

**Maharaja Ranjit Singh Punjab Technical University  
Bathinda-151001**



**FACULTY OF PHARMACY**

**SYLLABUS**

**FOR**

**BACHELOR OF PHYSIOTHERAPY**

**(4.5 YEARS PROGRAMME)**

**2023 BATCH ONWARDS**

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**MRSPTU BACHELOR OF PHYSIOTHERAPY  
SYLLABUS 2023 BATCH ONWARDS**

**SCHEME**

<b>1<sup>st</sup> Semester</b>		<b>Contact Hrs.</b>			<b>Marks</b>			<b>Credits</b>
<b>Subject Code</b>	<b>Subject</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>Int.</b>	<b>Ext</b>	<b>Total</b>	
<b>BPHTS1-101</b>	Human Anatomy-1	3	1	0	40	60	100	4
<b>BPHTS1-102</b>	Human Physiology -1	3	1	0	40	60	100	4
<b>BPHTS1-103</b>	Biochemistry	3	0	0	40	60	100	3
<b>BPHTS1-104</b>	Sociology	2	0	0	50	0	50	2
<b>BPHTS1-105</b>	Human Anatomy-1 Practical	0	0	6	60	40	100	3
<b>BPHTS1-106</b>	Human Physiology -1 Practical	0	0	2	60	40	100	1
<b>Foundation Course - Internal Examination</b>								
<b>BPHTS1-107</b>	Introduction to Healthcare Delivery System in India	2	0	0	50	0	50	2
<b>BPHTS1-108</b>	Basic computer and information science	1	0	0	50	0	50	1
<b>BPHTS1-109</b>	Basic computer and information science Practical	0	0	2	50	0	50	1
<b>BPHTS1-110</b>	English, Communication and soft skills	1	0	0	50	0	50	1
<b>BPHTS1-111</b>	English, Communication and soft skills Practical	0	0	2	50	0	50	1
<b>BPHTS1-112</b>	Introduction to Yoga- Basic theory, science and techniques	1	0	0	50	0	50	1
<b>BPHTS1-113</b>	Introduction to Yoga- Basic theory, science and techniques Practical	0	0	2	50	0	50	1
<b>BPHTS1-114</b>	PBL/Assignment/ICT learning	0	0	4	0	50	50	2
<b>BPHTS1-115</b>	Community orientation and clinical visit	0	0	2	0	50	50	1
<b>Total</b>		<b>16</b>	<b>2</b>	<b>17</b>	<b>640</b>	<b>360</b>	<b>1000</b>	<b>28</b>

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<b>2<sup>nd</sup> Semester</b>		<b>Contact Hrs.</b>			<b>Marks</b>			<b>Credits</b>
<b>Subject Code</b>	<b>Subject</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>Int.</b>	<b>Ext</b>	<b>Total</b>	
<b>BPHTS1-201</b>	Human Anatomy-2 (Including Applied Anatomy)	3	1	0	40	60	100	4
<b>BPHTS1-202</b>	Human Physiology -2 (Including Applied Physiology)	3	1	0	40	60	100	4
<b>BPHTS1-203</b>	General and Clinical Psychology	2	1	0	40	60	100	3
<b>BPHTS1-204</b>	Basic principles of Biomechanics	2	1	0	40	60	100	3
<b>BPHTS1-205</b>	Human Anatomy-2 (Including Applied Anatomy) – Practical	0	0	6	60	40	100	3
<b>BPHTS1-206</b>	Human Physiology -2 (Including Applied Physiology– Practical	0	0	4	60	40	100	2
<b>BPHTS1-207</b>	General and Clinical Psychology – Practical	0	0	2	30	20	50	1
<b>BPHTS1-208</b>	Basic principles of Biomechanics – Practical	0	0	2	30	20	50	1
<b>Foundation Course - Internal Examination</b>								
<b>BPHTS1-209</b>	Medical terminology and record keeping	2	0	0	50	-	50	2
<b>BPHTS1-210</b>	PBL/Assignment/ICT learning/Integrated seminar	0	0	4	50	-	50	2
<b>BPHTS1-211</b>	Clinical observation	0	0	6	-	100	100	3
<b>Total</b>		<b>12</b>	<b>4</b>	<b>24</b>	<b>440</b>	<b>460</b>	<b>900</b>	<b>28</b>

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<b>3<sup>rd</sup> Semester</b>		<b>Contact Hrs.</b>			<b>Marks</b>			<b>Credits</b>
<b>Subject Code</b>	<b>Subject</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>Int.</b>	<b>Ext</b>	<b>Total</b>	
<b>BPHTS1-301</b>	Pathology	3	0	0	40	60	100	3
<b>BPHTS1-302</b>	Microbiology	3	0	0	40	60	100	3
<b>BPHTS1-303</b>	Pharmacology	3	0	0	40	60	100	3
<b>BPHTS1-304</b>	Biomechanics and kinesiology	4	1	0	40	60	100	5
<b>BPHTS1-305</b>	Foundation of Exercise Therapy and therapeutic massage	3	0	0	40	60	100	3
<b>BPHTS1-306</b>	Pathology- Practical	0	0	2	30	20	50	1
<b>BPHTS1-307</b>	Microbiology- Practical	0	0	4	30	20	50	2
<b>BPHTS1-308</b>	Biomechanics and kinesiology - Practical	0	0	6	60	40	100	3
<b>BPHTS1-309</b>	Foundation of Exercise Therapy and therapeutic massage- Practical	0	0	4	60	40	100	2
<b>Foundation Course - Internal Examination</b>								
<b>BPHTS1-310</b>	Introduction to quality and patient safety (Including Emergency care, BLS, Biomedical waste management, Infection prevention and control, etc.)	1	0	0	50	-	50	1
<b>BPHTS1-311</b>	Introduction to quality and patient safety (Including Emergency care, BLS, Biomedical waste management, Infection prevention and control, etc.)- Practical	0	0	2	50	-	50	1
<b>BPHTS1-312</b>	Clinical observation	0	0	6	-	100	100	3
<b>Total</b>		<b>17</b>	<b>1</b>	<b>24</b>	<b>480</b>	<b>520</b>	<b>1000</b>	<b>30</b>

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<b>4<sup>th</sup> Semester</b>		<b>Contact Hrs.</b>			<b>Marks</b>			<b>Credits</b>
<b>Subject Code</b>	<b>Subject</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>Int.</b>	<b>Ext</b>	<b>Total</b>	
<b>BPHTS1-401</b>	Exercise Therapy	4	1	0	40	60	100	5
<b>BPHTS1-402</b>	Bio physics	1	0	0	40	60	100	1
<b>BPHTS1-403</b>	Electrotherapy (LMHF & Equipment care)	4	1	0	40	60	100	5
<b>BPHTS1-404</b>	Exercise Therapy -Practical	0	0	8	60	40	100	4
<b>BPHTS1-405</b>	Bio physics -Practical	0	0	2	60	40	100	1
<b>BPHTS1-406</b>	Electrotherapy (LMHF & Equipment care) -Practical	0	0	8	60	40	100	4
<b>Foundation Course - Internal Examination</b>								
<b>BPHTS1-407</b>	Medical/ Physiotherapy Law and Ethics	2	0	0	50	-	50	2
<b>BPHTS1-408</b>	Clinical Education	0	0	6	-	100	100	3
<b>Total</b>		<b>11</b>	<b>2</b>	<b>24</b>	<b>350</b>	<b>400</b>	<b>750</b>	<b>25</b>

# **FIRST SEMESTER**

**MRSPTU BACHELOR OF PHYSIOTHERAPY  
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**HUMAN ANATOMY-1**

**Subject Code: BPHTS1-101**

**L T P C**

**Duration: 60 (Hrs.)**

**3 1 0 4**

**Course Objectives:**

- Students will be able to learn the terminology of the subject and basic knowledge of cells, tissues, blood and to understand anatomy and physiology of human body.

**Course Outcomes:**

- Describe the hematological tests like blood cell counts, haemoglobin estimation, bleeding/clotting time etc and also record blood pressure, heart rate, pulse and respiratory volume.
- Explain the gross morphology, structure and functions of various organs of the human body.
- To study the gross morphology, structure and functions of nervous, respiratory, urinary and reproductive systems in the human body.
- To know about detail anatomical knowledge and outline of muscular anatomy system

**Unit-1 (10 Hours)**

**Histology :** General Histology, study of the basic tissues of the body; Microscope, Cell, Epithelium, Connective Tissue, Cartilage, Bone, Muscular tissue, Nerve Tissue – TS & LS, Circulatory system – large sized artery, medium sized artery, large sized vein, lymphoid tissue, Skin and its appendages.

**Unit-2 (15 Hours)**

**Embryology**

- Ovum, Spermatozoa, fertilization and formation of the Germ layers and their derivations.
- Development of skin, Fascia, blood vessels, lymphatic,
- Development of bones, axial and appendicular skeleton and muscles,
- Neural tube, brain vessels and spinal cord,
- Development of brain and brain stem structures

**Unit-3 (20 Hours)**

**Regional Anatomy**

**Thorax:**

- **Cardio – Vascular System Mediastinum:** Divisions and contents Pericardium: Thoracic Wall: position, shape and parts of the heart; conducting System; blood Supply and nerve supply of the heart; names of the blood vessels and their distribution in the body – region wise.
- **Respiratory system** - Outline of respiratory passages: Pleura and lungs: position, parts, relations, blood supply and nerve supply; Lungs – emphasize on bronchopulmonary segments.
- **Diaphragm:** Origin, insertion, nerve supply and action, openings in the diaphragm.
- **Intercostal muscles and Accessory muscles of respiration:** Origin, insertion, nerve supply and action.

**Abdomen:**

- **Peritoneum:** Parietal peritoneum, visceral peritoneum, folds of peritoneum, functions of peritoneum.
- Large blood vessels of the gut.
- Location, size, shape, features, blood supply, nerve supply and functions of the following: stomach, liver, spleen, pancreas, kidney, urinary bladder, intestines, gall bladder.

