articular surfaces (1st)
 - costal notch of manubrium
 - anterior end of 1st rib cartilage
 - accessory ligament (1st)
 - anterior sternocostal (stellate)
 - movements (1st)
 - slight gliding
 - articular surfaces (2nd-7th)
 - costal facet of sternum (R2 at sternal angle; R3-R7 at body)
 - anterior end of 2nd-7th rib cartilages
 - accessory ligaments (2nd-7th)
 - fibrous capsule
 - radiate sternocostal
 - intra-articular

- movements (2nd-7th)
 - gliding
- Costochondral joints (P)
 - synarthroses joined by periosteum
- Manubriosternal joint (P) – forms sternal angle/sternal angle of Louis
 - fibrocartilaginous amphiarthrosis
 - articular surfaces
 - inferior margin of manubrium
 - superior margin of body of sternum
 - accessory ligaments
 - manubriosternal ligament
 - movements
 - flexion and extension (very little)
- Xiphisternal joint (P) – forms infrasternal angle
 - fibrocartilaginous amphiarthrosis
 - articular surfaces
 - inferior margin of body of sternum
 - superior margin of xiphoid process
 - accessory ligaments
 - sternoxiphoid ligament
 - movements
 - flexion and extension (very little)

Thoracic Musculature

- Intercostals
 - external intercostals
 - internal intercostals
 - innermost intercostals
- Levator costarum
- Serratus posterior superior
- Serratus posterior inferior
- Diaphragm
- Deep thoracic muscles
 - splenius group
 - splenius capitis
 - splenius cervicis
 - erector spinae/sacrospinalis
 - iliocostalis group
 - iliocostalis cervicis
 - iliocostalis thoracis
 - longissimus group
 - longissimus capitis
 - longissimus cervicis

- spinalis group
 - spinalis thoracis
- transversospinalis group
 - semispinalis group
 - semispinalis capitis
 - semispinalis cervicis
 - semispinalis thoracis
 - multifidus group
 - multifidus thoracis
 - rotatores group
 - rotatores thoracis

Special feature of Thoracic Region

- Thoracolumbar fascia

Osteology of the Abdominal Region

- Lumbar Vertebrae
 - typical vertebrae (L1-L5)
 - body
 - pedicle
 - lamina (P)
 - transverse process (P)
 - spinous process (P)
 - accessory process
 - superior articular process
 - inferior articular process
 - mamillary process (P)
 - superior articular facet
 - inferior articular facet
 - superior vertebral notch
 - inferior vertebral notch
 - intervertebral foramen
 - vertebral foramen

Arthrology of the Abdominal Region

- Facet/Zygapophyseal/Apophyseal joints
 - synovial – plane/gliding – diarthrotic – monaxial
 - articular surfaces
 - see cervical spine
 - accessory ligaments
 - see cervical spine but no ligamentum nuchae
 - movements

- see cervical spine
- Intervertebral joints
 - symphysis type of amphiarthrosis
 - articular surfaces
 - see cervical spine
 - accessory ligaments
 - see cervical spine

Abdominal Region Musculature

- Diaphragm
- External abdominal obliques
- Internal abdominal obliques
- Transversus abdominis
- Rectus abdominis
- Pyramidalis
- Psoas major
- Psoas minor
- Iliacus
- Quadratus lumborum
- Latissimus dorsi
- Erector spinae/sacrospinalis
 - iliocostalis group
 - iliocostalis lumborum
 - longissimus group
- Transversospinalis group
 - multifidus group
 - multifidus lumborum
 - rotatores group
 - rotatores lumborum
- Interspinalis group
 - interspinalis lumborum
- Intertransversarii group
 - intertransversarius lumborum

Osteology of the Pelvic Girdle

- Sacrum
 - base (P)
 - body (P)
 - sacral promontory (P)
 - sacral canal
 - superior articular process and facet
 - ala (P)

- sacral tuberosity (P)
- auricular surface/facet
- median sacral crest (with tubercles) (P)
- intermediate sacral crest (with tubercles) (P)
- lateral sacral crest (with tubercles) (P)
- pelvic/anterior sacral foramina
- dorsal/posterior sacral foramina
- transverse lines/ridges (P)
- sacral hiatus (P)
- sacral cornu (P)
- apex (P)
- Coccyx
 - base (P)
 - coccygeal cornu
 - transverse process (rudimentary)
 - apex (P)
- Hip/Innominate/Pelvic/Coxal Bone/Os Coxa
 - ilium
 - ala (P)
 - iliac crest (P)
 - iliac tuberosity (P)
 - iliac tubercle (P)
 - anterior superior iliac spines (P)
 - anterior inferior iliac spines (P)
 - posterior superior iliac spines (P)
 - posterior inferior iliac spines (P)
 - iliac fossa (P)
 - body of ilium
 - auricular surface
 - anterior gluteal line
 - posterior gluteal line
 - inferior gluteal line
 - arcuate line
 - iliopectineal/iliopubic eminence
 - greater sciatic notch
 - acetabulum
 - margin/rim
 - acetabular fossa
 - lunate surface
 - acetabular notch
 - ischium
 - greater sciatic notch
 - lesser sciatic notch

- ischial spine (P)
- body of ischium
- ischial tuberosity (P)
- ischial ramus
- obturator foramen
- acetabulum
- pubis
 - iliopectineal/iliopubic eminence
 - superior pubic ramus (P)
 - inferior pubic ramus (P)
 - pecten (pectin pubis) (pectineal line)
 - pubic tubercle (P)
 - pubic crest
 - obturator crest
 - obturator groove
 - body of pubis (P)
 - symphyseal surface
 - obturator foramen
 - acetabulum

Arthrology of the Pelvic Girdle

(including sacrococcygeal and intercoccygeal joints and iliolumbar ligament)

- Lumbosacral joints /2 zygapophyseal + 1 intervertebral/apophyseal
 - articular surfaces
 - see other zygapophyseal and intervertebral joints
 - accessory ligaments
 - see other zygapophyseal and intervertebral joints
 - iliolumbar (P)
 - movements
 - see other zygapophyseal and intervertebral joints
- Sacroiliac joint (P)
 - mixed synovial, fibrous – plane/gliding – diarthrotic, amphiarthrotic – uniaxial/monaxial
 - articular surfaces
 - c-shaped auricular surface of sacrum
 - c-shaped auricular surface of ilium
 - accessory ligaments
 - ventral sacroiliac
 - long dorsal sacroiliac
 - short dorsal sacroiliac
 - interosseous sacroiliac
 - sacrotuberous (P)

- sacrospinous (P)
 - movements
 - gliding (slight, i.e. nutation, counternutation)
- Pubic /interpubic joint
 - cartilaginous – symphysis – amphiarthrosis
 - articular surfaces
 - symphyseal surfaces of pubis
 - accessory ligaments
 - fibrocartilaginous disc
 - superior pubic (P)
 - arcuate/inferior pubic
 - movements
 - gliding
- Sacrococcygeal joint (P)
 - symphysis – amphiarthrosis
 - articular surfaces
 - inferior surface of apex of sacrum
 - superior surface of the base of the coccyx
 - accessory ligaments
 - intervertebral rudimentary fibrocartilaginous disc
 - ventral/anterior sacrococcygeal
 - lateral sacrococcygeal
 - superficial posterior sacrococcygeal
 - deep posterior sacrococcygeal
 - intercornual
- Intercoccygeal joints

Muscles of the Pelvic Girdle

- Muscles of the iliac region
 - psoas major
 - psoas minor
 - iliacus
- Muscles of the gluteal region
 - gluteus maximus
 - gluteus medius
 - gluteus minimus
 - piriformis
 - superior gemellus
 - inferior gemellus
 - obturator internus
 - obturator externus
 - quadratus femoris

Osteology of the Lower Extremity

- Femur
 - head
 - neck
 - greater trochanter (P)
 - lesser trochanter (P)
 - intertrochanteric/trochanteric crest
 - trochanteric fossa
 - quadrate tubercle
 - gluteal tuberosity (P)
 - pectineal line
 - spiral line
 - intertrochanteric/trochanteric line
 - shaft (P)
 - linea aspera
 - lateral lip
 - medial lip
 - lateral supracondylar ridge (P)
 - medial supracondylar ridge (P)
 - lateral epicondyle (P)
 - medial epicondyle (P)
 - lateral condyle (P)
 - medial condyle (P)
 - adductor tubercle (P)
 - intercondylar notch
 - intercondylar fossa
 - patellar surface
 - trochlear groove
- Patella
 - anterior surface (P)
 - posterior surface
 - apex (P)
 - base (P)
 - lateral facet
 - medial facet
 - odd medial facet
 - superior border (P)
 - lateral border (P)
 - medial border (P)
- Tibia
 - lateral condyle (P)
 - facet for head of fibula
 - medial condyle (P)

- lateral superior articular surface (P)
- medial superior articular surface (P)
- intercondylar eminence
- lateral intercondylar tubercle
- medial intercondylar tubercle
- Gerdy's tubercle (P)
- pes anserinus/anserine site (P)
- anterior intercondylar areas
- posterior intercondylar area
- horizontal groove for semimembranosus
- tibial tuberosity (P)
- oblique line
- soleal line
- shaft (P)
- anterior tibial border (P)
- interosseous tibial border
- medial tibial border (P)
- medial tibial surface (P)
- lateral tibial surface
- posterior tibial surface
- fibular notch
- medial malleolus (P)
- malleolar groove (P)
 - groove for tibialis posterior tendon
 - groove for flexor digitorum longus tendon
 - groove for flexor hallucis longus tendon
- inferior articular surface
- medial malleolar surface
- Fibula
 - apex (P)
 - head (P)
 - articular facet
 - neck (P)
 - shaft (P)
 - anterior fibular border
 - interosseous/medial fibular border
 - posterior fibular border
 - medial crest
 - medial fibular surface
 - lateral fibular surface
 - posterior fibular surface
 - lateral malleolus (P)
 - articular surface
 - fossa of the malleolar groove (P)

