

Course Title	BIOKINESIOLOGY
Course Code	PT303
Course Credit	Lecture: 6
	Practical/ Clinical Training: 2
	Total: 8

Course Objective	
<p>On completion of unit students should be able to</p> <ol style="list-style-type: none"> 1. Understand the fundamentals of Biokinesiology, concept of structural stability and functional mobility related to various diseases and disorders. 2. Apply knowledge of kinesiology in professional physiotherapy practice. 3. Demonstrate and practice concepts of biomechanics and pathomechanics of axial & appendicle joints. 4. Analyse Normal human posture, gait, other physical & function activities like sitting to standing etc. 	

Detailed Syllabus

Sr. No.	Name of chapter & details	Hours Allotted
Section – I		
1	INTRODUCTION OF MECHANICS AND HUMAN MECHANICS RELATING TO PHYSICAL THERAPY	2
	Basic Concepts in Biokinesiology :	
	Kinematics and Kinetics. Types of Motion, Location of Motion, Direction of Motion Magnitude of Motion.	4
	Definition of Forces, Force of Gravity, Reaction forces, Moment arm of force, Force components, Force of friction, Concurrent force system, Parallel force systems	4
	Equilibrium, Objects in Motion, Work, Equilibrium of levers	2
2	Joint structure and Function	
	Joint design	2
	Materials used in human joints	2
	General properties of connective tissues	1

	Human joint design	1
	Joint function and Joint motion	2
	General effects of disease, injury and immobilization	2
3	Muscle structure and function	
	Mobility and stability functions of muscles	3
	Elements of muscle structure	2
	Muscle function	2
	Effects of immobilization, injury and aging	2
4	Goniometry	
	Principles of goniometry	1
	Types (Bubble and gravity goniometers)	1
	Normal range of various joints	2
	Measurement of individual joint range using goniometers	8
5	Biokinesiology of the vertebral column:	
	Importance of Core stability in Biokinesiology	4
	Structure and function of the Cervical Region	4
	Structure and function of the Thoracic Region	4
	Structure and function of the Lumbosacral Region	4
6	The Shoulder complex :	
	Components of shoulder complex	4
	Scapulo thoracic and gleno humeral contributions	4
	Sterno clavicular and acromioclavicular contributions	2
	Structural dysfunction of shoulder muscles and shoulder pathomechanics.	4
7	The elbow complex	
	Structure of elbow joint, Axis of motion, Muscle of motion	2
	Mobility and stability of elbow complex	3
	Applied pathomechanics	2
	Section II	
8	The wrist and hand complex :	
	Radio carpel joint structure, Midcarpal joint structure	2
	Function of wrist complex	2
	Flexor mechanism, Extensor mechanism	1

	Structure of thumb, Prehension, Power grip, Precision handling	1
	Functional position of the wrist and hand and applied pathomechanics	2
9	The Temporomandibular Joint	
	Structure and Function of temporomendibular joint	2
	Pathomechanics of temporomendibular joint	2
10	Biokinesiology of the Thorax and Chest wall:	
	Structure and Function of rib cage, Coordination and Integration of Ventilatory Motions	4
	Pathomechanics of rib cage	2
11	The hip complex	
	Structure and function of hip joint	3
	Structural adaptations to weight bearing	2
	Hip joint forces and muscle function in stance and its pathomechanics	4
12	The knee complex	
	Structure and function of tibiofemoral joint	5
	Weight bearing and non-weight bearing exercises of patellofemoral joint	2
	Structure and function of patellofemoral joint	3
	Applied pathomechanic of knee complex	4
13	The ankle and foot complex	
	Structure and function of the ankle joint, subtalar joint, talocalcaneonavicular joint, transverse tarsal joint, tarsometatarsal joints, metatarso phalangeal joints, interphalangeal joints	4
	Structure and function of the plantar arches, muscles of the ankle and foot, deviations from normal structure and function	4
14	Analysis of Posture	
	Static and dynamic posture, postural control	2
	Kinetics and kinematics of posture	3
	Ideal posture analysis	3
	Effects of posture on age, pregnancy, occupation and recreation	3

15	Analysis of Gait	
	General features of gait, gait initiation	2
	Kinematics and kinetics of gait, energy requirements	5
	Kinematics and kinetics of the trunk and upper extremities in relation to gait, stair case climbing and running	3
	Effects of age, gender, assistive devices, disease, muscle weakness, paralysis, asymmetries of the lower extremities, injuries and mal-alignments in gait	3
16	Movement analysis: ADL activities like sitting to standing, squatting, long sitting etc	3
17	Applied Bio kinesiology in sports and physical performance. Advance Bio kinesiology in physiotherapy practice.	2
	Biokinesiology in functional outcome measures	2

.Instructional Method:

1. Teaching and training sessions will be carried out through active learning. Active participation and contribution in group discussion and seminars are mandatory for students
2. Lectures to be conducted with the help of black board and/or audio-visual aids that includes multi-media projector, OHP, etc.
3. Problem based and/or case based assignments based on course content will be given to the students at the end of each unit/topic and will be evaluated at regular interval.
4. The course includes a laboratory where the students have an opportunity to build and appreciation for the concepts being taught in lectures.
5. Instruction method will be integrated with clinical training, bedside / class room teaching and tutorials as necessary.

Text Books:

1. Joint Structure and Function: A Comprehensive Analysis: 5th edition. Levangie PC; Norkin CC. F. A. Davis Company
2. Kinesiology: Scientific basis of human motion: 7th edition. Wells KF; Luttgens K. Saunders College Publishing West Washington Square, Philadelphia

Reference Books:

1. Basic Biomechanics of the Musculoskeletal System: 4th edition. Nordin M; Frankel VH. LWW
2. Brunnstrom's Clinical Kinesiology: 6th edition. Houglum PA; Bertoti DB. JP Bros Medical Publishers, Bangalore



SYLLABUS