**Unit-4 (15 Hours)**

- **Pelvis:** Position, shape, size, features, blood supply and nerve supply of the male and female reproductive system.
- **Endocrine glands:** Position, shape, size, function, blood supply and nerve supply of the following glands: Hypothalamus and pituitary gland, thyroid glands, parathyroid glands, Adrenal glands, pancreatic islets, ovaries and testes, pineal glands, thymus.

**Recommended Text Books / Reference Books:**

- 1. Ross and Wilson, 'Anatomy & Physiology.
- 2. Clark, 'Anatomy and Physiology: Understanding the Human Body'.
- 3. Pearce, 'Human Anatomy for Nurses.



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**HUMAN ANATOMY – I (PRACTICAL)**

**Subject Code: BPHTS1-105**

**L T P C**  
**0 0 6 3**

**Duration: 90 (Hrs.)**

**Course Objectives:**

Students will be able to learn the terminology of the subject and basic knowledge of cells, tissues, blood and to understand anatomy and physiology of human body.

**Course Outcomes:**

- Describe the hematological tests like blood cell counts, haemoglobin estimation, bleeding/clotting time etc and also record blood pressure, heart rate, pulse and respiratory volume.
- Explain the gross morphology, structure and functions of various organs of the human body.
- To study the gross morphology, structure and functions of nervous, respiratory, urinary and reproductive systems in the human body.
- To know about detail anatomical knowledge and outline of muscular anatomy system

**Experiment**

- Demonstration of various parts of body
- Demonstration of cell and tissues of body
- Demonstration of parts of brain
- Demonstration of various parts of appendicular skeleton system
- Demonstration of various parts of Axial skeleton system
- Demonstration of structural differences between skeletal, smooth and cardiac muscles
- Demonstration of various bones and joints.
- To study circulatory system from charts and transverse section (TS) of artery and vein.
- Demonstration of various parts of Human heart.
- To study the various endocrine gland
- To study the anatomical of peritoneum

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**HUMAN PHYSIOLOGY-1**

**Subject Code: BPHTS1-102**

**L T P C**

**Duration: 60 (Hrs.)**

**3 1 0 4**

**Course Objective:**

The course in Physiology over the first year is designed to give the student an in-depth knowledge of fundamental reactions of living organisms, particularly in the human body. The major topics covered include the following: the cell; primary tissue; connective tissue; skin; muscle; nervous tissue; blood; lymphoid tissues; respiration; blood vessels; circulation; cardiac cycle; systemic circulation; gastrointestinal tract; kidneys; uterus; urinary tract; pregnancy; endocrine system.

**Course Outcome:**

CO-1 General Physiology: Understand the basis of normal human physiology with special emphasis on the functioning of the cardiovascular, musculo-skeletal and nervous systems & its application in practice of physiotherapy.

CO-2 Nerve Physiology & Muscles Physiology: To know about detail anatomical knowledge of nervous system and outline of muscular anatomy system & its application in practice of physiotherapy.

CO-3 Bloods: Detail knowledge of different type and function of blood cells. Brief outline of cardiovascular and respiratory system & its application in practice of physiotherapy.

CO-4 Respiration: To learn and understand the skills of assessment of Breath sound, Blood pressure, Respiratory rate, Heart rate and Pulmonary Function Tests, & its application in practice of physiotherapy.

CO-5 Cardiovascular System & Exercise Physiology: How the activities of organs are integrated for maximum efficiency in Physical Activity and exercise & its application in practice of physiotherapy

CO-6 GIT: To learn and understand the skill of assessment of breath sound, blood pressure, respiratory rate, heart rate and pulmonary function test and its application in practice of physiotherapy

**Unit 1 (15 Hours)**

**General Physiology**

- Cell: Morphology. Organelles: their structure and functions
- Transport Mechanisms across the cell membrane
- Body fluids: Distribution, composition.

**Blood**

- Introduction: Composition and functions of blood.
- Plasma: Composition, formation, functions. Plasma proteins.
- RBC: count and its variations. Erythropoiesis- stages, factors regulating. Reticuloendothelial system (in brief) Haemoglobin –structure, function and derivatives Anemia (in detail), types of Jaundice. Blood indices, PCV, ESR.
- WBC: Classification. Morphology, functions, count, its variation of each. Immunity
- Platelets: Morphology, functions, count, its variations

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- Hemostatic mechanisms: Blood coagulation–factors, mechanisms. Their disorders. Anticoagulants.
- Blood Groups: Landsteiner’s law. Types, significance, determination, Erythroblastosis foetalis.
- Blood Transfusion: Cross matching. Indications and complications.
- Lymph: Composition, formation, circulation and functions.

**Unit 2 (15 Hours)**

**Nerve Muscle Physiology**

- Introduction: Resting membrane potential. Action potential – ionic basis and properties.
- Nerve: Structure and functions of neurons. Classification, Properties and impulse transmission of nerve fibers. Nerve injury – degeneration and regeneration.
- Neuroglia: Types and functions.
- Muscle: Classification. Skeletal muscle: Structure. Neuromuscular junction: Structure. Neuromuscular transmission, myasthenia gravis. Excitation- Contraction coupling. Rigor mortis.

**Cardiovascular System**

- Introduction: Physiological anatomy and nerve supply of the heart and blood vessels. Organisation of CVS. Cardiac muscles: Structure. Ionic basis of action potential and pacemaker potential. Properties.
- Conducting system: Components. Impulse conduction Cardiac Cycle: Definition. Phases of cardiac cycle. Pressure and volume curves. Heart sounds – causes, character. ECG: Definition. Different types of leads. Waves and their causes. P-R interval. Heart block.
- Cardiac Output: Definition. Normal value. Determinants. Stroke volume and its regulation. Heart rate and its regulation. Their variations
- Arterial Blood Pressure: Definition. Normal values and its variations. Determinants.
- Peripheral resistance. Regulation of BP.
- Arterial pulse.
- Shock – Definition. Classification–causes and features
- Regional Circulation: Coronary, Cerebral and Cutaneous circulation.
- Cardiovascular changes during exercise.

**Unit 3 (15 Hours)**

**Respiratory System -**

- Introduction: Physiological anatomy – Pleura, tracheo-bronchial tree, alveolus, respiratory membrane and their nerve supply. Functions of respiratory system. Respiratory muscles.
- Mechanics of breathing: Intrapleural and Intrapulmonary pressure changes during respiration. Chest expansion. Lung compliance: Normal value, pressure-volume curve, factors affecting compliance and its variations. Surfactant – Composition, production, functions. RDS
- Spirometry: Lung volumes and capacities. Timed vital capacity and its clinical significance. Maximum ventilation volume. Respiratory minute volume.
- Dead Space: Types and their definition.

- Pulmonary Circulation. Ventilation-perfusion ratio and its importance.
- Transport of respiratory gases: Diffusion across the respiratory membrane. Oxygen transport – Different forms, oxygen-haemoglobin dissociation curve. Factors affecting it. P50, Haldane and Bohr effect. Carbon dioxide transport: Different forms, chloride shift.
- Regulation of Respiration: Neural Regulation. Hering-breuer's reflex. Voluntary control. Chemical Regulation.
- Hypoxia: Effects of hypoxia. Types of hypoxia. Hyperbaric oxygen therapy. Acclimatization Hypercapnoea. Asphyxia. Cyanosis – types and features. Dysbarism
- Disorders of Respiration: Dyspnoea. Orthopnoea. Hyperpnoea, hyperventilation, apnoea, tachypnoea. periodic breathing – types Artificial respiration
- Respiratory changes during exercise.

### **Digestive System -**

- Introduction: Physiological anatomy and nerve supply of alimentary canal. Enteric nervous system
- Salivary Secretion: Saliva: Composition. Functions. Regulation. Mastication (in brief)
- Swallowing: Definition. Different stages. Function.
- Stomach: Functions. Gastric juice: Gland, composition, function, regulation. Gastrin: Production, function and regulation. Peptic ulcer. Gastric motility. Gastric emptying. Vomiting.
- Pancreatic Secretion: Composition, production, function. Regulation.
- Liver: Functions of liver. Bile secretion: Composition, functions and regulation. Gall bladder: Functions.
- Intestine: Succus entericus: Composition, function and regulation of secretion. Intestinal motility and its function and regulation.
- Mechanism of Defecation.

### **Unit 4 (15 Hours)**

#### **Endocrine System -**

- Introduction: Major endocrine glands. Hormone: classification, mechanism of action. Functions of hormones
- Pituitary Gland: Anterior Pituitary and Posterior Pituitary hormones: Secretory cells, action on target cells, regulation of secretion of each hormone. Disorders: Gigantism, Acromegaly, Dwarfism, Diabetes insipidus. Physiology of growth and development: hormonal and other influences.
- Pituitary-Hypothalamic Relationship.
- Thyroid Gland: Thyroid hormone and calcitonin: secretory cells, synthesis, storage, action and regulation of secretion. Disorders: Myxedema, Cretinism, Grave's disease.
- Parathyroid hormones: secretory cell, action, regulation of secretion. Disorders: Hypoparathyroidism. Hyperthyroidism. Calcium metabolism and its regulation.
- Adrenal Gland: Adrenal Cortex: Secretory cells, synthesis, action, regulation of secretion of Aldosterone, Cortisol, and Androgens. Disorders: Addison's disease, Cushing's syndrome, Conn's syndrome, Adrenogenital syndrome.

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- Adrenal Medulla: Secretory cells, action, regulation of secretion of adrenaline and noradrenaline. Disorders: Pheochromocytoma.
- Endocrine Pancreas: Secretory cells, action, regulation of secretion of insulin and glucagon. Glucose metabolism and its regulation. Disorder: Diabetes mellitus.
- Calcitriol, Thymus and Pineal gland (very brief).
- Local Hormones. (Briefly).

**Recommended Text Books / Reference Books:**

- Physiological basis of Medical Practice-Best and Taylor. Williams & Wilkins Co, Riverview, MI USA
- Text book of Medical Physiology- Arthur C, Guyton and John. E. Hall. Miamisburg, OH, U.S.A.
- Human Physiology (vol 1 and 2) by Dr. C.C. Chatterjee, Academic Publishers Kolkata
- Textbook of Human Histology by Inderbir Singh, Jaypee brother's medical publishers, New Delhi.
- Textbook of Practical Physiology by C.L. Ghai, Jaypee brother's medical publishers, New Delhi.
- Practical workbook of Human Physiology by K. Srinageswari and Rajeev Sharma, Jaypee brother's medical publishers, New Delhi.

**HUMAN PHYSIOLOGY – I (PRACTICAL)**

**Subject Code: BPHTS1-106**

**L T P C**

**Duration: 30 (Hrs.)**

**0 0 2 1**

**Course Objective:**

- The course in Physiology over the first year is designed to give the student an in-depth knowledge of fundamental reactions of living organisms, particularly in the human body. The major topics covered include the following: the cell; primary tissue; connective tissue; skin; muscle; nervous tissue; blood; lymphoid tissues; respiration; blood vessels; circulation; cardiac cycle; systemic circulation; gastrointestinal tract; kidneys; uterus; urinary tract; pregnancy; endocrine system.

**Course Outcome:**

- Practical classes include hematology experiments, clinical examinations, amphibian chart, and recommended demonstrations.

**Experiment**

- Hematology: To be done by the students
  - a. Study of Microscope and its uses
  - b. Determination of RBC count
  - c. Determination of WBC count
  - d. Differential leukocyte count
  - e. Estimation of hemoglobin
  - f. Calculation of blood indices
  - g. Determination of blood groups
  - h. Determination of bleeding time
  - i. Determination of clotting time
- Demonstrations only
  - j. Determination of ESR
  - k. Determination of PCV
- Amphibian Experiments – Demonstration and Dry charts Explanation. Instruments used for frog experiments. Kymograph, heart liver, Muscle trough, stimulator.
  - a. Simple muscle curve.
  - b. Effect of increasing the strength of the stimuli
  - c. Effect of temperature on muscle contraction
  - d. Effect of two successive stimuli.
  - e. Effect of Fatigue.
  - f. Effect of load on muscle contraction
  - g. Genesis of tetanus and clones.
  - h. Velocity of impulse transmission.

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**BIOCHEMISTRY**

**Subject Code: BPHTS1-103**

**L T P C**  
**3 0 0 3**

**Duration: 45 (Hrs.)**

**Course Objectives:**

Students will be able to learn the terminology of the subject and basic knowledge of basic chemistry and biochemistry involved in physiology of human body. They will be able to understand the reports generated by laboratory and shall be able to convey the surgeon about any critical alert.

**Course Outcomes:**

CO-1 Cell & Chemistry of Biomolecules: Demonstrate comprehensive understanding of biochemistry. Acquire the knowledge in biochemistry that is required to be practiced in community and at all levels of health care system.

CO-2 Carbohydrate: To Understand the carbohydrate, protein and lipid metabolism.

CO-3 Nucleic Acid: Understand relevant Nucleic Acid which will help to know about the important medical conditions.

CO-4 Vitamins (Fat & Water Soluble) & Enzymes & Hormones: Demonstrate empathy and have a human approach towards patients & respect their sensibilities.

CO-5 Nutrition & Special Topics: Understand relevant investigations which will help to know about the important medical conditions

**Unit- 1 (5 Hours)**

- Nutrition –
  - a. Introduction, Importance of nutrition Calorific values, Respiratory quotient – Definition, and its significance Energy requirement of a person - Basal metabolic rate: Definition, Normal values, factor affecting BMR Special dynamic action of food.
  - b. Physical activities - Energy expenditure for various activities. Calculation of energy requirement of a person
  - c. Balanced diet
    - i. Recommended dietary allowances
    - ii. Role of carbohydrates in diet: Digestible carbohydrates and dietary fibers
    - iii. Role of lipids in diet iv. Role of proteins in diet: Quality of proteins - Biological value, net protein utilization, Nutritional aspects of proteins-essential and non-essential amino acids. Nitrogen balance
    - iv. Nutritional disorders.
- Carbohydrate Chemistry –
  - a. Definition, general classification with examples, Glycosidic bond
  - b. Structures, composition, sources, properties and functions of Monosaccharides, Disaccharides, Oligosaccharides and Polysaccharides.
  - c. Glycosaminoglycan (mucopolysaccharides)

**Unit- 2 (10 Hours)**

- Lipid Chemistry –
  - a. Definition, general classification
  - b. Definition, classification, properties and functions of Fatty acids, Triacylglycerol,



- Phospholipids, Cholesterol
- c. Essential fatty acids and their importance
- d. Lipoproteins: Definition, classification, properties, Sources and function Ketone bodies
- Amino-acid Chemistry –
  - a. Amino acid chemistry: Definition, Classification, Peptide bonds
  - b. Peptides: Definition, Biologically important peptides
  - c. Protein chemistry: Definition, Classification, Functions of proteins,
- Enzymes –

Definition, Active site, Cofactor (Coenzyme, Activator), Proenzyme. Classification with examples, Factors effecting enzyme activity, Enzyme inhibition and significance, Isoenzymes, Diagnostic enzymology (clinical significance of enzymes)
- Nucleotide and Nucleic acid Chemistry -
  - a. Nucleotide chemistry: Nucleotide composition, functions of free nucleotides in body.
  - b. Nucleic acid (DNA and RNA) chemistry: Difference between DNA and RNA, Structure of DNA (Watson and Crick model), Functions of DNA. Structure and functions of tRNA, rRNA, mRNA.
- Digestion and Absorption -

General characteristics of digestion and absorption, Digestion and absorption of carbohydrates, proteins and lipids. Disorders of digestion and absorption – Lactose intolerance.
- Carbohydrate Metabolism -
  - a. Introduction, Glycolysis – Aerobic, Anaerobic Citric acid cycle, Substrate level phosphorylation.
  - b. Glycogen metabolism – Glycogenesis, Glycogenolysis, Metabolic disorders glycogen, Gluconeogenesis, Cori cycle
  - c. Hormonal regulation of glucose, Glycosuria, Diabetes mellitus.

**Unit 3 (15 Hours)**

- Lipid Metabolism -
  - a. Introduction to lipid metabolism, Lipolysis, Oxidation of fatty acids -oxidation of fatty acids,
  - b. Lipogenesis - Denovo synthesis of fatty acids, chain elongation, desaturation, triacylglycerol synthesis, fat metabolism in adipose tissues
  - c. Ketone body metabolism: Ketone body formation (ketogenesis), utilization (ketolysis), ketosis, Rothera's test.
  - d. Cholesterol metabolism: synthesis, degradation, cholesterol transport
  - e. Hypercholesterolemia and its effects (atherosclerosis and coronary heart diseases) Hypocholesterolemic agents, Common hyperlipoproteinemia, Fatty liver
- Amino acid and Protein Metabolism -
  - a. Catabolism of amino acids - Introduction, transamination, deamination, Fate of ammonia, transport of ammonia, Urea cycle



- b. Specialized products formed from amino acids - from glycine, arginine, methionine, phenylalanine and tyrosine.
- Vitamins -
  - a. Definition, classification according to solubility,
  - b. Individual vitamins - Sources, Coenzyme forms, functions, RDA, digestion, absorption and transport, deficiency and toxicity.
- Mineral Metabolism-

Definition, Sources, RDA, Digestion, absorption, transport, excretion, functions, disorder of Individual minerals - Calcium, phosphate, iron, Magnesium, fluoride, selenium, molybdenum, copper. Phosphate, calcium and iron in detail.
- Cell Biology -

#### **Unit 4 (15 Hours)**

Introduction, Cell structure, Cell membrane structure and function, various types of absorption. Intracellular organelles and their functions, briefly on cytoskeleton.

- Muscle Contraction -

Contractile elements in muscle, briefly on the process of muscle contraction, Energy for muscle contraction.
- Biochemistry of Connective tissue -

Introduction, various connective tissue proteins: Collagen, elastin - Structure and associated disorders. Glycoproteins, Proteoglycans.
- Hormone Action -

Definition, classification, Mechanism of hormone action. Receptors, signal transduction, second messengers and cell function.
- Acid-Base balance -

Acids, bases and buffers, pH. Buffer systems of the body, bicarbonate buffer system Role of lungs and kidneys in acid base balance, Acid base imbalance.
- Water balance -

Water distribution in the body, Body water, water turnover, Regulation of water balance: role of ADH and thirst centre.
- Electrolyte balance -
  - a. Osmolarity. Distribution of electrolytes.
  - b. Electrolyte balance: Role of aldosterone, rennin angiotensin system and ANF.
- Clinical Biochemistry -

Normal levels of blood and urine constituents, Relevance of blood and urine levels of Glucose, Urea, Uric acid, Creatinine, Calcium, Phosphates, pH and Bicarbonate. Liver function tests, Renal function tests.

#### **Recommended Text Books / Reference Books:**

1. Applied Biochemistry Professional Publications; First Edition
2. Fundamentals Of Applied Biochemistry Auris Publishing

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**SOCIOLOGY**

**Subject Code: BPHTS1-104**

**L T P C**

**Duration: 30 (Hrs.)**

**2 0 0 2**

**Course Objective:** Sociology will introduce student to the basic sociology concepts, principles and social process, social institutions in relation to the individual, family and community and the various social factors affecting the family in rural and urban communities in India will be studied.

**Course Outcome:**

- Sociology & Health – Social factors affecting Health Status, Social Consciousness & Perception of Illness, Decision Making in taking Treatment
- Socialization – Definition, Influence, of Social Factors, on Personality, Socialization in the Hospital & Rehabilitation of the patients.
- Community Role of Rural & Urban communities in Public Health, Role of community in determining Beliefs, Practices & Home Remedies in Treatment.
- Social Change, Organization: Student learns and critically evaluate the explanation of human behaviour social phenomena and social process locally and globally.
- Social Problems of the Disabled: Understanding the social problem and learning outcome of those prevailing problems affecting health care sector.