- groove for fibularis longus tendon
- Tarsals
 - talus
 - head (P)
 - articular surface for navicular
 - articular surface for anterior calcaneus
 - articular surface for middle calcaneus
 - articular surface for posterior calcaneus
 - articular surface for inferior tibia
 - articular surface for medial malleolus
 - articular surface for lateral malleolus
 - neck
 - talus sulcus
 - body
 - trochlea (P)
 - posterior process
 - ❖ medial tubercle (P)
 - ❖ lateral tubercle
 - lateral process
 - calcaneus
 - body (P)
 - superior articular surface
 - anterior articular surface (for talus)
 - middle articular surface (for talus)
 - posterior articular surface (for talus)
 - articular surface for cuboid
 - calcaneal sulcus
 - calcaneal tuberosity (P)
 - sustentaculum tali (P)
 - peroneal tubercle/trochlea (P)
 - groove for fibularis longus tendon (P)
 - navicular (P)
 - body
 - tuberosity
 - medial/1st cuneiform (P)
 - intermediate/middle/2nd cuneiform (P)
 - lateral/3rd cuneiform (P)
 - cuboid
 - body (P)
 - fibular sulcus/groove
- Metatarsals (P)
 - base
 - shaft/body

- head
- Phalanges (P)
 - base
 - shaft/body
 - head

Arthrology of the Lower Extremity

- Hip/Acetabulofemoral joint (P)
 - synovial – ball and socket – diarthrotic – triaxial
 - articular surfaces
 - head of femur
 - lunate surface of acetabulum
 - labrum
 - accessory ligaments
 - fibrous capsule
 - labrum
 - zona orbicularis
 - ligamentum capitis femoris/ligamentum of the head of the femur/ligamentum teres
 - transverse acetabular
 - iliofemoral/Y ligament of Bigelow/Y ligament
 - pubofemoral
 - ischiofemoral
 - movements (P)
 - flexion
 - extension
 - adduction
 - abduction
 - medial/internal rotation
 - lateral/external rotation
 - circumduction
- Knee/Tibiofemoral joint (P)
 - synovial – modified hinge – diarthrotic – biaxial
 - articular surfaces
 - medial and lateral femoral condyles
 - medial and lateral superior articular surfaces of tibia (tibial plateaus)
 - accessory ligaments
 - extracapsular
 - fibrous capsule
 - patellar (P)
 - medial patellar retinaculum
 - lateral patellar retinaculum
 - tibial/medial collateral (P)

- fibular/lateral collateral (P)
 - oblique popliteal
 - arcuate popliteal
 - intra-articular
 - anterior cruciate
 - posterior cruciate
 - posterior meniscomfemoral
 - transverse
 - coronary (P)
 - medial and lateral menisci
- movements (P)
 - flexion
 - extension
 - rotation
 - rolling
 - gliding (passive)
- Patellofemoral joint (P)
 - movements (P)
 - tracking
- Proximal/Superior tibiofibular joint (P)
 - synovial – plane/gliding – diarthrotic – uniaxial/monaxial
 - articular surfaces
 - articular facet on fibular head
 - facet on the lateral tibial condyle
 - accessory ligaments
 - fibrous capsule
 - anterior ligament of the fibular head
 - posterior ligament of the fibular head
 - upper interosseous membrane
 - movements
 - gliding
- Mid-tibiofibular joint (P)
 - fibrous – syndesmosis – amphiarthrotic – uniaxial/monaxial
 - accessory ligament
 - interosseous membrane
- Distal/Inferior tibiofibular joint (P)
 - fibrous syndesmosis
 - articular surfaces
 - articular area on the inferior end of the fibula
 - facet on the inferior end of the tibia
 - accessory ligaments
 - interosseous
 - anterior inferior tibiofibular ligament

- posterior inferior tibiofibular ligament
 - lower interosseous membrane
 - movements
 - gliding
- Ankle/Talocrural joint (P)
 - synovial – hinge – diarthrotic – uniaxial/monaxial/mortice
 - articular surfaces
 - inferior articular and medial malleolar surfaces of tibia
 - lateral malleolar articular surface of fibula
 - trochlea of the talus
 - accessory ligaments
 - fibrous capsule
 - deltoid/medial collateral (P)
 - posterior tibiotalar
 - tibiocalcaneal
 - tibionavicular
 - anterior tibiotalar
 - lateral collateral
 - anterior talofibular (P)
 - posterior talofibular
 - calcaneofibular
 - movements (P)
 - dorsiflexion
 - plantarflexion
- Subtalar/talocalcaneal joint
 - synovial – plane/gliding – diarthrotic – uniaxial/monaxial
 - articular surfaces
 - posterior, anterior and middle articular surface for the calcaneus on the talus
 - facets on superior surface of the calcaneus
 - accessory ligaments
 - fibrous capsule
 - medial talocalcaneal
 - lateral talocalcaneal
 - posterior talocalcaneal
 - movements (P)
 - pronation (eversion, dorsiflexion and abduction)
 - supination (inversion, plantarflexion and adduction)
- Talocalcaneonavicular joint
 - synovial – modified ball and socket (talonavicular part) and plane/gliding – diarthrotic – triaxial
 - articular surfaces
 - facet on head of talus
 - facet on proximal side of navicular

- anterior talar facet
 - middle talar facet
 - sustentaculum tali
- accessory ligaments
 - fibrous capsule
 - dorsal talonavicular
 - plantar calcaneonavicular /spring (P)
 - calcaneonavicular portion of the bifurcate ligament
- movements
 - gliding
 - inversion
 - eversion
 - rotation
- Calcaneocuboid joint (P)
 - synovial – plane/gliding – diarthrotic – uniaxial/monaxial
 - articular surfaces
 - anterior articular surface of the calcaneus
 - posterior articular surface of cuboid
 - accessory ligaments
 - fibrous capsule
 - calcaneocuboid portion of the bifurcate ligament
 - plantar calcaneocuboid /short plantar
 - long plantar (P)
 - dorsal calcaneocuboid
 - movements
 - inversion
 - eversion
- Cuboideonavicular joint (P)
 - synovial – plane/gliding – diarthrotic – uniaxial/monaxial
 - articular surfaces
 - articular surface on lateral aspect of navicular
 - articular surface on posteromedial side of cuboid
 - accessory ligaments
 - fibrous capsule
 - dorsal cuboideonavicular
 - interosseous cuboideonavicular
 - long plantar
 - movements
 - gliding
- Distal intertarsal joints (P)
 - synovial – plane/gliding – diarthrotic – uniaxial/monaxial
 - articular surfaces
 - articular surface of navicular
 - articular surface of cuboid

- articular surface of cuneiform
 - articular surface of metatarsals
 - accessory ligaments
 - fibrous capsules
 - dorsal
 - plantar
 - cuneonavicular
 - intercuneiform
 - cuneocuboid
 - movements
 - gliding
- Tarsometatarsal joints (P)
 - synovial – plane/gliding – diarthrotic – uniaxial/monaxial
 - articular surfaces
 - articular surfaces of distal tarsals
 - bases of metatarsals
 - accessory ligaments
 - fibrous capsules
 - dorsal interosseous
 - long plantar interosseous
 - movements
 - gliding
- Intermetatarsal joints (P)
 - synovial – plane/gliding – diarthrotic – uniaxial/monaxial
 - articular surfaces
 - articular surfaces adjacent surfaces of bases of metatarsals
 - accessory ligaments
 - fibrous capsules
 - dorsal intermetatarsal
 - plantar intermetatarsal
 - interosseous intermetatarsal
 - deep transverse metatarsal
 - movements
 - gliding
- Metatarsophalangeal joints (P)
 - synovial – condyloid – diarthrotic – biaxial
 - articular surfaces
 - heads of metatarsals
 - bases of proximal phalanges
 - accessory ligaments
 - fibrous capsule
 - medial collateral
 - lateral collateral
 - movements (P)

- flexion
 - extension
 - adduction
 - abduction
 - circumduction
- Interphalangeal (distal interphalangeal, proximal interphalangeal and interphalangeal of the hallux only) joints (P)
 - synovial – hinge – diarthrotic – uniaxial/monaxial
 - articular surfaces
 - heads of more proximal phalanges
 - bases of more distal phalanges
 - accessory ligaments
 - fibrous capsule
 - medial collateral
 - lateral collateral
 - movements (P)
 - flexion
 - extension

Muscles of the Lower Extremity

- Muscles of the Thigh
 - anterior femoral muscle group
 - tensor fascia lata
 - sartorius
 - quadriceps/quadriceps femoris
 - rectus femoris
 - vastus lateralis
 - vastus intermedius
 - vastus medialis
 - articularis genu
 - medial femoral muscle group
 - adductor longus
 - adductor brevis
 - adductor magnus
 - pectineus
 - gracilis
 - posterior femoral muscle group
 - hamstrings
 - biceps femoris
 - semimembranosus
 - semitendinosus
- Muscles of the Leg
 - anterior crural muscle group

- tibialis anterior
 - extensor digitorum longus
 - extensor hallucis longus
 - fibularis tertius
 - lateral crural muscle group
 - fibularis longus
 - fibularis brevis
 - superficial posterior muscle group
 - gastrocnemius
 - soleus
 - plantaris
 - deep posterior muscle group
 - popliteus
 - tibialis posterior
 - flexor digitorum longus
 - flexor hallucis longus
- Muscles of the Foot
 - dorsal muscles of the foot
 - extensor digitorum brevis
 - extensor hallucis brevis
 - plantar muscles of the foot
 - 1st layer
 - abductor hallucis
 - flexor digitorum brevis
 - abductor digiti minimi/quinti
 - 2nd layer
 - quadratus plantae/flexor digitorum accessories
 - lumbricals
 - (flexor digitorum longus tendon)
 - (flexor hallucis longus tendon)
 - 3rd layer
 - flexor hallucis brevis
 - adductor hallucis
 - flexor digiti minimi brevis/flexor digiti quinti
 - 4th layer
 - dorsal interossei
 - plantar interossei
 - (fibularis longus tendon)
 - (tibialis posterior tendon)

