2012/13 Batch
Locomotion Module - Year 1

FINAL document – Updated on January 2014

Concept	Objective	Time	T/L activity	Department
General consideration				
2012-1/SBM-2/1				
a. Introduction to limbs and limb girdles	1. Describe the evolutionary changes that has taken place when quadruped became a biped 2. Describe how the general plan of the upper limb is built for prehension and lower limbs is built for support and propulsion	1hr	Lecture	Anatomy
b. Human skeleton	1. Describe the general arrangement of the human skeleton (axial/appendicular skeleton and their component parts) 2. State the bones of each component part 3. State the functions of the human skeleton	1hr	Lecture	Anatomy
c. Nerve supply of the body wall and limbs	1. Recall the segmental supply of the body wall 2. Describe the arrangement of a typical spinal nerve 3. Describe the segmental innervations of skin and muscles 4. Recall neurovascular plane **5.** Describe limb plexus formation **6.**	**1hr**	**Lecture** **PD**	**Anatomy**
d. Introduction to dissections	1. understand why dissections are important in 2. take care of the cadaver during dissections 3. understand the importance of pre-dissection activities such as studying the bones and living anatomy 4. understand the importance of implying proper method of dissection, engaging in group studies, using the cadaver, text books, atlases, skeleton, radiographs etc. in learning the structure of the body 5. identify the tissues encountered in dissection of the human body and their arrangement,	**1hr** **3hr**	**Lecture** **PD**	**Anatomy**
e. Classification of joints and joint movements	1.describe the classification, structure, innervations, vasculature and stability of joints	1hr	**Lecture** **PD**	Anatomy

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a. Structure of bone and cartilage	1.Classify bones and cartilages 2.Describe the parts of a long bone 3.Describe the microscopic structure of bone and cartilage composition of bone and cartilage adaptation to function their function. 4.State the structural and functional differences between the different types of cartilage	2hr	Lecture PD	Anatomy
b. Collagen and ground substance	1. State the basic steps involved in collagen synthesis and their defects. 2. State different types of collagen and their distribution. 3. State how the structures of collagen and ground substance of bone facilitate the deposition of bone mineral. Explain the mechanism of calcification.	1hr	Lecture	Biochemistry
c. Structure of muscle , tendon, ligament, synovium 2007-2/SBM-2/02	1. Describe the microscopic structure of the skeletal muscle/heart muscle/smooth muscle including the distribution of cellular organelles in each and their function. 2. Describe the main ultra structural components of a skeletal muscle cell with special reference to sarcoplasmic reticulum, t tubules, terminal cisternae and actin and myosin filaments 3.**Describe the microscopic structure of tendon, ligament and synovium and its functional relevance** **4.Describe the different macroscopic types of tendons and arrangement of raphes** **5. Describe the arrangement of synovial sheaths, membranes and bursae**	2hr	Lecture PD	Anatomy
d. Structure of bone and cartilage		2hr	PD	Anatomy
e. Contraction and relaxation of muscle	1.Describe the process of excitation and contraction coupling and muscle relaxation 2.In a muscle tracing, identify the following phenomena, muscle twitch, summation, tetanus, staircase phenomenon, muscle fatigue, effect of temperature on muscle contraction	2hr 2hr	Lectures PD	Physiology Physiology
f. Form mechanics and coordinated activity of	1.describe the form and mechanics of muscle form (fiber disposition ,pennation,and mechanics of contraction)	1hr	Lecture	Anatomy

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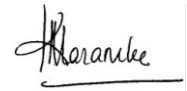
Muscle	2.describe how coordinated activity of muscles produce movement (prime movers, antagonists, synergist and fixators) 3.explain how gravity assist movement of joints and how muscled contract paradoxically			
g. Muscle metabolism	1. Recall the three major types of muscle and the distribution of cellular organelles in each and their function. 2. State the major fuels used by skeletal muscle and describe the environment present to promote energy production. 3. Describe the status of ATP/ADP ratio in a skeletal muscle fibre when it is resting and active, explaining how the ratio affects energy production under aerobic and anaerobic (hypoxic) conditions.	2hr	Lecture	Biochemistry
Effect of exercise on muscles				
2012-1/SBM-2/3				
a. .Biochemical Effect of exercise on muscle b. Changes in muscle mass to meet the functional demand	Explain the principles of: 1.Oxygen debt, 2.Changes in the muscle following muscle fatigue after exercise and lactic acidosis 3.Recovery from exercise 4.Energy cost of exercise in terms of BMR 5.Receptor changes in exercise (LDL, insulin etc) 6.Changes in blood lipids with exercise 7.Calculation of energy requirement for exercise	2hr 3hr	Lecture PD	Biochemistry
	1.Describe morphological (ultra-structural) biochemical and physiological adaptations of skeletal muscle that occur in response to exercise 2.Describe the characteristics of different muscle fiber types 3.Describe how these are adapted for activities requiring rapid, powerful movements or endurance events 4.Describe the acute and chronic adaptations of muscles for exercise and training 5.Explain how body's diverse energy systems interact to transfer energy during rest and different exercise intensities 6.Describe the role of central and peripheral factors in development of fatigue in skeletal muscle fibers.	2hr	Lecture	Physiology



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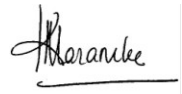
a. Physiological Basis of muscle disorders/dysfunctions	1.State the different types of muscle disorders /dysfunction 2.Describe the physiological basis of muscle dysfunction in different muscle disorders	2hr 2hr	Lecture SGD	Physiology Physiology
b. Identification of muscle damage	1.Name the enzymes that are useful in identifying skeletal muscle damage 2.State the alteration in activity of the enzymes in serum following skeletal muscle damage 3.Explain how skeletal muscle damage could be differentiated from cardiac muscle damage based on serum parameter changes 4.Define the term 'myoglobinuria' State the effect of myoglobin on nephrons 5.Outline the basis of the determination of enzymes used in the identification of muscle damage (creatine kinase, LDH, aminotransferases) 6.Describe how myoglobinuria is detected in urine	2hr? 3hr	Lecture PD	
Growth and Development				
2012-1/SBM-2/5				
a. **Development of limb bud**	1.Describe the development of the limb bud 2.Describe the development of the musculature, skeleton and nerve supply of the limbs(dermatomes/myotomes) 3.Describe the events that occur during the development of limb buds 4.describe common congenital defects of limbs 5.describe the processes of ossification giving examples and the time of appearance of ossification centres	2hr	Lectures	Anatomy
b. Introduction to Bone growth and remodeling	1. Explain what is meant by bone remodeling and the advantage of this process to the body. 2. State the role of nutritional and other factors in bone remodeling	1hr	Lecture	Biochemistry



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c. Vitamins and minerals in relation to bone growth and remodeling	1. Describe the synthesis, functions, dietary sources and recommended daily allowance of vitamin D. 2. State the effects of vitamin D deficiency and excess. 3. Recall the role of bone, kidney and the intestine in maintaining the calcium and phosphorus concentrations in the blood. 4. State the functions of calcium and phosphorus in the body. 5. Recall the sources that are rich in calcium in the Sri Lankan diet. 6. Describe the role of fluoride in bone mineralisation	2hr	Lecture	Biochemistry
	Ca^{++} metabolism, role of nutrients in bone formation (vitamins A, D, K, C, fluoride etc	2hr	SGD	Biochemistry
	State the effects of other hormones such as insulin, oestrogen, cortisol, thyroid hormones, growth hormone on bone	1hr		**biochemistry**
d. Markers of bone growth	1. Estimation of serum parameters used as markers of bone growth. 2. Alkaline phosphatase (isoform)- state types of alkaline phosphatase, differences between them and their tissue distribution 3. Hydroxyproline excretion,- significance of elevation 4. Serum Ca^{2+} & phosphate 24 hr urinary Ca^{2+} & phosphate Alkaline phosphatase.	1hr 3hr	Lecture PD	Biochemistry
a. Osteology and Surface Anatomy UL	1. Identify the bones that form the pectoral girdle and the upper limb 2. Name their parts and general features 3. Describe how the basic organization of the upper limb skeleton correlates to it s function 4. Demonstrate the bony anatomical landmarks of the pectoral girdle and the upper limb 5. Describe the surface projection of structures of the UL 6. Describe the dermatomes of the upper limb	2hr	PD	Anatomy

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(i) Superficial veins and cutaneous innervation **(ii)Scapular region** **(iii) Axilla and brachial plexus** **(iv) Arm and cubital fossa** **(v) Flexor region of fore arm** **(vi) Palm of the hand** **(vii)Extensor (region of forearm and dorsum of hand**	1. Describe the arrangement of superficial veins and cutaneous innervations of upper limb 2. Describe the regional arrangement of structures of the upper limb 3. Describe the attachments innervations, action and surface projections of muscles of upper limb 4. Describe the course and relations of nerves and blood vessels of the upper limb 5. Describe the arterial supply, venous drainage and nerve supply of upper limb	(26hr) 22 4hr	PD Revision	Anatomy
b. Joints and movements of the upper limb	1. Describe the structure movements and stabilizing factors of the shoulder joint, elbow joint and wrist joint 2. Describe the movements of the small joints of the hand. 3. State the spinal segments for joint movements.	2hr	PD	Anatomy
Functional relevance				
2012-1/SBM-2/7				
a. Overview of upper limb	1.Describe the structural arrangement of upper limb in relation to its functions 2. Describe the interrelationship of the components of the UL in producing movements	2hr 4hr	Lectures SGD	
Structure of Lower limb	1.			
2012-1/SBM-2/8	2.			
a. Osteology and Surface anatomy	b. Identify the bones that form the pelvic girdle and the upper limb c. Name their parts and general features d. Describe how the basic organization of the lower limb skeleton correlates to it s function e. Demonstrate the bony anatomical landmarks of the pelvic girdle and the upper limb f. Describe the surface projection of structures of the LL	2hr	PD	Anatomy

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	g. Describe the dermatomes of the lower limb			
b. Dissections –lower limb				
(i) Superficial veins and cutaneous innervation **(iii) (ii) Front and medial aspect of the thigh (** **(iv) Gluteal region** **(v) Back of the thigh and popliteal fossa** **(vi) Leg and dorsum of the foot** **(vii) Sole of the foot - including arches of the foot**	1. Describe the arrangement of superficial veins and cutaneous innervations of lower limb 2. Describe the regional arrangement of structures of the lower limb 3. Describe the attachments innervations, action and surface projections of muscles of lower limb 4. Describe the course and relations of nerves and blood vessels of the lower limb 5. Describe the arterial supply, venous drainage and nerve supply of lower limb	(24hr) 20 4hr	Dissections PD revision	Anatomy
c. Joints and movements of the lower limb	1. Describe the structure movements and stabilizing factors of the hipjoint, knee joint and ankle joint 2. Describe the movements of the foot joints . 3. State the spinal segments for joint movements.	2hr	PD	Anatomy
Functional relevance				
2012-1/SBM-2/9				
a. Gait	Describe the weight bearing function of the lower limb including foot arches and weight distribution in the foot Walking cycle and adaptations of the lower limb to walking, running and landing	1hr	Lecture	Anatomy
b. Overview of lower limb	Describe the structural arrangement of lower limb in relation to its functions Describe the interrelationship of the components of the LL in producing movements Compare and contrast the upper and lower limbs in relation to structure and function	2hr	Lectures	
		4hr	SGD	
a. .Venous drainage and Lymphatic drainage	1. recall the venous drainage of UL/LL 2.describe clinical correlations of venous drainage and of the upper and lower limbs 3recall the lymphatic drainage of the UL/LL	1hr	Lecture	

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	4.Describe the clinical correlations of lymphatic drainage of UL/LL		
b. Arterial supply of Limbs	1recall the arterial supply of UL/LL 2.Describe the clinical significance collateral supply (arterial) of the upper limb 3. Describe the clinical significance collateral supply (arterial) of the lower limb	1hr	Lecture
c. Tissue injuries of limbs	state the common injuries caused by direct and indirect trauma (fracture,dislocation,sprains,strains ect. of UL/LL) 2. state the anatomical basis of such injuries 2. state the structures that can be damage due to intimate relationship and their consequences 3. Describe the basis of common non traumatic injuries/pathologies 4. Describe how tissue injury can cause compartment syndromes and their consequences	 5hr	SGD CCR
d. nerve injuries of limbs	1.describe the anatomical basis nerve injuries of upper and lower limbs	2hr	Lecture

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Objectives

1. Students should be able describe the structure (gross/micro/cellular/molecular) function growth and development of tissues of musculoskeletal system in order to describe
    - how structure adapted to perform function and compensate functional demands
    - basis of disorders due to derangement of structure, functions, growth or development, and basis of diagnosis and management
    - basis of diagnosis and management

2. Students should be able describe the normal Structure, functions, growth and development of upper and lower limbs in order to describe
    - How structure adapted to perform function
    - basis of disorders due to derangement of structure, function, growth or development, and basis of diagnosis and management