**Unit- 1 (7 Hours)**

**Introduction:**

- a. Meaning- Definition and scope of sociology
- b. Its relation to Anthropology, Psychology, Social Psychology.
- c. Methods of Sociological investigations- Case study, social survey, questionnaire, Interview and opinion poll methods.
- d. Importance of its study with special reference to Health Care Professionals.

**Social Factors in Health and disease situations:**

- a. Meaning of social factors
- b. Role of social factors in health and illness

**Socialization:**

- a. Meaning and nature of socialization.
- b. Primary, Secondary and Anticipatory socialization.
- c. Agencies of socialization.

**Unit- 2 (8 Hours)**

**Social Groups:**

Concepts of social groups, influence of formal and informal groups on health and sickness.  
The role of primary groups and secondary groups in the hospital and rehabilitation setup.

**Family:**

- a. The family, meaning and definitions.
- b. Functions of types of family
- c. Changing family patterns
- d. Influence of family on the individuals health, family and nutrition, the effects of sickness in the family and psychosomatic disease and their importance to physiotherapy.

**Community:**

- e. Rural community: Meaning and features –Health hazards of ruralities, health hazards to tribal community.
- f. Urban community: Meaning and features- Health hazards of urbanities.

**Unit- 3 (7 Hours)**

**Culture and Health:**

- g. Concept of Health
- h. Concept of Culture
- i. Culture and Health
- j. Culture and Health Disorders

**Social change:**

- k. Meaning of social changes.
- l. Factors of social changes.
- m. Human adaptation and social change
- n. Social change and stress.
- o. Social change and deviance.
- p. Social change and health programme
- q. The role of social planning in the improvement of health and rehabilitation.

**Unit 4 (8 Hours)**

Social Problems of disabled: Consequences of the following social problems in relation to sickness and disability, remedies to prevent these problems.

- a. Population explosion
- b. Poverty and unemployment
- c. Beggary
- d. Juvenile delinquency
- e. Prostitution
- f. Alcoholism
- g. Problems of women in employment
- h. Geriatric problems
- i. Problems of underprivileged.

**Social Security:**

Social security and social legislation in relation to the disabled.

**Social worker:**

- a. Meaning of Social Work
- b. The role of a Medical Social Worker.

**Recommended Text Books / Reference Books:**

- Textbook of Sociology for Physiotherapy Students by KP Neeraja
- Sociology for Physiotherapists by Dibyendunarayan Bid

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**INTRODUCTION TO HEALTHCARE DELIVERY SYSTEM IN INDIA**

**Subject Code: BPHTS1-107**

**L T P C**

**Duration: 30 (Hrs.)**

**2 0 0 2**

**Course Objective:** The course provides the students a basic insight into the main features of Indian health care delivery system and how it compares with the other systems of the world.

**Course Outcome:**

- Describe the health systems of various Countries including India
- Discuss and learn public health care system in India
- Develop, implement and manage various public health programs
- Critically analyze the various components of health care delivery system in India
- Apply various principles of planning and management in implementing health projects and programmes.
- Recognize the various sections of healthcare legislations in India and initiate appropriate actions in public health practice
- Describe the principles, history and methods of epidemiological studies

**Unit 1 (10 Hours)**

- Introduction to healthcare delivery system
  - a. Healthcare delivery system in India at primary, secondary and tertiary care
  - b. Community participation in healthcare delivery system
  - c. Health system in developed countries.
  - d. Private Sector
  - e. National Health Mission
  - f. National Health Policy
  - g. Issues in Health Care Delivery System in India
- National Health Programme- Background objectives, action plan, targets, operations, achievements and constraints in various National Health Programme.

**Unit 2 (5 Hours)**

- Introduction to AYUSH system of medicine
  - a. Introduction to Ayurveda.
  - b. Naturopathy
  - c. Unani
  - d. Siddha
  - e. Homeopathy
  - f. Need for integration of various system of medicine
- Health scenario of India- past, present and future

**Unit 3 (10 Hours)**

- Demography & Vital Statistics-
  - a. Demography – its concept
  - b. Vital events of life & its impact on demography
  - c. Significance and recording of vital statistics
  - d. Census & its impact on health policy

**Unit 4 (5 Hours)**

- Epidemiology
  - a. Principles of Epidemiology
  - b. Natural History of disease
  - c. Methods of Epidemiological studies
  - d. Epidemiology of communicable & non-communicable diseases, disease transmission, host defense immunizing agents, cold chain, immunization, disease monitoring and surveillance.

**Recommended Text Books / Reference Books:**

Model Curriculum – General Duty Assistant. NSQF level 4, HSS/Q5101. Healthcare Sector Skill Council.

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**BASIC COMPUTER AND INFORMATION SCIENCE**

**Subject Code: BPHTS1-108**

**L T P C**

**Duration: 15 (Hrs.)**

**1 0 0 1**

**Course Objective:** The students will be able to appreciate the role of computer technology. The course has focus on computer organization, computer operating system and software, and MS windows, Word processing, Excel data worksheet and PowerPoint presentation.

**Course Outcome:**

Upon completion of the course the student shall be able to

- Know the various types of application of computers.
- Know the various types of databases
- Know the various applications of databases
- Knows the computer network

**Unit 1 (2 Hours)**

**Introduction to computer:** Introduction, characteristics of computer, block diagram of computer, generations of computer, computer languages.

**Input output devices:** Input devices(keyboard, point and draw devices, data scanning devices, digitizer, electronic card reader, voice recognition devices, vision-input devices), output devices(monitors, pointers, plotters, screen image projector, voice response systems).

**Processor and memory:** The Central Processing Unit (CPU), main memory.

**Unit 2 (3 Hours)**

**Storage Devices:** Sequential and direct access devices, magnetic tape, magnetic disk, optical disk, mass storage devices.

**Introduction of windows:** History, features, desktop, taskbar, icons on the desktop, operation with folder, creating shortcuts, operation with windows (opening, closing, moving, resizing, minimizing and maximizing, etc.).

**Introduction to MS-Word:** introduction, components of a word window, creating, opening and inserting files, editing a document file, page setting and formatting the text, saving the document, spell checking, printing the document file, creating and editing of table, mail merge.

**Unit 3 (5 Hours)**

**Introduction to Excel:** introduction, about worksheet, entering information, saving workbooks and formatting, printing the worksheet, creating graphs.

**Introduction to power-point:** introduction, creating and manipulating presentation, views, formatting and enhancing text, slide with graphs.

**Unit 4 (5 Hours)**

**Introduction of Operating System:** introduction, operating system concepts, types of operating system.

**Computer networks:** introduction, types of network (LAN, MAN, WAN, Internet, Intranet), network topologies (star, ring, bus, mesh, tree, hybrid), components of network.

**Internet and its Applications:** definition, brief history, basic services (E-Mail, File Transfer Protocol, telnet, the World Wide Web (WWW)), www browsers, use of the internet. Application of Computers in clinical settings.

**Recommended Text Books / Reference Books:**

- Bioinformatics (Concept, Skills and Applications) – S.C.Rastogi-CBS Publishers and Distributors, 4596/1- A, 11 Darya Gani, New Delhi – 110 002(INDIA)
- Microsoft office Access - 2003, Application Development Using VBA, SQL Server, DAP and Infopath – Cary N.Prague – Wiley Dreamtech India (P) Ltd., 4435/7, Ansari Road, Daryagani, New Delhi - 110002

**BASIC COMPUTER AND INFORMATION SCIENCE PRACTICAL**

**Subject Code: BPHTS1-109**

**L T P C**

**Duration: 30 (Hrs.)**

**0 0 2 1**

**Course Objective:** The students will be able to appreciate the role of computer technology. The course has focus on computer organization, computer operating system and software, and MS windows, Word processing, Excel data worksheet and PowerPoint presentation.

**Course Outcome:**

Upon completion of the course the student shall be able to

- Know the various types of application of computers.
- Know the various types of databases
- Know the various applications of databases
- Knows the computer network

**Experiment**

- Learning to use MS office: MS word, MS PowerPoint, MS Excel.
- To install different software.
- Data entry efficiency



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**ENGLISH, COMMUNICATION AND SOFT SKILLS**

**Subject Code: BPHTS1-110**

**L T P C**

**Duration: 15 (Hrs.)**

**1 0 0 1**

**Course Objective**

- The students will be able to appreciate communication skills as these are important to everyone - those are how we give and receive information and convey our ideas and opinions with those around us.
- The topic shall also include the 'Soft skills' which is a term often associated with a person's "EQ" (Emotional Intelligence Quotient) which is an important part of their individual contribution to the success of an organization.

**Course Outcome**

- Projecting the first impression
- Use simple forms of polite expressions to establish basic social contact and to perform everyday functions including making requests and offers, conducting simple phone conversations, asking and telling time, giving simple directions, asking about price, ordering a meal, etc.
- Students learn to use general, social and professional language.
- Polishing manners to behave appropriately in social and professional circles.
- Handling difficulty situations with grace style and professionalism

**UNIT-1 (3 Hrs)**

Basic Language Skills: Grammar and Usage.

Business Communication Skills with focus on speaking - Conversations, discussions, dialogues, short presentations, pronunciation.

**UNIT-2 (2 Hrs)**

Teaching the different methods of writing like letters, E-mails, report, case study, collecting the patient data etc. Basic compositions, journals, with a focus on paragraph form and organization.

Basic concepts & principles of good communication

**UNIT-3 (5 Hrs)**

Special characteristics of health communication

Types & process of communication

Barriers of communication & how to overcome.

**UNIT-4 (5 Hrs)**

Soft Skills - with important sub-elements:

- i. Communication Styles
- ii. Team work
- iii. Leadership Skills
- iv. Effective & Excellent Customer Service
- v. Decision Making & Problem Solving
- vi. Managing Time and Pressures
- vii. Self-Management & Attitude.

**Recommended Text Books / Reference Books:**

- Effective Communication and Soft Skills by Nitin Bhatnagar Pearson Education India, 2011
- Communication N Soft Skills Paperback – 2013 by Niraj Kumar, Chetan Srivastava

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**ENGLISH, COMMUNICATION AND SOFT SKILLS PRACTICAL**

**Subject Code: BPHTS1-111**

**L T P C**

**Duration: 30 (Hrs.)**

**0 0 2 1**

**Course Objective**

- The students will be able to appreciate communication skills as these are important to everyone - those are how we give and receive information and convey our ideas and opinions with those around us.
- The topic shall also include the 'Soft skills' which is a term often associated with a person's "EQ" (Emotional Intelligence Quotient) which is an important part of their individual contribution to the success of an organization.

**Course Outcome**

- Projecting the first impression
- Use simple forms of polite expressions to establish basic social contact and to perform everyday functions including making requests and offers, conducting simple phone conversations, asking and telling time, giving simple directions, asking about price, ordering a meal, etc.
- Students learn to use general, social and professional language.
- Polishing manners to behave appropriately in social and professional circles.

Handling difficulty situations with grace style and professionalism

**Experiment**

1. Basic Language Skills: Grammar and Usage.
2. Business Communication Skills. With focus on speaking - Conversations, discussions, dialogues, short presentations, pronunciation.
3. Teaching the different methods of writing like letters, E-mails, report, case study, collecting the patient data etc. Basic compositions, journals, with a focus on paragraph form and organization.
4. Basic concepts & principles of good communication
5. Special characteristics of health communication
6. Types & process of communication – verbal, non-verbal and written communication. Upward, downward and lateral communication.
7. Therapeutic communication: empathy versus sympathy.
8. Communication methods for teaching and learning.
9. Communication methods for patient education.
10. Barriers of communication & how to overcome.

**INTRODUCTION TO YOGA- BASIC THEORY, SCIENCE AND TECHNIQUES**

**Subject Code: BPHTS1-112**

**L T P C**

**Duration: 15 (Hrs.)**

**1 0 0 1**

**Course Objective:**

Class incorporates yoga postures, gentle movement sequences, breath work, supported silent meditation, and guided relaxation to support increased awareness and mindfulness of the breath and body, and quieting of the nervous system.

**Course Outcome:**

- Knows the Yoga and its types,
- Know the yoga its physiological and Psycho-somatic effects
- Know the physiological effect of yoga practice
- To demonstrate standard yoga postures used by the beginners.

**UNIT 1 (5 Hours)**

**Foundations of Yoga**

- Introduction to Yoga and its philosophy
- Brief history, development of Yoga
- Philosophical foundations of Yoga
- Streams & types of Yoga

**UNIT 2 (5 Hours)**

**Yoga and Health**

- Concept of body in yoga – Panchakosha theory
- Concept of Health and Disease in yoga
- Stress management through yoga
- Disease prevention and promotion of positive health through yoga

**UNIT 3 (5 Hours)**

**Physiological effects of Yoga practices**

- Physiological effects of Shat kriyas
- Physiological effects of Asanas
- Physiological effects of Pranayamas
- Physiological effects of Relaxation techniques and Meditation

**Recommended Text Books / Reference Books:**

- The yoga sutras of patanjali by sri swami satchidananda
- Eastern body, western mind by anodea Judith

**INTRODUCTION TO YOGA- BASIC THEORY, SCIENCE AND TECHNIQUES  
PRACTICAL**

**Subject Code: BPHTS1-113**

**L T P C**  
**0 0 2 1**

**Duration: 30 (Hrs.)**

**Course Objective:**

Class incorporates yoga postures, gentle movement sequences, breath work, supported silent meditation, and guided relaxation to support increased awareness and mindfulness of the breath and body, and quieting of the nervous system.

**Course Outcome:**

- Knows the Yoga and its types,
- Know the yoga its physiological and Psycho-somatic effects
- Know the physiological effect of yoga practice
- To demonstrate standard yoga postures used by the beginners.

**List of Practical / Demonstrations**

- Sukshma Vyayama/ Sithilikarna Vyayama and Surya Namaskar)
- Loosening exercises of each part of the body particularly of the joints
- 12 step Surya namaskar with prayer and specific mantras
  
- Yogic kriyas [Observation/ demonstration only] (3 hours)
- Neti (Jala Neti, Sutra Neti)
- Dhauti (Vamana Dhauti, Vastra Dhauti)
- Trataka
- Shankaprakshalana (Laghu & Deergha)
- Yogasanas
  
- Standing postures
  - i. Tadasana (Upward stretch posture)
  - ii. Ardha Chakrasana (Half wheel posture)
  - iii. Ardha Katicakrasana (Half lumber wheel posture)
  - v. Utkatasana (Chair posture)
  - vi. Pada Hastasana (Hand to toes posture)
  - vii. Trikonasana (Triangle posture)
  - viii. Parshva Konasana (Side angle posture)
  - ix. Garudasana (Eagle posture)
  - x. Vrikshasana (Tree posture)
  
- Prone positions
  - i. Makarasana (Crocodile posture)
  - ii. Bhujangasana (Cobra posture)
  - iii. Salabhasana (Locust posture)
  - iv. Dhanurasana (Bow posture)
  - v. Naukasana (Boat posture)
  - vi. Marjalarasana (Cat posture)

- Supine postures
  - i. Ardha halasana/ Uttana Padasana
  - ii. Sarvangasana (All limb posture)
  - iii. Pawana muktasana (Wind releasing posture)
  - iv. Matsyasana (Fish posture)
  - v. Halasana (Plough posture)
  - vi. Chakrasana (Wheel posture)
  - vii. Setu Bandhasana (Bridge posture)
  - viii. Shavasana (Corpse posture)
- Sitting postures
  - i. Parvatasana (Mountain posture)
  - ii. Bhadrasana (Gracious posture)
  - iii. Vajrasana (Adamantine posture)
  - iv. Paschimottanasana (Back stretching posture)
  - v. Janushirasana (Head to knee posture)
  - vi. Simhasana (Lion posture)
  - vii. Gomukhasana (Cow head posture)
  - viii. Ushtrasana (Camel posture)
  - ix. Ardha Matsyendrasana (Half matsyendra spine twist posture)
  - x. Vakrasana (Spinal twist posture)
  - xi. Kurmasana (Turtle posture)
  - xii. Shashankasana (Rabbit posture)
  - xiii. Mandukasana (Frog Posture)
- Meditative postures and Meditation techniques
  - i. Siddhasana (Accomplished pose)
  - ii. Padmasana (Lotus posture)
  - iii. Samasana
  - iv. Swastikasana (Auspicious posture)
- Pranayamas
  - i. The practice of correct breathing and Yogic deep breathing
  - ii. Kapalabhati
  - iii. Bhastrika
  - iv. Sitali
  - v. Sitkari
  - vi. Sadanta
  - vii. Ujjayi
  - viii. Surya Bhedana
  - ix. Chandra Bhedana
  - x. Anuloma-Viloma/Nadishodana
  - xi. Bhramari

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- Relaxation Techniques (2 hours)
  - i. Shavasana
  - ii. Yoga Nidra

**COMMUNITY ORIENTATION AND CLINICAL VISIT**

**Subject Code: BPHTS1-115**

L	T	P	C
0	0	4	2

**Duration: 60 (Hrs.)**

**Course Objective:**

The objective of this particular section of the foundation course is to sensitize potential learners with essential knowledge; this will lay a sound foundation for their learning across the under-graduate program and across their career. Innovative teaching methods should be used to ensure the attention of a student and make them more receptive such as group activities, interactive fora, role plays, and clinical bed-side demonstrations.

1. The community orientation and clinical visit will include visit to the entire chain of healthcare delivery system -Sub centre, PHC, CHC, SDH, DH and Medical College, private hospitals, dispensaries and clinics.
2. The student will also be briefed regarding governance at village level including interaction and group discussion with village panchayat and front line health workers.
3. Clinical visit to their respective professional department within the hospital.

# **SECOND SEMESTER**



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**HUMAN ANATOMY-2 (INCLUDING APPLIED ANATOMY)**

**Subject Code: BPHTS1-201**

**L T P C**  
**3 1 0 4**

**Duration: 60 (Hrs.)**

**Course Objective:**

- Studies are concerned with the topographical and functional anatomy of the limbs and thorax. Particular attention is paid to the muscles, bones and joints of the regions. The head and neck and central nervous system (CNS) are studied with particular reference to topics of importance to physiotherapists. The study of the CNS includes detailed consideration of the control of motor function.

**Course Outcome:**

- Demonstrate knowledge of general overall anatomically principles associated with Musculo Skelton anatomy, lower extremity Neuro anatomy program region.

**Unit 1 (15 Hours)**

- Musculo Skeletal Anatomy - (All the topics to be taught in detail)
  - a. Anatomical positions of body, axes, planes, common anatomical terminologies (Groove, tuberosity, trochanters etc)
  - b. Connective tissue classification.
  - c. Bones- Composition & functions, classification and types according to morphology and development.
  - d. Joints-definition-classification, structure of fibrous, cartilaginous joints, blood supply and nerve supply of joints.
  - e. Muscles – origin, insertion, nerve supply and actions.
  - f. Upper Extremity
    - i. Osteology: Clavicles, Scapula, Humerus, Radius, Ulna, Carpals, Metacarpals, Phalanges.
    - ii. Soft parts: Breast, pectoral region, axilla, front of arm, back of arm, cubital fossa, front of fore arm, back of fore arm, palm, dorsum of hand, muscles, nerves, blood vessels and lymphatic drainage of upper extremity.
    - iii. Joints: Shoulder girdle, shoulder joint, elbow joints, radio ulnar joint, wrist joint and joints of the hand.
    - iv. Arches of hand, skin of the palm and dorsum of hand.

**Unit 2 (15 Hours)**

- Lower Extremity
  - i. Osteology: Hip bone, femur, tibia, fibula, patella, tarsals, metatarsals and phalanges.
  - ii. Soft parts: Gluteal region, front and back of the thigh (Femoral triangle, femoral canal and inguinal canal), medial side of the thigh (Adductor canal), lateral side of the thigh, popliteal fossa, anterior and posterior compartment of leg, sole of the foot, lymphatic drainage of lower limb, venous drainage of the lower limb, arterial supply of the lower limb, arches of foot, skin of foot.
  - iii. Joints: Hip Joint, Knee joint, Ankle joint, joints of the foot.

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- Trunk & Pelvis:
- Osteology: Cervical, thoracic, lumbar, sacral and coccygeal vertebrae and ribs.
  - i. Soft tissue: Pre and Para vertebral muscles, intercostals muscles, anterior abdominal wall muscles, Inter-vertebral disc.
  - ii. Pelvic girdle and muscles of the pelvic floor.
- Head and Neck:
  - i. Osteology: Mandible and bones of the skull.
  - ii. Soft parts: Muscles of the face and neck and their nerve and blood supply-extra ocular muscles, triangles of the neck.
  - iii. Gross anatomy of eyeball, nose, ears and tongue.

**Unit 3 (15 Hours)**

- Neuro Anatomy - Organization of Central Nervous system - Spinal nerves and autonomic nervous system mainly pertaining to cardiovascular, respiratory and urogenital system
  - i. Cranial nerves
  - ii. Peripheral nervous system
  - iii. Peripheral nerve
  - iv. Neuromuscular junction
  - v. Sensory end organs
  - vi. Central Nervous System
  - vii. Spinal segments and areas
  - viii. Brain Stem

**Unit 4 (15 Hours)**

- i. Cerebellum
- ii. Inferior colliculi
- iii. Superior Colliculi
- iv. Thalamus
- v. Hypothalamus
- vi. Corpus striatum
- vii. Cerebral hemisphere
- viii. Lateral ventricles
- ix. Blood supply to brain
- x. Basal Ganglia
- xi. The pyramidal system
- xii. Pons, medulla, extra pyramidal systems
- xiii. Anatomical integration

**Recommended Text Books / Reference Books:**

- Ross and Wilson, 'Anatomy & Physiology.
- Clark, 'Anatomy and Physiology: Understanding the Human Body'.
- Pearce, 'Human Anatomy for Nurses.

**HUMAN ANATOMY-2 (INCLUDING APPLIED ANATOMY) - PRACTICAL**

**Subject Code: BPHTS1-205**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>0</b>	<b>0</b>	<b>6</b>	<b>3</b>

**Duration: 90 (Hrs.)**

**List of Practical / Demonstrations**

- Upper extremity including surface Anatomy.
- Lower extremity including surface Anatomy.
- Head & Spinal cord and Neck and Brain including surface Anatomy.
- Thorax including surface anatomy, abdominal muscles.
- Histology-Elementary tissue including surface Anatomy.
- Embryology-models, charts & X-rays.

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**HUMAN PHYSIOLOGY-2 (INCLUDING APPLIED PHYSIOLOGY)**

**Subject Code: BPHTS1-202**

**L T P C**  
**3 1 0 4**

**Duration: 60 (Hrs.)**

**Course Objective:**

- The course in Physiology over the first year is designed to give the student an in-depth knowledge of fundamental reactions of living organisms, particularly in the human body.
- The major topics covered include the following the cell; primary tissue; connective tissue; skin; muscle; nervous tissue; blood; lymphoid tissues; respiration; blood vessels; circulation; cardiac cycle; systemic circulation; gastrointestinal tract; kidneys; uterus; urinary tract; pregnancy; endocrine system.

**Course Outcome:**

- Describe the physiological & Therapeutic uses, merits /demerits of various exercise modes.
- Demonstrate various therapeutic exercises on self & acquire the application skill on models.
- Acquire the skill of assessment of isolated & group muscle strength, & Range of motion of the joints subjectively & objectively.
- Describe the pattern of normal and abnormal movements of various joints and activities

**UNIT 1 (20 Hours)**

- Special Senses -
  - a. Vision: Introduction: Functional anatomy of eye ball. Functions of cornea, iris, pupil, aqueous humor – glaucoma, lens – cataract, vitreous humor, rods and cones. Photopic vision. Scotopic vision.
  - b. Visual Pathway and the effects of lesions.
  - c. Refractive Errors: myopia, hypermetropia, presbyopia and astigmatism.
  - d. Visual Reflexes: Accommodation, Pupillary and Light. Visual acuity and Visual field. Light adaptation. Dark adaptation.
  - e. Color vision – color blindness. Nyctalopia.
  - f. Audition: Physiological anatomy of the ear. Functions of external ear, middle ear and inner ear. Structure of Cochlea and organ of corti. Auditory pathway. Types of Deafness. Tests for hearing. Audiometry.
  - g. Taste: Taste buds. Primary tastes. Gustatory pathway.
  - h. Smell: Olfactory membrane. Olfactory pathway.
  - i. Vestibular Apparatus: Crista ampullaris and macula. Functions. Disorders
- Nervous System -
  - a. Introduction: Organisation of CNS – central and peripheral nervous system. Functions of nervous system. Synapse: Functional anatomy, classification, Synaptic transmission. Properties.
  - b. Sensory Mechanism: Sensory receptors: function, classification and properties. Sensory pathway: The ascending tracts – Posterior column tracts, lateral

- spinothalamic tract and the anterior spinothalamic tract – their origin, course, termination and functions. The trigeminal pathway. Sensory cortex. Somatic sensations: crude touch, fine touch, tactile localization, tactile discrimination, stereognosis, vibration sense, kinesthetic sensations. Pain sensation: mechanism of pain. Cutaneous pain –slow and fast pain, hyperalgesia. Deep pain. Visceral pain – referred pain. Gate control theory of pain. tabes dorsalis, sensory ataxia.
- c. Motor Mechanism: Motor Cortex. Motor pathway: The descending tracts – pyramidal tracts, extrapyramidal tracts – origin, course, termination and functions. Upper motor neuron and lower motor neuron. Paralysis, monoplegia, paraplegia, hemiplegia and quadriplegia.
  - d. Reflex Action: components, Bell-Magendie law, classification and Properties. Monosynaptic and polysynaptic reflexes, superficial reflexes, deep reflexes. Stretch reflex– structure of muscle spindle, pathway, higher control and functions. Inverse stretch reflex. Muscle tone – definition, and properties hypotonia, atonia and hypertonia. UMNL and LMNL
  - e. Spinal cord Lesions: Complete transection and Hemisection of the spinal cord.
  - f. Cerebellum: Functions, Cerebellar ataxia.
  - g. Posture and Equilibrium: Postural reflexes – spinal, medullary, midbrain and cerebral reflexes.
  - h. Thalamus and Hypothalamus: Nuclei. Functions. Thalamic syndrome
  - i. Reticular Formation and Limbic System: Components and Functions.
  - j. Basal Ganglia: Structures included and functions. Parkinson's disease.
  - k. Cerebral Cortex: Lobes. Brodmann's areas and their functions. Higher functions of cerebral cortex – learning, memory and speech.
  - l. EEG: Waves and features. Sleep: REM and NREM sleep.
  - m. CSF: Formation, composition, circulation and functions. Lumbar puncture and its significance. Blood brain barrier. Hydrocephalus.
  - n. ANS: Features and actions of parasympathetic and sympathetic nervous system.

## **UNIT 2 (20 Hours)**

- Renal System -
  - a. Introduction: Physiological anatomy. Nephrons – cortical and juxtamedullary. Juxtaglomerular apparatus. Glomerular membrane. Renal blood flow and its regulation. Functions of kidneys.
  - b. Mechanism of Urine Formation: Glomerular Filtration: Mechanism of glomerular filtration. GFR – normal value and factors affecting. Renal clearance. Inulin clearance. Creatinine clearance.
  - c. Tubular Reabsorption: Reabsorption of Na<sup>+</sup>, glucose, HCO<sub>3</sub><sup>-</sup>, urea and water. Filtered load. Renal tubular transport maximum. Glucose clearance: T<sub>m</sub>G. Renal threshold for glucose.
  - d. Tubular Secretion: Secretion of H<sup>+</sup> and K<sup>+</sup>. PAH clearance.

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- e. Mechanism of concentrating and diluting the Urine: Counter-current mechanism. Regulation of water excretion. Diuresis. Diuretics.
- f. Micturition: Mechanism of micturition. Cystometrogram. Atonic bladder, automatic bladder.
- g. Acid-Base balance (very brief)
- h. Artificial Kidney: Principle of hemodialysis.
- i. Skin and temperature regulation.
- Reproductive System -
  - a. Introduction: Physiological anatomy reproductive organs. Sex determination. Sex differentiation. Disorder
  - b. Male Reproductive System: Functions of testes. Pubertal changes in males. Spermatogenesis. Testosterone: action. Regulation of secretion. Semen.
  - c. Female Reproductive System: Functions of ovaries and uterus. Pubertal changes in females. Oogenesis. Hormones: estrogen and progesterone-action. Regulation of secretion. Menstrual Cycle: Phases. Ovarian cycle. Uterine cycle. Hormonal basis. Menarche. Menopause. Pregnancy: Pregnancy tests. Physiological changes during pregnancy. Functions of placenta. Lactation. Contraception methods
- Physiology of exercise –
  - a. Effects of acute and chronic exercise on
    - i. O<sub>2</sub> transport
    - ii. Muscle strength/power/endurance
    - iii. B.M.R. /R.Q.
    - iv. Hormonal and metabolic effect
    - v. Cardiovascular system
    - vi. Respiratory system
    - vii. Body fluids and electrolyte
  - b. Effect of gravity / altitude /acceleration / pressure on physical parameters
  - c. Physiology of Age
- Applied Physiology -

More detailed study of the physiology and practical applications of the following selected topics with emphasis on aspects, which should help in understanding the nature and treatment of common clinical situations of interest in Physiotherapy.

**UNIT 3 (10 Hours)**

- Pulmonary Functions
  - a. Properties of gases, Mechanics of respiration, Diffusion capacity, special features of pulmonary circulation and their application.
  - b. Respiratory adjustments in exercises.
  - c. Artificial respiration
  - d. Breath sounds.

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- Cardio vascular Functions
  - a. Blood flow through arteries, arterioles, capillaries, veins and venuoles.
  - b. Circulation of Lymph, Oedema
  - c. Factors affecting cardiac output.
  - d. Circulatory adjustment in exercise and in postural and gravitational changes,
  - e. Pathophysiology of fainting and heart failure.

**UNIT 4 (10 Hours)**

- Muscles and Nervous System Functions
  - a. Peripheral nervous system, neuromuscular transmission, Types of nerve fibers.
  - b. Action potential, Strength-duration curve, ECG, EMG, VEP, NCV
  - c. Degeneration and regeneration of nerve, Reactions of denervations.
  - d. Synaptic transmission, Stretch reflex- Mechanism and factors affecting it.
  - e. Posture, Balance and Equilibrium/Coordination of voluntary movement.
  - f. Voluntary motor action, clonus, Rigidity, incoordination.
  - g. Special senses- Vision, taste, hearing, vestibular, Olfaction
  - h. Sympathetic and Parasympathetic regulation, Thermoregulation.
- Blood functions
  - a. Thalassemia Syndrome, Hemophilia, VWF
  - b. Anemia, Leukocytosis
  - c. Bone marrow transplant
- Metabolic Functions
  - a. Diabetes Mellitus, Physiological basis of Peptic Ulcer, Jaundice, GIT disorders and Dietary fiber, Thyroid functions, Vitamins deficiency.

**Recommended Text Books / Reference Books:**

- Physiological basis of Medical Practice-Best and Tailor. Williams & Wilkins Co, Riverview, MI USA
- Text book of Medical Physiology- Arthur C, Guyton and John. E. Hall. Miamisburg, OH, U.S.A.
- Human Physiology (vol 1 and 2) by Dr. C.C. Chatterrje ,Academic Publishers Kolkata
- Textbook of Human Histology by Inderbir Singh, Jaypee brother's medical publishers, New Delhi.
- Textbook of Practical Physiology by C.L. Ghai, Jaypee brother's medical publishers, New Delhi.
- Practical workbook of Human Physiology by K. Srinageswari and Rajeev Sharma, Jaypee brother's medical publishers, New Delhi.

**HUMAN PHYSIOLOGY-2 (INCLUDING APPLIED PHYSIOLOGY) - PRACTICAL**

**Subject Code: BPHTS1-206**

L	T	P	C
0	0	4	2

**Duration: 60 (Hrs.)**

**Clinical Examination**

- Examination of Radial pulse.
- Recording of blood pressure
- Examination of CVS
- Examination of Respiratory system
- Examination of Sensory system
- Examination of Motor System
- Examination of reflexes
- Examination of cranial nerves

**Amphibian Experiments – Demonstration and Dry charts Explanation.**

- Normal cardiogram of amphibian heart.
- Properties of Cardiac muscle
- Effect of temperature on cardiogram.

**Recommended Demonstrations**

- Spirometry
- Artificial Respiration
- ECG
- Perimetry
- Mosso's Ergometry



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**GENERAL AND CLINICAL PSYCHOLOGY**

**Subject Code: BPHTS1-203**

**L T P C**  
**2 1 0 3**

**Duration: 45 (Hrs.)**

**Course Objective:**

- Human Psychology involves the study of various behavioral patterns of individuals, theories of development, normal and abnormal aspects of motor, social, emotional and language development, communication and interaction skills appropriate to various age groups.

**Course Outcome:** The Course outcome is to know about the

- Psychosocial assessment of patients in various developmental stages.
- Explain the concept of stress and its relationship to health, sickness and one's profession.
- Identify ego defense mechanisms and learn counseling techniques to help those in need.
- Help them to understand the reason of non – compliance among patients and improve compliance behavior.
- Help them gain insight into the applications of psychology in the field of Physiotherapy

**UNIT 1 (15 Hours)**

- Introduction to Psychology
  - a. Schools: Structuralism, functionalism, behaviorism, Psychoanalysis.
  - b. Methods: Introspection, observation, inventory and experimental method.
  - c. Branches: pure psychology and applied psychology
  - d. Psychology and physiotherapy
- Growth and Development
  - a. Life span: Different stages of development (Infancy, childhood, adolescence, adulthood, middle age, old age).
  - b. Heredity and environment: role of heredity and environment in physical and psychological development, "Nature v/s Nurture controversy".
- Sensation, attention and perception
  - a. Sensation: Vision, Hearing, Olfactory, Gustatory and Cutaneous sensation, movement, equilibrium and visceral sense.
  - b. Attention: Types of attention, Determinants of attention (subjective determinants and objective determinants).
  - c. Perception: Gestalt principles of organization of perception (principle of figure ground and principles of grouping), factors influencing perception (past experience and context).
  - d. Illusion and hallucination: different types.
- Motivation
  - a. Motivation cycle (need, drive, incentive, reward).
  - b. Classification of motives.
  - c. Abraham Maslow's theory of need hierarchy

**UNIT 2 (15 Hours)**

- Frustration and conflict
  - a. Frustration: sources of frustration.
  - b. Conflict: types of conflict.
  - c. Management of frustration and conflict
- Emotions
  - a. Three levels of analysis of emotion (physiological level, subjective state, and overt behavior).
  - b. Theories of emotion
  - c. Stress and management of stress.
- Intelligence
  - a. Theories of intelligence.
  - b. Distribution of intelligence.
  - c. Assessment of intelligence
- Thinking
  - a. Reasoning: deductive and inductive reasoning
  - b. Problem solving: rules in problem solving (algorithm and heuristic)
  - c. Creative thinking: steps in creative thinking, traits of creative people

**UNIT 3 (15 Hours)**

- Learning
  - a. Factors effecting learning.
  - b. Theories of learning: trial and error learning, classical conditioning, Operant conditioning, insight learning, social learning theory.
  - c. The effective ways to learn: Massed/Spaced, Whole/Part, Recitation/Reading, Serial/Free recall, Incidental/Intentional learning, Knowledge of results, association, organization, and mnemonic methods.
- Personality
  - a. Approaches to personality: type & trait, behavioristic, psychoanalytic and humanistic approach.
  - b. Personality assessment: observation, situational test, questionnaire, rating scale, interview, and projective techniques.
  - c. Defense Mechanisms: denial of reality, rationalization, projection, reaction formation, identification, repression, regression, intellectualization, undoing, introjection, acting out.
- Social psychology
  - a. Leadership: Different types of leaders. Different theoretical approaches to leadership.
  - b. Attitude: development of attitude. Change of attitude.
- Clinical psychology – Models of training, abnormal behavior assessment, clinical judgment, psychotherapy, self-management methods, physiotherapist patient interaction, aggression, self imaging, stress management, assertive training, Group therapy, Body awareness, Pediatric, child and geriatric clinical psychology.

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**Recommended Text Books / Reference Books:**

- Morgan & King, Introduction to Psychology, 3rd Ed, 1994
- Sachdeva D.R. & Bhushan. V, An introduction to Sociology, Kitab Mahal Limited, 1974.
- Clifford T. Morgan – Introduction to Psychology, ELBS, 2 Ed, 1990
- Hilgard & Atkinson - Introduction to Psychology, CBS, 3 Ed, 1994
- Madan. G.R. Indian Social Problems, Vol.1, Chennai Applied Publications, 1973.

**GENERAL AND CLINICAL PSYCHOLOGY - PRACTICAL**

**Subject Code: BPHTS1-207**

L	T	P	C
0	0	2	1

**Duration: 30 (Hrs.)**

**Experiment**

- Pain assessment
- Psychological approach to pain management
- Cognitive reconceptualising pain
- Relaxation Therapy
- Behavioural Therapy
- Electromyography (EMG)
- Thermal biofeedback
- Neurofeedback/ electroencephalography (EEG)
- Electrodermography (EDG)

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**BASIC PRINCIPLES OF BIOMECHANICS**

**Subject Code: BPHTS1-204**

**L T P C**  
**2 1 0 3**

**Duration: 45 (Hrs.)**

**Course Objective:**

- Biomechanics involves the study of basic concepts of human movement, and application of various biomechanical principles in the evaluation and treatment of disorders of musculoskeletal system. Students are taught to understand the various quantitative and qualitative methods of movement. Mechanical principles of various treatment methods are studied. Study of posture and gait are also included.

**Course Outcome:**

- Correctly apply fundamental human movement principles, from both natural and social science perspectives, to a variety of contexts and populations
- Demonstrate an applied understanding of the form and function of the human body
- Critically evaluate human movement research in order to design and implement activities to confirm/generate disciplinary knowledge

**UNIT 1 (15 Hours)**

- Basic Concepts in Biomechanics: Kinematics and Kinetics
  - a. Types of Motion
  - b. Location of Motion
  - c. Direction of Motion
  - d. Magnitude of Motion
  - e. Definition of Forces
  - f. Force of Gravity
  - g. Reaction forces
  - h. Equilibrium
  - i. Objects in Motion
  - j. Force of friction
  - k. Concurrent force systems
  - l. Parallel force system
  - m. Work
  - n. Moment arm of force
  - o. Force components
  - p. Equilibrium of levers

**UNIT 2 (10 Hours)**

- Joint structure and Function -
  - a. Joint design
  - b. Materials used in human joints
  - c. General properties of connective tissues
  - d. Human joint design
  - e. Joint function
  - f. Joint motion
  - g. General effects of disease, injury and immobilization.

**UNIT 3 (10 Hours)**

- Muscle structure and function -
  - a. Mobility and stability functions of muscles
  - b. Elements of muscle structure
  - c. Muscle function
  - d. Effects of immobilization, injury and aging

**UNIT 4 (10 Hours)**

- Biomechanics of the Thorax and Chest wall -
  - a. General structure and function
  - b. Rib cage and the muscles associated with the rib cage
  - c. Ventilatory motions: its coordination and integration
  - d. Developmental aspects of structure and function
  - e. Changes in normal structure and function I relation to pregnancy, scoliosis and COPD
- The Temporomandibular Joint-
  - a. General features, structure, function and dysfunction

**Recommended Text Books / Reference Books:**

- Basics Biomechanics, Susan J hall, 1<sup>st</sup> edition 1995
- A textbook of Biomechanics, singh arunjith, Singh pritpal 1<sup>st</sup> edition 2013

**BASIC PRINCIPLES OF BIOMECHANICS - PRACTICAL**

**Subject Code: BPHTS1-208**

L	T	P	C
0	0	2	1

**Duration: 30 (Hrs.)**

**Experiment**

1. Goniometry – measurement of joint ROM
2. Identify Muscle work of various movements in body at different angle.
3. Identify normal and abnormal posture.
4. Normal gait with it parameters and identify abnormal gait with the problems in it.

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**MEDICAL TERMINOLOGY AND RECORD KEEPING**

**Subject Code: BPHTS1-209**

L	T	P	C
2	0	0	2

**Duration: 30 (Hrs.)**

**Course Objective:**

- This course introduces the elements of medical terminology. Emphasis is placed on building familiarity with medical words through knowledge of roots, prefixes, and suffixes.

**Course Outcome:** Upon completion of this course the student should be able to:

- Students origin, word building, abbreviations and symbols, terminology related to the human anatomy, reading medical orders and reports, and terminology specific to the student's field of study.
- Derivation of medical terms.

**Topics**

- Define word roots, prefixes, and suffixes.
- Conventions for combined morphemes and the formation of plurals.
- Basic medical terms in health care and physiotherapy.
- Form medical terms utilizing roots, suffixes, prefixes, and combining roots.
- Interpret basic medical abbreviations/symbols.
- Utilize diagnostic, surgical, and procedural terms and abbreviations related to the integumentary system, musculoskeletal system, respiratory system, cardiovascular system, nervous system, and endocrine system.
- Interpret medical records/reports.

**Recommended Text Books / Reference Books:**

- Comprehensive medical terminology 3<sup>rd</sup> edition Bety Davis Jones, RN, MA, CMA



# **THIRD SEMESTER**

**PATHOLOGY**

**Subject Code: BPHTS1-301**

**L T P C**

**Duration: 45 (Hrs.)**

**3 0 0 3**

**Course Objectives:**

- Acquire the knowledge of concepts of cell injury & changes produced thereby in different tissues & organs-; capacity of the body in healing process.
- Recall the Etiopathogenesis, the pathological effects & the clinic pathological correlation of common infections & non-infectious diseases.
- Acquire the knowledge of concepts of neoplasia with reference to the Etiology, gross & microscopic features, diagnosis, & prognosis in different tissues, & organs of the body.

**Course Outcomes:**

- Demonstrate an understanding of essential basic pathological processes including cell death and injury, inflammation, thrombosis and neoplasia
- Acquire the ability to relate these essential basic pathological processes to the pathogenesis of common and important diseases
- Demonstrate an understanding of the predisposing factors, causes, pathogenesis, morphology and potential complications of such diseases

**UNIT -1 (15 Hrs.)**

- **General Pathology-** Cell injury-causes, mechanism & toxic injuries with special reference to Physical, Chemical, & ionizing radiation
- **Reversible injury (degeneration)-** types, morphology, swelling, hyaline, fatty changes, Intra-cellular accumulation-hyaline mucin,
- **Irreversible cell injury**-types of necrosis, apoptosis, calcification, dystrophic & metastasis,
- **Extra-cellular accumulation-** amyloidosis, calcification, Pathogenesis, morphology.
- **Inflammation & Repair**
  - a) Acute inflammation – features, causes, vascular & cellular events,
  - b) Morphologic variations,
  - c) Inflammatory cells & mediators,
  - d) Chronic inflammation:- causes, types, non-specific & granulomatous
  - e) Wound healing by primary & secondary union factors promoting & delaying healing process.
  - f) Healing at various sites including-bones, nerve & muscle.

**UNIT -2 (10 Hrs.)**

- **Immuno – pathology –** (basic concepts)
  - a) Immune system:- organization-cells- antibodies- regulation of immune responses,
  - b) Hyper-sensitivity,
  - c) Secondary immuno-deficiency including HIV,
  - d) Organ transplantation
- **Circulatory disturbances**
  - a) Edema - pathogenesis - types - transudates / exudates
  - b) Chronic venous congestion- lung, liver, spleen,

- c) Thrombosis – formation – fate – effects,
- d) Embolism – types- clinical effects,
- e) Infarction – types – common sites
- f) Gangrenes – types – actiopathogenesis
- g) Shock – Pathogenesis, types, morphologic changes
- h) Deficiency disorders – Vitamins A, B, C, D,

**UNIT -3 (10 Hrs.)**

- **Growth Disturbance**

- a) Atrophy-malformation, agenesis, dysplasia,
- b) Neoplasia classification, histogenesis, biologic behaviour, difference between benign & malignant tumour
- c) Malignant neoplasms- grades-stages-local & distal spread,
- d) Carcinogenesis – environmental carcinogens,
- e) Chemical, Occupational, heredity, viral, f) precancerous lesions & ca in situ g) Tumor & host interactions – systemic effects-metastatic or direct spread of tumors affecting bones, spinal cord, leading to paraplegia, etc.

**UNIT -4 (10 Hrs.)**

- **Neuro Pathology**

- a)-Reaction of nervous tissue to injury – infection & ischaemia
- b)- Pyogenic meningitis, TBM, Viral,
- c)- Cerebro – vascular diseases – atherosclerosis – Thrombosis, embolism, aneurysm, hypoxia, infarction & hemorrhage.
- d)- effects of Hypotension on CNS e)- Coma f)- Polio myelitis- Leprosy- Demyelinating diseases – Parkinsonism – Cerebral palsy- metachromatic leucodystrophy – Dementia – Hemiplegia / paraplegia – Pathogenesis & pathology of Wilson's disease g

**Recommended books:-**

- **Rapid Review Pathology by Edward F. Goljan**
- Robbins and Cotran Review of Pathology by Klatt and Kumar
- Underwood's Pathology: A Clinical Approach by Simon Cross
- Pathology Illustrated by Fiona Roberts & Elaine MacDuff
- Robbins Basic Pathology by Kumar, Abbas & Aster

**MICROBIOLOGY**

**Subject Code: BPHTS1-302**

**L T P C**

**Duration: 45 (Hrs.)**

**3 0 0 3**

**Course Objectives:**

- To introduce to the students regarding various kinds of microbes in terms of their structure, growth etc. & collection of clinical samples their processing and identification.

**Course Outcomes:**

- Describe/explain the processes used by microorganisms for their replication, survival, and interaction with their environment, hosts, and host population.

**Unit-1 (10 Hours)**

- **Introduction and History of Microbiology**
  - a. Classification-Prokaryotes, Eukaryotes, Viruses, Fungi.
  - b. Morphology-size, shape, arrangement
  - c. Special characteristics—spores, capsules, enzymes, mortality, reproduction
  - d. Gram staining, ZN staining
  - e. Different types of microscopes

**Unit-2 (15 Hours)**

- **Sterilization:** Definition and different methods of sterilization including – Gaseous sterilization, Plasma sterilization, Advantage and disadvantage of various methods and their controls, Sterilization of different instruments used in patients, Preparation of materials for Autoclaving: packing, loading, holding time, unloading
- **Disinfection:** Definition and different type of methods including High level disinfectants, Disinfection of patient care unit and rooms (O.T., Wards, ICUs & Laboratories), Central supply department Areas and floor plan for instrument cleaning high level disinfection & sterilizing area.
- **Asepsis:** Universal Precautions, Use of aseptic precautions to prevent infection, Safety mechanisms including vaccination in prevention of blood borne infections

**Unit-3 (10 Hours)**

- **Culture media-** Liquid and Solid, Collection & transport of specimens for Microbiological Investigations.
- **Infection** - Source - Portals of entry - Spread of infection. Antimicrobial agents - Fundamental aspects - Antibiotic sensitivity testing.
- **Immunity** – Non-specific - Natural & Acquired - Allergy and Anaphylaxis Outline of common infections, diseases, etiology, treatment and prevention. - Skin and soft tissue infections - Respiratory tract infections - Meningitis - Enteric infections - Urinary tract infections - Ocular infections - Wound infections - PUO Hospital acquired infections - Catheter associated urinary tract infections (CAUTI) - Ventilator associated pneumonia (VAP) - Catheter related blood stream infections (CRBSI) - Surgical Site Infection Pathogenic yeasts and fungi.

**Unit-4 (10 Hours)**

- **Virology:** With special reference to hepatitis, poliomyelitis, HIV & Influenza, Viruses relevant in dialysis patients including their modes of transmission, Diseases communicable to healthcare workers in hospital set up and their prevention, Prevention measures to combat spread of these infections by monitoring and control.
- **Microbial surveillance and sampling:** Bacteriology of air, water and food, Hospital infection Control & Influenza, Viruses relevant in dialysis patients including their modes of transmission, Diseases communicable to healthcare workers in hospital set up and their prevention, Prevention measures to combat spread of these infections by monitoring and control. Microbial surveillance and sampling. Bacteriology of air, water and food, Hospital infection Control.

**Recommended Text Books / Reference Books:**

- M.J. Jr., Pelczar, E.C.S., Chan and R. Krieg, 'Microbiology', McGraw Hill.
- G.J. Tortora, B.R. Funke and C.L. Case, 'Microbiology-An Introduction', Benjamin Cummings.
- B.D. Davis, R. Dulbecco, H.N. Eisen and H.S. Ginsber, 'Microbiology', Harper & Row, Publishers.
- R.Y. Stainer, J.L. Ingraham, M.L. Wheelis and P.R. Palmer, 'General Microbiology', MacMilan Press Ltd.

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**PHARMACOLOGY**

**Subject Code: BPHTS1-303**

**L T P C**

**Duration: 45 (Hrs.)**

**3 0 0 3**

**Course Objectives:**

- The goal of the study of pharmacological sciences is to understand the properties of drugs and the ways in which these properties react, according to The American Society for Pharmacology and Experimental Therapeutics.

**Course Outcomes:**

- Pharmacology is the study of how a drug works on the body, its side effects on the body, and the way the body uses the drug.

**UNIT-1 (15 HOURS)**

• **General Pharmacology:**

- a. Introduction, Definitions, Classification of drugs, Sources of drugs, Routes of drug administration,
- b. Distribution of drugs, Metabolism and Excretion of drugs, