

INSTITUTE	FACULTY OF PHYSIOTHERAPY
PROGRAM	MASTER OF PHYSIOTHERAPY
SEMESTER	1
COURSE TITLE	BIOMECHANICS & THERAPEUTICS
COURSE CODE	MPT-103
COURSE CREDITS	5

Objective:

- 1 Understand the skeletal and neuro-muscular system considered for movement.
- 2 Explain the biomechanical principles and pathomechanics concerning the human movement and relate to the concept of pathomechanics in Various conditions.
- 3 Apply the knowledge of ergonomics to effectively communicate, and educate workers regarding poor ergonomics
- 4 Demonstrate knowledge of ethical and medico-legal consideration towards patients
- 5 Understand exercise physiology in healthy and diseased population and understand body composition measurement, exercise and related symptoms testing in healthy and pathological conditions
- 6 Understand exercise prescriptions for healthy and various common diseased population and types of diet for various population

Course Outcomes: After completion of this course, student will be able to:

- 1 Understand the skeletal and neuro-muscular system considered for movement.
- 2 Explain the biomechanical principles and pathomechanics concerning the human movement and relate to the concept of pathomechanics in Various conditions.
- 3 Apply the knowledge of ergonomics to effectively communicate, and educate workers regarding poor ergonomics
- 4 Demonstrate knowledge of ethical and medico-legal consideration towards patients
- 5 Understand exercise physiology in healthy and diseased population and understand body composition measurement, exercise and related symptoms testing in healthy and pathological conditions
- 6 Understand exercise prescriptions for healthy and various common diseased population and types of diet for various population

Pre-requisite of course:A basic understanding of human movement science and undergraduate-level physiotherapy concepts is required.

Teaching and Examination Scheme

Theory Hours	Tutorial Hours	Practical Hours	ESE	IA	CSE	Viva	Term Work
90	0	0	100	0	0	0	0

Contents : Unit	Topics	Contact Hours
1	<p>Concepts of Biomechanics: Introduction to Kinesiology and Biomechanics. Biomechanics of Tissues and structures of the musculoskeletal system , Principle of Biomechanics, Nature and importance of Biomechanics in Physiotherapy., Methods of kinetics and kinematics investigation , Introduction to biomechanical analysis of human motion. , Analytical tools and techniques – 1. Isokinetic Dynamometer, 2. Kinesiological EMG, 3. Electronic Goniometer, 4. Force Platform, 5. Videography, Upper Extremity: Shoulder and Shoulder girdle, Elbow joint, Wrist joint and Hand., Lower Extremity: Pelvic Girdle, Hip joint, Knee joint, Ankle & Foot , Spine , Gait, Gait Analysis: Kinetic & Kinematic Analysis. , Pathological Gait: Kinetic & Kinematic Analysis, Ergonomic approach to lifting and handling, workspace and environment. Patient positioning, body mechanics and Transfer techniques</p>	45

Contents : Unit	Topics	Contact Hours
2	<p>Physiotherapy techniques</p> <p>Principle of therapeutic exercises, Definition, details of effects and uses of following exercises., Dynamic Exercises, Plyometric Exercises, Isokinetic Exercises, Kinetic chain exercises, Balance and coordination exercises, Biophysics of contractile and non-contractile tissues, Response to mechanical loading, Clinical reasoning and differential clinical diagnosis based on various approaches such as Maitland, Kaltenborne, Cyriax, Mulligan, Mckenzie etc. , Proprioceptive neuromuscular Facilitation,, Hydrotherapy Techniques, Functional assessment and re-education, Yoga: Introduction, Historical background and Origin of Yoga, Meaning and Concept of Yoga and its relationship with Physical Education and Sports, Yoga in Global Scenario, Pranayama: Meaning, Types and its importance. Asanas: Asanas- meaning, types, principles, Techniques of asanas and effects of asanas on various systems of the body - circulatory, respiratory and digestive system. , Electro diagnosis: introduction to methods of electro diagnosis SD CURVE , Electromyography: technique of EMG, interpretation of normal and abnormal responses, Nerve conduction studies: MNCV, SNCV, variables affecting nerve conduction, measurement of NCV of nerves of upper limb and lower limb, interpretations of normal and abnormal responses., Evoked potentials, H-reflex, P wave, repetitive nerve stimulation, VEP, BAEP, SSEP, SSR., Review of Principles underlying the application of following modalities with reference to their Production, biophysical and therapeutic effects, indications and contraindications and the specific uses of: 1. Superficial heating modalities 2. Deep heating modalities 3. Ultrasound 4. Cryotherapy, Review of Principles underlying the application of following modalities with reference to their Production, biophysical and therapeutic effects, indications and contraindications and the specific uses of Physiotherapy , Low Frequency Current: Diadynamic Current, Iontophoresis , High Voltage, Pulsed Galvanic Stimulation, TENS, IFT, Russian Currents. LASER , Advanced Electro Therapeutics in Tissue healing, Wound care, Management of Scars, keloids, Muscle Plasticity & Integumentary Conditions., BIO-FEED BACK</p>	45
Total Hours		90

Textbook :

- 1 The Biomechanics of Sports Techniques , James G. Hay , Prentice Hall, -
- 2 Clinical Kinesiology , Brunnstrom, F.A. Davis, -
- 3 Kinesiology – Scientific Basis of Human Motion , Luttgens, K., Hamilton, N. , Brown & Benchmark, -
- 4 Biomechanics – A Qualitative Approach for Studying Human Motion, Kreighbaum, E., Barthels, K., MacMillan, -
- 5 Kinesiology and Applied Anatomy, Rasch, R., Burk, R., Lee & Fabiger, -

Textbook :

- 6 Biomechanics of Spine, White, A., Punjabi, M., Lippincott, -
- 7 Joint Structure and Function – A Comprehensive Analysis, Norkin, C., Levangie, P., F.A. Davis, -
- 8 Physiology of Joints, Vol. I, II & III, Kapandji, W.B. Saunders, -
- 9 Analysis of Sports Motion: Anatomic and Biomechanics Perspectives, Northrip et al., W.C. Brown Co., Iowa, -
- 10 Basic Biomechanics in Sports and Orthopedic Therapy, Leveac, B.F. , C.V. Mosby, -
- 11 Biomechanics of Sports , De Boer, J., Groot, G. , CRL Press, Florida, -
- 12 Muscle Alive , Basmajian, J.V. , Williams & Wilkins, -
- 13 Basic Biomechanics of Musculoskeletal System, Nordin, M., Frankel, V., Williams & Wilkins, -
- 14 Introduction to Sports Biomechanics, Bartlet, F. & F.N. Spon, Madras, -

Suggested Theory Distribution:

The suggested theory distribution as per Bloom’s taxonomy is as follows. This distribution serves as guidelines for teachers and students to achieve effective teaching-learning process

Distribution of Theory for course delivery					
Remember / Knowledge	Understand	Apply	Analyze	Evaluate	Higher order Thinking / Creative
0.00	0.00	35.00	35.00	30.00	0.00

Instructional Method:

- 1 Interactive Lectures
- 2 Demonstrations & Practical Sessions
- 3 Case-Based Learning
- 4 Group Discussions & Seminars