Special features of the Lower Extremity

- Patellar ligament

- Retinacula of the ankle
 - superior and inferior extensor
 - superior and inferior fibular
 - flexor
- Tarsal tunnel
- Femoral triangle
- Adductor/subsartorial/Hunter's canal
- Adductor hiatus
- Popliteal fossa
- Sesamoid bones
 - patella
 - fabella in tendon of lateral head of gastrocnemius
 - in tendons of flexor hallucis brevis
- Arches of the foot
 - lateral longitudinal
 - medial longitudinal
 - transverse
- Knee bursae
 - suprapatellar
 - superficial infrapatellar
 - deep infrapatellar
 - prepatellar
 - popliteal
 - semimembranosus
 - four additional bursae related to tendon of insertion of biceps femoris; tendons on insertion of sartorius, gracilis and semitendinosus; origins of lateral and medial heads of gastrocnemius
- Calcaneal bursae
 - superficial
 - deep/retrocalcaneal
- Gluteal bursae
 - trochanteric
 - ischial
 - gluteofemoral
- Genu varum
- Genu valgum
- Genu recurvatum
- Hallux valgus
- Q angle
- Adductor hiatus

Osteology of the Shoulder/Pectoral Girdle

- Scapula

- superior border (P)
- medial/vertebral border (P)
- lateral/axillary border (P)
- superior angle (P)
- inferior angle (P)
- medial angle (P)
- scapular spine (P)
- acromion/acromion process (P)
- neck
- coracoid process/coracoid (P)
- supraspinous/supraspinatus fossa (P)
- infraspinous/infraspinatus fossa (P)
- subscapular fossa (P)
- glenoid fossa/cavity
- supraglenoid tubercle (P)
- infraglenoid tubercle (P)
- tubercle of the spine of the scapula (P)
- suprascapular/superior notch
- spinoglenoid/inferior notch
- Clavicle
 - sternal/medial end (P)
 - acromial/lateral end (P)
 - sternal facet
 - acromial facet
 - superior surface (P)
 - inferior surface (P)
 - costal tubercle (impression for costoclavicular ligament)
 - conoid tubercle
 - groove for subclavius muscle
 - shaft (P)
 - trapezoid line

Arthrology of the Shoulder/Pectoral Girdle

- Sternoclavicular joint (P)
 - synovial – double plane/gliding (pseudo saddle) (with articular disc) – diarthrotic – biaxial/triaxial
 - articular surfaces
 - sternal end of the clavicle
 - clavicular notch of the manubrium sterni
 - accessory ligaments
 - fibrous capsule
 - anterior sternoclavicular

- posterior sternoclavicular
 - interclavicular
 - costoclavicular
 - (articular disc)
 - movements (P)
 - protraction
 - retraction
 - elevation
 - depression
 - upward and downward rotation
- Acromioclavicular joint (P)
 - synovial – plane/gliding – diarthrotic – uniaxial/monaxial
 - articular surfaces
 - acromial end of clavicle
 - acromion of the scapula
 - accessory ligaments
 - fibrous capsule
 - acromioclavicular (P)
 - coracoclavicular (trapezoid and conoid) (P)
 - coracoacromial (P)
 - superior transverse scapular
 - movements (P)
 - gliding
- Glenohumeral joint (P)
 - synovial – ball and socket – diarthrotic – triaxial
 - articular surfaces
 - glenoid fossa/cavity of scapula
 - head of the humerus
 - glenoid labrum
 - accessory ligaments
 - fibrous capsule
 - superior glenohumeral (P)
 - middle glenohumeral (P)
 - inferior glenohumeral (P)
 - coracohumeral
 - transverse humeral
 - movements (P)
 - flexion
 - extension
 - adduction
 - abduction
 - lateral/external rotation
 - medial/internal rotation
 - circumduction

- Scapulothoracic/scapulocostal joint (P) (not a synovial joint)
 - articular surfaces
 - subscapular fossa of the scapula
 - upper rib cage
 - movements (P)
 - protraction
 - retraction
 - elevation
 - depression
 - upward rotation of glenoid fossa
 - downward rotation of glenoid fossa

Muscles of the Shoulder/Pectoral Girdle

- Muscles connecting the shoulder/pectoral girdle with the vertebral column
 - sternocleidomastoid
 - trapezius
 - latissimus dorsi
 - rhomboid major
 - rhomboid minor
 - levator scapulae
- Muscles connecting the shoulder/pectoral girdle with the thorax
 - pectoralis major
 - pectoralis minor
 - subclavius
 - serratus anterior
- Muscles of the scapula
 - deltoid
 - supraspinatus
 - infraspinatus
 - teres minor
 - subscapularis
 - teres major

Special feature of the Shoulder/Pectoral Girdle

- Quadrangular space

Osteology of the Upper Extremity

- Humerus
 - head
 - anatomical neck (P)
 - surgical neck (P)
 - greater tubercle (P)

- three impressions/facets
 - lateral lip of the bicipital/intertubercular groove
 - lesser tubercle (P)
 - medial lip of bicipital/intertubercular groove
 - bicipital/intertubercular groove (P)
 - spiral/radial groove
 - shaft (P)
 - deltoid tuberosity (P)
 - lateral supracondylar ridge/crest (P)
 - medial supracondylar ridge/crest (P)
 - lateral epicondyle (P)
 - medial epicondyle (P)
 - capitulum (lateral condyle)
 - trochlea (medial condyle)
 - radial fossa
 - coronoid fossa
 - olecranon fossa (P)
 - notch for ulnar nerve (P)
- Radius
 - head
 - proximal articular surface/fovea capitis
 - articular circumference (P)
 - neck (P)
 - radial/bicipital tuberosity (P)
 - anterior oblique line
 - interosseous border
 - pronator tubercle
 - radial styloid process (radial styloid) (P)
 - ulnar notch
 - Lister's/dorsal tubercle (P)
 - groove for
 - extensor digitorum and extensor indicis
 - extensor pollicis longus
 - extensor carpi radialis longus and brevis
 - extensor pollicis brevis
 - abductor pollicis longus
 - distal articular surface
- Ulna
 - olecranon/olecranon process (P)
 - trochlea/trochlear notch/ulnar notch
 - coronoid process
 - radial notch
 - ulnar tuberosity
 - supinator crest

- supinator fossa
- interosseous border
- head (P)
- ulnar styloid process (P)
- Carpals (P)
 - scaphoid
 - tubercle
 - lunate
 - triquetrum
 - pisiform
 - trapezium
 - tubercle
 - trapezoid
 - capitate
 - hamate
 - hook/hamulus
- Metacarpals (P)
 - base
 - shaft/body
 - head
- Phalanges (P)
 - base
 - shaft/body
 - head

Arthrology of the Upper Extremity

- Humeroulnar/ulnotrochlear and humeroradial/radiocapitellar joints (elbow joint/elbow joint complex) (P)
 - Humeroulnar – synovial – hinge – diarthrotic – uniaxial/monaxial
 - Humeroradial – synovial – atypical ball-and-socket – diarthrotic – biaxial
 - articular surfaces
 - humeroulnar – trochlea of the humerus – trochlear notch of the ulna
 - humeroradial – capitulum of the humerus – head of the radius at fovea capitis
 - accessory ligaments
 - fibrous capsule
 - radial/lateral collateral (P)
 - ulnar/medial collateral (P)
 - movements (P)
 - flexion
 - extension
- Proximal radioulnar joint (P)
 - synovial – pivot – diarthrotic – uniaxial/monaxial
 - articular surfaces

- head of the radius
 - radial notch of the ulna
 - accessory ligaments
 - fibrous capsule
 - annular (P)
 - proximal interosseous membrane
 - movements (P)
 - rotation (pronation and supination)
- Mid-radioulnar joint (P)
 - fibrous – syndesmosis – amphiarthrotic – uniaxial/monaxial
 - accessory ligament
 - interosseous membrane
 - movements (P)
 - slight rotation (pronation and supination)
- Distal radioulnar joint (P)
 - synovial – pivot – diarthrotic – uniaxial/monaxial
 - articular surfaces
 - head of the ulna
 - ulnar notch of the radius
 - accessory ligaments
 - fibrous capsule
 - anterior ligament
 - posterior ligament
 - distal interosseous membrane
 - movements (P)
 - rotation (pronation and supination)
- Wrist/Radiocarpal joint
 - synovial – ellipsoid – diarthrotic – biaxial
 - articular surfaces
 - distal end of radius
 - articular disc of the distal radioulnar joint
 - proximal surfaces of scaphoid, lunate and triquetrum
 - accessory ligaments
 - fibrous capsule
 - ulnar collateral (P)
 - radial collateral (P)
 - palmar radiocarpals (P)
 - dorsal radiocarpals (P)
 - movements (P)
 - flexion
 - extension
 - adduction (ulnar deviation)
 - abduction (radial deviation)
 - circumduction

- Midcarpal joint
 - synovial – condyloid – diarthrotic – uniaxial/monaxial
 - articular surfaces
 - proximal row of carpals
 - distal row of carpals
 - accessory ligaments
 - transverse carpal ligament
 - movements
 - flexion
 - extension
- Intercarpal joints (P)
 - synovial – plane/gliding – diarthrotic – uniaxial/monaxial
 - articular surfaces
 - carpal bones and between the proximal and distal rows of carpals
 - accessory ligaments
 - fibrous capsules
 - palmar interosseous (intercarpal)
 - intercarpal interosseous
 - movements (P)
 - gliding
- Carpometacarpal joints
 - 2nd - 5th: synovial – plane/gliding – diarthrotic – uniaxial/monaxial
 - 1st: synovial – saddle – diarthrotic – biaxial (triaxial)
 - articular surfaces
 - distal surfaces of distal row of carpals
 - bases of metacarpals
 - accessory ligaments
 - fibrous capsule
 - carpometacarpal
 - interosseous carpometacarpal
 - movements (P)
 - 2nd - 5th: gliding
 - 1st: flexion, extension, adduction, abduction, circumduction, opposition, reposition
- Intermetacarpal joints (P)
 - synovial – plane/gliding – diarthrotic – uniaxial/monaxial
 - articular surfaces
 - adjacent surfaces of bases of metacarpals 2-5
 - accessory ligaments
 - fibrous capsules
 - interosseous intermetacarpal
 - palmar
 - dorsal

- deep transverse metacarpal
 - movements (P)
 - gliding
 - opposition
- Metacarpophalangeal joints (P)
 - 2nd - 5th: synovial – condyloid – diarthrotic – biaxial
 - 1st: synovial – hinge – diarthrotic – uniaxial/monaxial
 - articulating surfaces
 - heads of metacarpals
 - bases of proximal phalanges
 - accessory ligaments
 - fibrous capsules
 - collateral (P)
 - movements (P)
 - 2nd - 5th: flexion, extension, adduction, abduction and circumduction
 - 1st: flexion and extension
- Interphalangeal (proximal interphalangeal, distal interphalangeal and interphalangeal of the pollex only) joints (P)
 - synovial – hinge – diarthrotic – uniaxial/monaxial
 - articulating surfaces
 - heads of most proximal phalanges
 - bases of most distal phalanges
 - accessory ligaments
 - fibrous capsules
 - palmar plate
 - medial collateral
 - lateral collateral
 - movements (P)
 - flexion
 - extension

Muscles of the Upper Extremity

- Muscles of the arm
 - coracobrachialis
 - biceps brachii
 - brachialis
 - triceps brachii
- Muscles of the anterior forearm/ antebrachial muscles
 - 1st /superficial layer
 - pronator teres
 - flexor carpi radialis
 - palmaris longus

- flexor carpi ulnaris
 - 2nd /intermediate layer
 - flexor digitorum superficialis
 - 3rd /deep layer
 - flexor pollicis longus
 - flexor digitorum profundus
 - pronator quadratus
- Muscles of the posterior forearm/antebrachial muscles
 - 1st /superficial layer
 - brachioradialis
 - extensor carpi radialis longus
 - extensor carpi radialis brevis
 - extensor digitorum (communis)
 - extensor digiti minimi
 - extensor carpi ulnaris
 - anconeus
 - 2nd /deep layer
 - supinator
 - extensor pollicis longus
 - extensor pollicis brevis
 - abductor pollicis longus
 - extensor indicis
- Muscles of the hand
 - thenar muscles
 - abductor pollicis brevis
 - opponens pollicis
 - flexor pollicis brevis
 - adductor pollicis
 - hypothenar muscles
 - abductor digiti minimi
 - flexor digiti minimi brevis
 - opponens digiti minimi
 - palmaris brevis
 - lumbricals
 - dorsal interossei
 - palmar interossei

Special features of the Upper Extremity

- Carrying angle
- Arches of the hand
 - carpal transverse
 - metacarpal transverse

- longitudinal
- Carpal tunnel
- Tunnel of Guyon (pisohamate tunnel)
- Anatomical snuffbox
- Mobile wad of three
- Palmar aponeurosis
- Sesamoid bones
 - pisiform
 - in tendon of flexor pollicis brevis
 - in tendon of adductor pollicis
- Retinacula
 - flexor/transverse carpal
 - extensor
- Bursae
 - bicipitoradial
 - olecranon
 - intratendinous
 - subtendinous
 - subcutaneous
 - radioulnar
 - subacromial/subdeltoid
- Elbow valgus
- Elbow varus

Physiology of the Skeletal System

Performance Objectives

- Define and describe the blood and nerve supply of bone
- Define and describe bone formation and bone growth
- Define and describe bone homeostasis

Content

- Compact and spongy bone tissue
- Blood and nerve supply of bone
- Intramembranous ossification
- Endochondral ossification
- Growth in length and thickness
- Remodelling
- Repair of bone
- Role in calcium homeostasis

- Aging and bone tissue

Physiology of the Muscular System

Performance Objectives

- Define and describe the functions and properties of muscular tissue
- Define and describe the processes of contraction and relaxation of muscle fibres
- Define and describe the concept of electromyography
- Define and describe muscle metabolism
- Define and describe control of muscle tension
- Define and describe the types of skeletal muscle fibres
- Define and describe the regeneration of muscular tissue
- Define and describe aging and muscular tissue

Content

- Functions of muscular tissue
 - produce movement
 - stabilize body positions
 - storage and movement of substances within the body
 - heat generation
- Properties of muscular tissue
 - electrical excitability
 - contractility
 - extensibility
 - elasticity
- Sliding filament mechanism
- Neuromuscular junction
- Muscle metabolism
 - production of adenosine triphosphate
 - muscle fatigue
 - oxygen consumption after exercise
- Control of muscle tension
 - motor units
 - twitch contraction
 - frequency of stimulation
 - motor unit recruitment
 - muscle tone
 - isometric and isotonic contractions
- Types of skeletal muscle fibres
 - slow oxidative fibres

- fast oxidative-glycolytic fibres
- fast glycolytic fibres
- distribution and recruitment of different types of fibres

Musculoskeletal Pathology

Performance Objectives

- Define and describe the structural and degenerative pathologies of the musculoskeletal system
- Define and describe bone fractures, bone dysplasias, benign and malignant bone tumors, bone infections, bone necrosis
- Define and describe pathologies associated with other connective tissues
- Define and describe joint traumas and how these traumas affect joint function
- Define and describe joint diseases
- Define and describe myopathies
- Define and describe pediatric pathologies

Content

Bony pathologies

- Fractures
 - classification by site
 - diaphyseal
 - metaphyseal
 - epiphyseal
 - intra-articular
 - fracture-dislocation
 - classification by extent
 - complete
 - incomplete
 - crack/hairline
 - greenstick
 - compression
 - classification by configuration
 - transverse
 - oblique
 - spiral
 - comminuted
 - linear
 - avulsion
 - relationship of the fracture fragments to each other
 - undisplaced

- displaced
- relationship of the fracture to the external environment
 - closed
 - open
- special type
 - stress
- named
 - basilar skull
 - Colles'
 - Smith's
 - Barton's
 - Jefferson
 - Clay-Shoveler's
 - flexion teardrop
 - extension teardrop
 - flail chest
 - Jones (dancers)
 - Rolando
 - Salter-Harris
 - Bennett's
 - boxer's
 - blowout
 - Galeazzi
 - chalk stick
 - Maisonneuve
 - Monteggia
 - Chance
 - Pott's
 - toddler's
 - trimalleolar
 - pseudarthrosis
- healing
- medical management
- Dysplasias
 - achondroplasia
 - osteogenesis imperfecta
- Tumors
 - primary
 - benign
 - osteoma
 - osteochondroma
 - enchondroma
 - osteoid osteoma

- giant cell tumor
 - aneurysmal bone cyst
 - fibrous dysplasia
 - malignant
 - osteosarcoma
 - chondrosarcoma
 - fibrosarcoma
 - malignant fibrous histiocytoma
 - Hodgkin’s lymphoma
 - Ewing’s sarcoma
 - multiple myeloma
 - secondary
 - metastatic tumors
- Infections
 - osteomyelitis (acute and chronic)
- Necrosis
 - post traumatic
 - idiopathic
 - secondary
 - avascular necrosis
- Osteoporosis
- Dysostosis

Connective tissue and joint pathologies

- Noninflammatory diseases (Group I)
 - osteoarthritis (degenerative joint disease)
 - rheumatic fever
 - classic gout
 - pseudo gout
 - scleroderma
 - polymyositis
 - systemic lupus erythematosus
 - acromegaly
 - infection (viral, fungal, bacterial)
 - neurogenic arthritis (Charcot’s disease)
- Inflammatory (Group II)
 - rheumatoid arthritis
 - psoriatic arthritis
 - acute rheumatic fever
 - scleroderma
 - polymyositis
 - ankylosing spondylitis/Marie Strumpell disease/bamboo spine
 - gout (metabolic arthritis)

- Septic (Group III)
 - septic arthritis
- Joint traumas
 - sprains (Grades I, II and III)
 - dislocations
 - subluxations

Skeletal muscle pathologies (muscle fibre pathologies)

- Inflammatory myopathies
 - polymyositis
 - dermatomyositis
 - inclusion body myositis
 - myositis ossificans
- Degenerative myopathies
 - dystrophy
 - muscular dystrophy
 - atrophy
 - myotonia
- Myalgia
- Traumas
 - strain (Grades I, II and III)
 - hematoma
- Spasm (protective and intrinsic)
- Tendon pathologies
 - inflammatory pathologies
 - tendinitis, calcific tendinitis, tenosynovitis,
 - stenosing tenosynovitis (DeQuervain's syndrome, trigger finger)

Pediatric pathologies

- Greenstick fracture
- Juvenile chronic arthritis
- Mechanical/orthopedic disorders
- Joint arthralgias
- Normal growth variants (eg. Osgood-Schlatter disease, Sever's disease)
- Hypermobility
- Musculoskeletal congenital anomalies
 - club foot
 - dwarfism
 - Klippel-Feil Syndrome
 - osteogenesis imperfecta
 - spina bifida (occulta and manifesta)
 - hemivertebrae

- juvenile idiopathic arthritis (Still's disease)
- degenerative arthritis (Legg-Calvé-Perthes syndrome [Legg-Calvé-Perthes disease, Perthes disease], Chandler's disease, gout)

Spinal musculoskeletal pathologies, variants and abnormal motion

- Spine as a whole (except the sacrum)
 - structural scoliosis
 - idiopathic
 - infantile
 - juvenile
 - adolescent
 - congenital
 - nonstructural scoliosis
 - increased and decreased lordotic curves
 - increased and increased kyphotic curves
 - dislocation
 - subluxation
 - hypermobility
 - hypomobility
 - spondylosis
 - spondylolysis
 - spondylolisthesis
 - Pott's disease
 - osteoarthritis
 - ankylosing spondylitis
 - central stenosis
 - disc disease (including herniated, prolapsed, bulging, extrusion, sequestration and degenerative)
- Cervical spine
 - cervical rib
 - posterior ponticle (pons posticus)
 - blocked vertebrae
 - Klippel-Feil syndrome
 - Sprengle's deformity
 - torticollis
 - hyperflexion/hyperextension trauma (whiplash)
- Thoracic spine and ribs
 - butterfly vertebrae
 - hemivertebrae
 - Schmorl's nodes
 - osteoporosis (dowager's hump)
 - juvenile osteochondrosis (Scheuermann's disease)
 - central stenosis

- pectus excavatum and carinatum
- barrel chest
- Lumbar spine and pelvis
 - butterfly vertebrae
 - hemivertebrae
 - Schmorl's nodes
 - sacralization
 - congenital hip dysplasia
 - coxa vara and coxa valga
 - spina bifida (occulta and manifesta)
 - pubic symphysis disruption
- Sacrum
 - sacral dysplasia
 - fracture
 - lumbarization
 - hypermobility and hypomobility of the sacro-iliac joint

Musculoskeletal pathologies of the lower extremity

- Bone alignment pathologies
 - congenital and traumatic dislocations of the hip, knee, ankle and foot joints
 - femoral torsion
 - femoral anteversion and retroversion
 - genu varus and valgus
 - tibial torsion
 - hindfoot and forefoot varus and valgus
 - forefoot adduction and abduction
 - foot and toe deformities
 - equinus deformity
 - pes cavus and planus
 - metatarsal planus
 - talipes equinovarus
 - hallux valgus
 - hammer toe
 - mallet toe
 - claw toe
- Other pathologies of the lower extremity
 - bursitis
 - trochanteric
 - prepatellar
 - slipped capital epiphysis
 - patello-femoral syndromes
 - chondromalacia patella
 - repetitive trauma

- patellar tendinitis
- quadriceps tendinitis
- prepatellar tendinitis
- prepatellar bursitis
- compartment syndromes
 - anterior compartment syndrome
 - superficial posterior compartment syndrome
 - deep posterior compartment syndrome
 - foot compartment syndromes
 - fibrocartilaginous disc
- shin splints
- talocrural, subtalar, midtarsal and forefoot joint pathologies
- plantar fasciitis/fasciosis
- capsulitis
- post-immobilization stiffness
- heel spurs
- corns, calluses, bunions, warts
- neurovascular
 - intermittent claudication
- ligamentous injuries
 - anterior and posterior cruciate tears

Musculoskeletal pathologies of the upper extremity

- Bone alignment pathologies
 - congenital and traumatic dislocations and subluxations of the glenohumeral, sternoclavicular, acromioclavicular, radioulnohumeral, wrist, hand and finger joints
 - congenital dislocation of the scapula (Sprengel deformity)
 - congenital pseudoarthrosis of the clavicle, radius and ulna
- Other pathologies of the upper extremity
 - bursitis
 - subacromial
 - acromial
 - adhesive capsulitis
 - ulnar collateral ligament injury of the thumb (gamekeeper's/skier's thumb)
 - jammed fingers
 - mallet finger
 - boutonniere finger
 - Jersey finger
 - Bennett finger
 - ruptures
 - rotator cuff
 - long head of biceps brachii

- extensor pollicis longus
- Dupuytren's contracture
- DeQuervain's contracture
- Volkmann's ischemic contracture

FASCIAL ANATOMY, PHYSIOLOGY & PATHOLOGY

Note: Core material presented here outlines representations of knowledge in the field. Because this is a relatively new area of study, a list of sources is included at the end of this section. Current research can be consulted for the purpose of discussion on new concepts and approaches to fascial anatomy, physiology and pathology. In this section, “fascia” is used to mean general connective tissue and does not refer to specialized connective tissue such as cartilage, bone, blood or lymph.

Performance Objectives

- Identify the various types of fascia
- Identify the various classifications of fascia
- Identify the components of fascia
- Identify the arrangements of these components in the various types of fascia
- Identify the functions of fascia
- Identify the concept of fascial continuity from the cellular level to the largest structures, and how the fascial layers interconnect
- Identify fascial layers in selected parts of the body
- Identify the function of fascia as a sensory structure and its relationship to the autonomic nervous system
- Identify the function of fascia as a mechanosensitive structure

Fascia: Anatomy and Physiology

Performance Objectives

- Define and describe the content and function of the ground substance in fascia
- Define and describe types of fascial structures investing and connecting the body
- Define and describe the functions of fascia in the body
- Define and describe the properties of fascia
- Define and describe the effects of fascial dysfunction and loss of fascial motion

Content

- Ground substance
 - colloidal solution
 - functions of ground substance
 - hydration
 - lubrication

- shock absorption and resistance to compression
 - cellular nutrition
 - immune defense system
- Functions of fascia
 - suspend structures of the body
 - maintain anatomical structure, shape and integrity
 - separate structures
 - protect against change of tension and absorb shocks
 - adapt to changing conditions such as tension, size, etc
 - force transmission
 - coordinate movement between structures
 - maintain posture
 - provide sensory information to the autonomic nervous system
 - defend against infection
 - chemical defense
 - creation of fibrous compartments
- Properties of fascia
 - contractility
 - support and stability
 - viscoelasticity
 - sensory and autonomic response to pressure, pain, other
- Types of fascial structures investing and connecting the body
 - superficial (subcutaneous) fascia
 - coverings of vessels (blood, nerve, lymph)
 - organ capsules
 - body wall linings and limb linings
 - coverings for muscles and muscle fibres
 - aponeuroses
 - septi
 - tendons and tendon coverings
 - ligaments
 - periosteum
 - joint capsules
 - basement membranes (connects cells to fascial matrix)
- The tensegrity concept
- Causes of lost or impaired motion and asymmetry
 - lack of active or passive motion
 - fibrosis
 - viscous ground substance
 - injury, surgery, inflammation and adhesions
 - pathophysiological scars, adhesions and contractures

Fascia: Pathology

Performance Objectives

- Define, describe and discuss the structural and degenerative pathologies of fascia, both systemic and local.

Content

- Collagen diseases
 - systemic lupus erythematosus
 - scleroderma
 - polymyositis
 - polyarteritis nodosa
 - dermatomyositis
 - Wegener's granulomatosis
 - Marfan's syndrome
 - necrotizing fasciitis
- Other fascial pathologies
 - pathophysiological scars
 - adhesions
 - fibrosis
 - contractures
 - fascial strains, tears and ruptures
 - fasciitis/fasciosis
 - fibromyalgia
 - compartment syndromes
 - postural imbalance
 - fibrocontractive diseases

Sources referred to in the section on fascia

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NEUROANATOMY, NEUROPHYSIOLOGY AND NEUROPATHOLOGY

Organization of the nervous system

Performance Objectives

- Describe the anatomical and functional organization of the nervous system
- Describe sensory, motor and integrative elements of the nervous system
- Describe the mechanisms of synaptic transmission, neurotransmitters, neural circuits and repair and regeneration of nervous tissue

Content

- Organization of the nervous system
 - Central nervous system
 - brain and spinal cord
 - Peripheral nervous system
 - somatic nervous system
 - autonomic nervous system
 - sympathetic division
 - parasympathetic division
 - enteric nervous system
- Functions of the nervous system
- Electrical signals in neurons
 - ion channels
 - resting membrane potential
 - graded potentials
 - action potentials
- Signal transmission at synapses
 - synapse
 - types of synapses
 - axodendritic, axosomatic and axoaxonic synapses
 - electric and chemical synapses
 - excitatory and inhibitory postsynaptic potentials
 - removal of neurotransmitter
 - spatial and temporal summation of postsynaptic potentials
- Neurotransmitters
 - small-molecule neurotransmitters
 - neuropeptides

- Neural circuits
- Regeneration and repair of nervous tissue

Central nervous system (spinal cord, reflexes and brain)

Performance Objectives

- Describe the anatomy and physiology of the spinal cord
- Describe the anatomy and physiology of spinal reflexes
- Describe the gross anatomy and physiology of the brain along with the divisions and sub-divisions of each

Content

- Protective structures and coverings of the spinal cord
 - vertebral column
 - meninges
- Gross anatomy of the spinal cord including cross section
- Spinal cord physiology
 - sensory and motor tracts
 - reflexes and reflex arcs
 - components of a reflex arc
 - stretch reflex
 - tendon reflex
 - flexor and crossed extensor reflexes
- Organization, protection and blood supply of the brain
 - primary brain vesicles
 - secondary brain vesicles
 - cranial meninges
 - blood-brain barrier
- Parts of brain
 - Cerebrum
 - cerebral cortex
 - lobes
 - cerebral white matter
 - basal nuclei
 - limbic system
 - Diencephalon
 - thalamus
 - hypothalamus
 - epithalamus

- circumventricular organs
- Cerebellum
- Brain stem
 - medulla oblongata
 - pons
 - midbrain
 - reticular formation
- Cerebrospinal fluid
 - functions
 - formation
 - circulation
- Functional organization of the cerebral cortex
 - sensory areas
 - primary somatosensory area
 - primary visual area
 - primary auditory area
 - primary gustatory area
 - primary olfactory area
 - motor areas
 - primary motor area
 - Broca's speech area
 - association areas
 - hemispheric lateralization
 - brain waves

Sensory nervous system

Performance objectives

- Describe the anatomy and physiology of the sensory nervous system

Content

- Sensation
 - sensory modalities
 - general senses
 - special senses
 - process of sensation
 - sensory receptors
 - pain receptors / noxious or injurious stimuli receptors
 - noci
 - free nerve endings: mechanical, thermal, chemical
 - proprioceptive receptors

- muscle spindles
 - tendon organs
 - joint kinesthetic receptors
- thermal receptors
 - cold receptors
 - warm receptors
- tactile receptors
 - touch (crude vs. fine)
 - ❖ Meissner's corpuscles
 - ❖ root hair plexes
 - ❖ Merkel discs (type I cutaneous mechanoreceptors)
 - ❖ Ruffini corpuscles (type II cutaneous mechanoreceptors)
 - pressure and vibration
 - ❖ laminated/Pacinian corpuscle
 - ❖ itch and tickle
- Somatic sensations
 - tactile
 - thermal
 - pain
 - proprioceptive
- Somatic sensory pathways
 - 1st, 2nd and 3rd order neurons
 - posterior column-medial lemniscus pathway to the cortex
 - anterolateral pathways to the cortex
 - trigeminothalamic pathway to the cortex
 - mapping the primary somatosensory area
 - somatic sensory pathways to the cerebellum

Special senses

Performance objectives

- Describe the anatomical features and physiological mechanisms of perception in the following special senses of olfaction, gustation, vision and hearing and physiology of equilibrium

Content

- Olfaction
 - anatomy of olfactory receptors
 - olfactory cilia
 - odourants
 - supporting cells

- basal cells
 - olfactory/Bowman's glands
 - physiology of olfaction
 - odour thresholds and adaptation
 - olfactory pathway
- Gustation
 - anatomy of taste buds and papillae
 - physiology of gustation
 - taste thresholds and adaptation
 - gustatory pathway
- Vision
 - anatomy of accessory structures
 - eyelids
 - eyelashes
 - eyebrows
 - lacrimal apparatus
 - extrinsic eye muscle
 - anatomy of the eyeball
 - fibrous tunic
 - vascular tunic
 - retina
 - lens
 - eyeball interior
 - physiology of vision
 - photoreceptors
 - photopigments
 - dark and light adaptation
 - release of phototransmitter by photoreceptors
 - visual pathway
- Hearing and equilibrium
 - anatomy of the ear
 - physiology of hearing
 - auditory pathway
 - physiology of equilibrium

Physiology of the somatic motor system

Performance objectives

- List the motor pathways and distinguish between direct and indirect cortical control over movement
- Define upper and lower motor neurons

- Describe the mechanisms of control of motor activities by the spinal cord, brainstem, cortex, basal nuclei and cerebellum
- Identify and describe how structures associated with the spinal cord control motor activity
- Describe the role of the cerebellum in the control of motor activity

Content

- Somatic motor pathways
 - components
 - lower motor neurons
 - local circuit neurons
 - upper motor neurons
 - basal nuclei neurons
 - cerebellar neurons
 - organization
 - mapping the motor areas
 - pyramidal tracts – direct cortical control level
 - lateral corticospinal tracts
 - anterior corticospinal tracts
 - corticobulbar tracts
 - extrapyramidal tracts – indirect cortical control
 - rubrospinal tract
 - tectospinal tract
 - vestibulospinal tract
 - lateral reticulospinal tract
 - medial reticulospinal tract
 - role of basal nuclei
 - modulation of movement of the cerebellum
- Spinal cord level of motor control
 - Muscle spindles
 - Golgi tendon organs
- Spinal cord level of motor control
- Brainstem level of motor control
- Cortical level of motor control
- Basal ganglia level of motor control
- Function of the cerebellum

Higher functions, activation and behavioural functions of the brain

Performance objectives

- Describe the higher functions of the brain and the structures with which they are associated
- Distinguish between auditory and visual interpretation of words and symbols and interpretation of thoughts and ideas in verbal or written form
- Describe the cortical areas involved with the mechanism of speech: the formulation of thoughts and ideas in verbal form, the organization and control of motor speech patterns for expression and the articulation of words
- Differentiate among immediate, short-term and long-term memory
- Define consolidation of memories
- Describe the mechanism of and the systems involved in brain activation
- Describe the contributions of the reticular activating system and neurohormones in the control of brain activation
- Distinguish between slow wave and rapid eye movement sleep
- Describe the role of the limbic system in emotions, memory and behavioural functions and explain how it provides the link between emotions and physiology

Content

- Function of specific cortical areas
 - association areas
- Function of the brain in communication
- Function of the corpus callosum
- Thoughts and memory
 - synaptic facilitation/inhibition and memory
 - immediate memory
 - short-term memory
 - long-term memory
 - memory consolidation
 - long-term potentiation
- Activation systems in the brain
 - control of cerebral activity by the reticular activating system
 - neurohormonal control of brain activity
- Limbic system
 - emotional states
 - role in learning and memory
 - behavioural functions
 - link between emotions and physiology
- Sleep
 - Slow-wave sleep
 - rapid eye movement sleep and dreaming

Peripheral nervous system anatomy

Performance objectives

- Describe the anatomy of the peripheral nervous system
- Describe the nerves of the posterior primary divisions of C1-C8
- Describe the nerves of the anterior primary division – cervical plexus
- Describe the roots, trunks, divisions, cords and branches of the brachial plexus
- Describe the anatomy of the intercostal nerves
- Describe the anterior primary divisions of L1-L4
- Describe the roots and nerves of the lumbar plexus
- Describe the roots and branches from the posterior divisions of the sacral plexus
- Describe the roots and branches of the anterior divisions of the sacral plexus
- Describe the dermatomes and myotomes of the upper limb, lower limb and trunk
- Describe the coccygeal plexus
- Describe the cranial nerves including name, origin, number, course and motor and/or sensory innervations
- Describe the significance of and demonstrate testing of each cranial nerve

Content

- Spinal nerves and their branches and their plexuses (name, root number, course and motor and/or sensory innervation)
 - posterior primary divisions (C1-C8)
 - anterior primary divisions – cervical plexus (C1-C4)
 - superficial branches
 - lesser occipital nerve (C2)
 - greater auricular nerve (C2-C3)
 - transverse cervical nerve (C2-C3)
 - supraclavicular nerves (C3-C4)
 - deep branches
 - ansa cervicalis (C1-C3)
 - phrenic nerve (C3-C5)
 - segmental branches (C1-C5)
 - anterior primary divisions (C5-C8) – brachial plexus
 - roots
 - ❖ dorsal scapular nerve (C5)
 - ❖ long thoracic nerve (C5-C7)
 - trunks
 - ❖ suprascapular nerve (C5-C6)
 - ❖ nerve to subclavius (C5-C6)
 - divisions
 - cords

- branches
 - ❖ lateral pectoral nerve (C5-C7) (from lateral cord)
 - ❖ musculocutaneous nerve (C5-C7) (from lateral cord)
 - ❖ median nerve (C5-T1) (from lateral and medial cord)
 - ❖ upper subscapular nerve (C5-C6) (from posterior cord)
 - ❖ thoracodorsal nerve (C6-C8) (from posterior cord)
 - ❖ lower subscapular nerve (C5-C6) (from posterior cord)
 - ❖ axillary nerve (C5-C6) (from posterior cord)
 - ❖ radial nerve (C5-T1) (from posterior cord)
 - ❖ medial pectoral nerve (C8-T1) (from medial cord)
 - ❖ medial cutaneous nerve of the arm (C8-T1) (from medial cord)
 - ❖ medial cutaneous nerve of the forearm (C8-T1) (from medial cord)
 - ❖ ulnar nerve (C8-T1) (from medial cord)
- dermatomes of the upper extremity
- myotomes of the upper extremity
- intercostal nerves
 - branches
 - rami communicantes
 - collateral branch
 - lateral cutaneous branch
 - anterior cutaneous branch
 - muscular branches
 - pleural sensory branches
 - peritoneal sensory branches
- dermatomes of the trunk
- myotomes of trunk
- anterior primary divisions (L1-L4) – lumbar plexus
 - roots and nerves of the lumbar plexus
 - iliohypogastric nerve (L1)
 - ilioinguinal nerve (L1)
 - genitofemoral nerve (L1-L2)
 - lateral cutaneous nerve of the thigh (L2-L3)
 - femoral nerve (L2-L4)
 - ❖ medial cutaneous nerve of the thigh
 - ❖ intermediate cutaneous nerve of the thigh
 - ❖ saphenous nerve
 - obturator nerve (L2-L4)
- anterior primary divisions (L4-S4) – sacral plexus
 - roots and nerves of the sacral plexus
 - superior gluteal nerve (L4-S1)
 - inferior gluteal nerve (L5-S2)
 - nerve to piriformis (S1-S2)

- nerve to obturator internus and superior gemellus (L5-S2)
- nerve to quadratus femoris and inferior gemellus (L4-S1)
- perforating cutaneous nerve (S2-S3)
- posterior cutaneous nerve of the thigh (S1-S3)
- sciatic nerve (L4-S3)
 - ❖ tibial nerve (L4-S3)
 - medial plantar nerve
 - lateral plantar nerve
 - ❖ common fibular nerve (L4-S2)
 - superficial plantar nerve
 - deep plantar nerve
- pudendal nerve(S2-S4)
 - (lumbosacral plexus)
 - dermatomes of the lower extremity
 - myotomes of the lower extremity
 - coccygeal plexus
- Cranial nerves
 - olfactory (CN I)
 - optic (CN II)
 - oculomotor (CN III)
 - trochlear (CN IV)
 - trigeminal (CN V)
 - abducens (CN VI)
 - facial (CN VII)
 - vestibulocochlear (CN VIII)
 - glossopharyngeal (CN IX)
 - vagus (CN X)
 - accessory (CN XI)
 - hypoglossal (CN XII)

Autonomic nervous system

Performance Objectives

- Describe the anatomical and physiological organization of the autonomic nervous system
- Describe and differentiate between the sympathetic and parasympathetic divisions of the autonomic nervous system
- Describe the anatomy and physiology of the sympathetic division and list the structures innervated by both prevertebral and paravertebral sympathetic ganglia

- Describe the anatomy and physiology of the parasympathetic division and list the structures innervated
- Describe the craniosacral parasympathetic and thoracolumbar sympathetic outflows and the structures innervated by each
- List the major autonomic nervous system neurotransmitters and their receptors
- Describe the special effects of sympathetic and parasympathetic stimulation and autonomic reflexes
- Describe the control of the autonomic nervous system by the hypothalamus

Content

- Anatomy of autonomic motor pathways
 - anatomical components
 - preganglionic neurons
 - autonomic ganglia
 - postganglionic neurons
 - autonomic plexuses
 - anatomy of the sympathetic division
 - spinal nerves
 - cephalic periarterial nerves
 - sympathetic nerves
 - splanchnic nerves
 - to abdominopelvic organs
 - to adrenal medulla
 - anatomy of the parasympathetic division
- Neurotransmitters and receptors
 - cholinergic neurons and receptors
 - adrenergic neurons and receptors
 - receptor agonists and antagonists
- Physiology of the autonomic nervous system
 - autonomic tone
 - sympathetic and parasympathetic responses
 - distribution
 - location of preganglionic neurons
 - associated ganglia
 - axon length and divergence
- Integration and control of autonomic functions
 - autonomic reflexes
 - autonomic control by higher centres

Clinical and pathological considerations

Performance Objectives

- Define and describe diseases, degenerative diseases and disorders of the central nervous system
- Define and describe injuries and trauma to the central nervous system
- Define and describe focal dysfunctions of the frontal, parietal, and temporal lobes
- Define and describe global-diffuse disorders of the cerebrum
- Define and describe headaches of intracranial and extracranial origins and differentiate these from migraine and other vascular headaches
- Define and describe disorders of somatic nerve function
- Define and describe disorders of the peripheral nervous system
- Describe the repair of peripheral axons following injury
- Define and describe various neuropathies
- Describe the physiology of nerve root compression
- Define and describe the signs and symptoms of peripheral nerve and nerve root compression
- Describe the manifestations of nerve root pain
- Define and describe basal nuclei disorders
- Define and describe lesions of the plexuses
- Define and describe the common nerve root compression/entrapment syndromes
- Define and describe cranial nerve lesions

Content

- Encephalitis
- Meningitis
- Cerebral abscesses
- Neoplasms
- Toxic deficiency and metabolic disorders
- Stroke/cerebrovascular accident
- Cerebral palsy
- Alzheimer's disease
- Huntington's disease/chorea
- Parkinson's disease (hypo- and hyperkinetic disorders)
- Amyotrophic Lateral Sclerosis (Lou Gehrig's disease)
- Friedreich's ataxia
- Spinal muscular atrophy
- Demyelinating diseases
- Senile dementia
- Head trauma, spinal cord injury
- Schizophrenia, bipolar, depression
- Polio and post-polio syndrome
- Upper motor neuron lesions
- Lower motor neuron lesions

- Neurapraxia, axonotmesis, neurotmesis
- Neuritis, neuralgia (shingles – postherpetic neuralgia), radiculalgia, radiculitis, causalgia
- Tremors, chorea, athetosis, dystonia, myoclonus, tics
- Common nerve entrapment syndromes
 - median nerve compression
 - pronator teres syndrome
 - anterior interosseous syndrome
 - carpal tunnel syndrome
 - ulnar nerve compression
 - cubital tunnel syndrome (Tardy ulnar palsy)
 - ulnar tunnel syndrome (Guyon’s tunnel syndrome)
 - radial nerve compression
 - crutch palsy
 - Saturday night palsy
 - posterior interosseous syndrome
 - cheiralgia paresthetica
 - suprascapular nerve entrapment
 - axillary nerve palsy
 - long thoracic nerve entrapment
 - Horner’s syndrome
 - meralgia paresthetica
 - tarsal tunnel syndrome
 - fibular nerve syndrome
 - sciatica
 - femoral nerve syndrome
 - obturator nerve syndrome
 - anterior and posterior compartment syndromes
 - piriformis syndrome
 - thoracic outlet syndrome
 - cauda equina syndrome
- Erb’s paralysis (Erb-Duchenne paralysis)
- Klumpke’s paralysis (Dejerine-Klumpke paralysis)
- Cranial nerve lesions
 - CN V – Trigeminal neuralgia (tic douloureux)
 - CN VII – Bell’s palsy
 - CN IX – Glossopharyngeal neuralgia

COMMUNICATION

Performance Objectives

- Demonstrate understanding of communication strategies in the context of patient-centred care
- Demonstrate professional communication skills in all professional encounters
- Build rapport and use empathetic responses in the therapeutic relationship as appropriate
- Recognize and avoid non-facilitative behaviours and statements
- Demonstrate knowledge and ability to communicate effectively with other health professionals and the public
- Identify and describe personal and interpersonal sources of conflict
- Recognize and practice constructive problem solving skills with patients, colleagues and others
- Perform comprehensive clinical assessment interviews
- Create and maintain appropriate professional documentation

Content

- Professional communications
 - vocabulary and style of speech
 - writing and reporting skills
 - conduct and behaviour
 - critical thinking, summarization and presentation
 - CMTBC Standards of Practice and requirements related to health care record keeping
- Communication skills in the therapeutic relationship
 - process and components of communication: verbal and nonverbal
 - active listening
 - observation
 - rapport and empathy
 - feedback
 - transference and counter-transference
 - managing boundaries in communication
 - obtaining patient consent, consistent with statutory requirements and profession-specific standards
 - ensure and enhance patient engagement in treatment planning
 - patient education
- Conflict resolution and problem solving
 - feedback and constructive criticism
 - dynamics of conflict, functional and dysfunctional conflict

- crisis handling and intervention
 - documenting conflict; referral and resources
- Intra-professional and inter-professional communication
 - verbal and written communications with peer groups and with other health care professionals
 - inquiries, liaison and documentation in practice management
 - professional presentations

ETHICAL, PROFESSIONAL and LEGAL ISSUES

Ethical and Professional Issues

Performance Objectives

- Demonstrate knowledge of the health care system in Canada and provincial/territorial jurisdictions
- Explain the role of regulation of health professions
- Comply with national, provincial, and regulatory requirements
- Explain the purpose of a profession's code of ethics
- Demonstrate knowledge of and compliance with CCHPBC's Code of Ethics
- Demonstrate ability to work effectively toward resolution of ethical issues and challenges
- Recognize and describe professionalism, and apply this knowledge to the expected conduct of health care professionals
- Demonstrate knowledge of confidentiality, patient's informed consent, patient's right of refusal of treatment, and continuity of care requirements
- Demonstrate understanding of personal and professional boundaries in the context of the therapeutic relationship
- Demonstrate knowledge of and compliance with CCHPBC's Standards of Practice
- Recognize and demonstrate a professional approach to issues that may be perceived to be, or are directly associated with sexuality and gender-specific considerations, including and not limited to disrobing, arousal, breast care, and treatment of sensitive areas
- Recognize and demonstrate a professional approach to issues associated with physical, mental, and emotional wellbeing
- Identify and differentiate between therapeutic and non-therapeutic touch, and therapeutic and non-therapeutic settings
- Demonstrate understanding and respect for the therapeutic relationship
- Recognize and employ behaviours and actions that enhance the therapeutic relationship

Content

- CCHPBC's Standards of Practice, Bylaws, Code of Ethics, provincial legislation related to the practice of massage therapy in BC and in Canada, and other regulatory requirements including the Human Rights Code of BC
- Patient-centred care
- Professional responsibilities in regard to unethical conduct of peers (*Health Professions Act*)
- Prevention of abuse of patients, both inadvertent and otherwise

- Professional responsibilities in regard to safety of patients in varied treatment settings
- Roles of personal and professional values in ethical decision-making; understanding personal bias
- Comprehensive understanding of personal and professional boundaries in theory and in practice
- Boundary issues that arise during massage treatment, including and not limited to draping, therapist body use, communication, touch, and inadvertent contact with patient
- Laws and practical application of requirements for patient confidentiality
- Laws and practical application of requirements for informed consent
- Therapist behaviours that encourage or define professional boundaries
- Therapist behaviours that ensure confidentiality of patient information
- Recognition of appropriate and inappropriate touch / contact
- Types of boundary violations, including and not limited to physical, emotional, psychological, financial, and social
- Issues and continuum of boundary violations in therapeutic relationships
- Issues related to gender that may require consideration in massage therapy treatment
- Management of transference and counter transference in the therapeutic relationship, in the context of professional boundaries and patient-centred care
- Cultural, social, gender, age and other considerations that may impact the therapeutic relationship
- Professional behaviour in response to a patient's needs, unusual or otherwise
- Boundary and trust issues in varied therapeutic settings (eg hospital, geriatric facility, hospice, etc)
- Professional trustworthiness and honesty

Legal Issues

Performance Objectives

- Demonstrate clear understanding and practical knowledge of regulations and legislation that govern registered massage therapists in British Columbia and across Canada
- Demonstrate understanding of the structure and function of the College of Complementary Health Professionals of British Columbia and its relationship to the Ministry of Health, Government of British Columbia
- Identify all requirements for registration with the College of Complementary Health Professionals of British Columbia

Content:

Legislation

- *Health Professions Act*

- *Health Professions General Regulation*
- *Massage Therapists Regulation*
- *Health Care (Consent) and Care Facility (Admission) Act*
- *Infants Act*
- *Personal Information Protection Act*
- *Child, Family and Community Service Act*
- *Adult Guardianship Act*
- *Criminal Records Review Act*
- *Medicare Protection Act*
- *Human Rights Code, BC*
- *Bylaws of the College of Complementary Health Professionals of British Columbia*
- *CCHPBC, Code of Ethics*
- *CCHPBC, Standards of Practice*
- *CCHPBC, Notices to the Profession*

KINESIOLOGY

Performance Objectives

- Demonstrate understanding of kinetic chains, open and closed
- Identify types of lever systems based on an understanding of kinetics, fulcrums, weights, and torques
- Define and apply concepts and principles of joint surfaces and movements in clinical applications
- Define and apply types of muscle contraction as well as the concept of muscular interaction
- Demonstrate understanding of length-tension relationships and relate them to active and passive weakness

Content

- Principles of movement
- Lever functions and classifications
- Types of muscle work
- Muscle forces
- Gravity
 - centre of gravity
 - forces of gravity
 - lines of gravity
- Location of mass centres
 - centres of rotation
 - axes
- Force vectors
- Biomechanics of movement – how the body moves at specific joints when it relates to force
- Functional movement - how muscle groups work together
- Gait, weight bearing and non-weight bearing
- Lifting
- Grasps
 - power grip
 - hook
 - cylinder
 - fist
 - spherical
 - precision or prehension grips
 - three-point chuck, three-fingered prehension or digital prehension
 - lateral key, pulp-to-side pinch, lateral prehension or subterminolateral opposition

- tip pinch, tip-to-tip prehension, or terminal opposition
- Joint surfaces and movements
- Arthrokinematics
 - concave/convex rule
- Osteokinematics
- Closed pack position-patterns of restriction
- Exercise therapy
 - exercise rehabilitation
 - post rehabilitation
 - corrective exercise

NUTRITION

Performance Objectives

- Demonstrate understanding of nutrition as an element of shared foundational knowledge amongst health professionals
- Define nutrition and develop critical thinking in the field of nutrition
- Define and describe the nutritive values of carbohydrates, lipids and proteins
- Define and describe the nutritive values of vitamins and minerals
- Define and describe the roles of water in nutrition
- Define and describe medical dietary considerations

Content

- Nutrition
 - nutrients and non-nutrients in foods
 - the relationship between nutrition and disease prevention
- Carbohydrates
 - nutritive values of carbohydrates
 - dietary requirements of carbohydrates
 - types of carbohydrates
 - food sources of carbohydrates
 - Dietary Reference Intake for carbohydrates
- Lipids
 - nutritive values of lipids
 - dietary requirements of lipids
 - types of dietary lipids
 - food sources of lipids
 - Dietary Reference Intake for lipids
- Proteins
 - nutritive values of proteins
 - dietary requirements of proteins
 - essential and non-essential amino acids
 - types of proteins food sources of proteins
 - Dietary Reference Intake for proteins
- Vitamins
 - nutritive values of vitamins
 - functions of water soluble and lipid soluble vitamins
 - food sources of vitamins
 - dietary requirements of vitamins
 - absorption of vitamins
 - functions of vitamins and antioxidants
 - role of water and lipids in vitamin metabolism

- Dietary Reference Intake for vitamins
- Minerals
 - nutritive values of minerals
 - function(s) of major and trace minerals
 - food sources of major and trace minerals
 - absorption of major and trace minerals
 - Dietary Reference Intake for major and trace minerals
- Water
 - physiological need for water and the mechanism for regulating thirst
- Nutritional deficiencies
- Dietary considerations
 - life stages
 - illness, injury and tissue recovery
 - athletics

UNDERSTANDING PAIN AND STRESS

Performance Objectives

- Demonstrate an understanding of the impact of stress on acute and/or chronic pain
- Demonstrate an understanding of stress as a source of pain and pain as a source of stress
- Recognize and differentiate among types of pain
- Administer appropriate pain scales and pain measurements as needed
- Assess pain
- Recognize clinical presentations of stress and/or pain-related syndromes and disorders
- Differentiate between known causes and unidentifiable causes of pain
- Identify methods of stress/pain management including those used by other health care professionals
- Understand the context and impact of pain in a patient's life, and develop realistic strategies for minimizing the impact of pain
- Recognize when the patient's stress-associated pain exceeds the registrant's scope of practice

Content

- Definition of stress, hypostress, eustress, hyperstress, distress
- The effects of stress-related hormones
 - adrenaline/epinephrine
 - noradrenaline/norepinephrine
 - cortisol
- Types of pain
 - acute
 - sub-acute
 - chronic
 - intractable
 - somatic
 - systemic
 - radicular
 - functional
 - psychogenic
 - referred
 - neurogenic
 - radiating
 - phantom
- Dimensions of pain
 - physiological
 - sensory

- affective
- cognitive
- behavioural
- sociocultural-ethnocultural
- Pain and tension cycle specific to patient's presentation of injury, illness and/or stress
- The pain-gating mechanism, specificity theory of pain, patterning theory of pain
- Anatomy, physiology and pathology relevant to stress disorders, or disorders with a major stress component including
 - mood disorders
 - cognitive disorders
 - eating disorders
 - post-traumatic stress disorder
 - substance abuse
 - addiction
 - pain and stress component of chronic illness or disability
 - stress component of grief, personal loss, social instability, rapid change
- Respiratory assessment related to pain and stress, as relevant
- Techniques to facilitate breathing re-education

PHARMACOLOGICAL CONSIDERATIONS

Performance Objectives

- Define a drug, explain how drugs are classified, list the common classes of drugs, and describe the uses and effects of each class
- Describe the rationale for careful history taking that includes knowledge of the patient's use of pharmaceutical and over-the-counter medication
- Demonstrate the importance of identifying contraindications and precautions with respect to use of pharmaceutical and over-the-counter medication by patients seeking massage therapy treatment
- Demonstrate knowledge of a drug's profile as it relates to massage therapy practice and make treatment modifications to ensure safe and effective treatment delivery

Content

- General principles and terminology of pharmacology
 - brand name
 - generic name
 - use/indications
 - mechanism of action
 - half life
 - absorption/bioavailability/bioequivalence
 - drug interactions
 - photosensitivity reactions
 - metabolism of drugs
 - elimination of drugs
 - administration of drugs
- Classifications of drugs
 - antipyretics
 - analgesics
 - antimalarial drugs
 - antibiotics
 - antiseptics
- Common classes of drugs and their uses and effects for
 - pain and inflammation
 - cardiovascular disease
 - diabetes mellitus and metabolic disorder
 - mood disorders
 - respiratory disorders
 - gastrointestinal tract or digestive system
 - central nervous system
 - musculoskeletal system
 - skin

- infections and infestations
- allergic disorders
- obstetrics and gynecological disorders
- Considerations in case history taking
 - potential of drugs and drug combinations to affect assessment results, including the clinical case history
 - potential of drugs and drug combinations to affect treatment planning and scheduling
 - impact of duration of drug use as it relates to massage treatment planning
 - contraindication and precautions to treatment
 - alterations to sensory perception of treatment applications

PUBLIC HEALTH CONSIDERATIONS

Performance Objectives

- Identify activities, environmental adaptations, and other contributing factors in workplace injuries and time off work, including but not limited to headache, low back pain, and repetitive strain injuries
- Collaborate with other health care professionals to provide appropriate care in team settings as indicated
- Summarize the range of community resources available for referrals to provide ongoing patient support

RESEARCH LITERACY

Performance Objectives

- Demonstrate understanding of the meaning of evidence-based practice in the context of massage therapy
- Demonstrate research literacy
- Demonstrate understanding of the peer review process in science
- Undertake a literature search Summarize the strengths and weaknesses of common scientific research designs
- Demonstrate understanding of components of a research article
- Describe the application of statistics to clinical evidence
- Understand the use of basic descriptive statistics of distribution (mean, median, mode, standard deviation)
- Describe practices in choosing a population/research sample for inclusion in a study
- Distinguish between validity and reliability and explain their significance to research
- Evaluate the validity claim of clinical evidence
- Identify patient-oriented evidence that has the potential to change practice Explain the role of an ethics review in scientific research

SELF CARE

Performance Objectives

- Identify and practice methods for maintaining the physical, mental and emotional health of the massage therapist
- Identify and practice proper biomechanics beneficial to physical ease and treatment efficiency
- Recognize stress factors in massage therapy practice and introduce corresponding methods of prevention
- Recognize and describe personal, physical, emotional and knowledge-based strengths and weaknesses and conduct ongoing self-assessment of competence to practice
- Recognize and discuss how personal values, attitudes and ethics influence professional values, attitudes and ethics

Content

- Physical, mental and emotional requirements of practice
 - norms and expectations of physical fitness
 - physical exercise and its relationship to stress physiology
 - relationships of lifestyle habits to physical, mental and emotional health and consequent influence in health care practice
 - benefits of relaxation and stress-reduction techniques
 - personal and professional boundary management

POST-SURGICAL CONSIDERATIONS

Performance Objectives

- Identify and describe the purpose of various common surgical procedures
- Identify common complications to massage therapy treatment for post-operative patients
- Identify and practice history taking and assessment methods for post-operative patients
- Demonstrate understanding of contraindications and precautions in treatment of post-operative patients

Content

- Common types of surgical procedures including orthopedic and cardiovascular procedures
- Complications related to massage therapy care include and are not limited to
 - loss of tensile strength in various connective tissues muscle weakness
 - nerve damage
 - skin lesions
 - scar tissue
 - pain
 - loss of function
- Precautions for massage treatment relative to post-operative care
- History specific to the post-operative patient
- Limitations of scope of practice in treatment of the post-operative patient
- Precautions related to modality selection and post-massage-treatment recommendations
 - massage techniques
 - hydrotherapy
 - therapeutic exercise
 - adaptations to patient's activities of daily living

BUSINESS PRACTICES

Performance Objectives:

- Demonstrate understanding of the importance of a consistent business framework in support of effective patient care
- Demonstrate understanding of common business practices when applied to proprietorships, partnerships, or corporations practicing massage therapy
- Identify and discuss common methods of time management, scheduling, promotion and advertising in establishing and operating massage therapy practice
- Demonstrate the ability to create and maintain basic accounting and bookkeeping processes
- Identify and recognize basic principles of accounting and bookkeeping suitable for proprietorships, partnerships, or corporations practicing massage therapy, including liability issues and taxation requirements
- Demonstrate understanding of agencies, professional associations, and allied professions with whom massage therapists commonly do business
- Demonstrate functional knowledge of third-party insurers (extended health care) including government medical services plan
- Review and discuss billing procedures
- Demonstrate ability to write medical-legal reports as requested by lawyers or others so entitled
- Review and discuss types of clinic forms for documentation and record keeping purposes
- Demonstrate understanding of employment requirements in clinical settings that include employment contracts
- Demonstrate understanding of the Canadian Free Trade Agreement's labour mobility provisions for regulated health professionals

Content:

- Basic accounting & bookkeeping
 - distinction between personal and business activities
 - record keeping: daily, monthly, and year-end ledger detail for income tax purposes
 - issuing receipts
 - retention of business files and records
 - income and other tax; planning and filing
- Agency relationships, including and not limited to
 - third-party insurers, extended medical benefit plans
 - Medical Services Plan of B.C.
 - Insurance Corporation of British Columbia
 - Veteran's Affairs

- WorkSafe B.C.
- Documentation and record keeping, including and not limited to
 - understand formats used by medical professionals in preparing medical-legal reports
 - reports to referring health professionals
 - review of clinic forms used to record patient information

END.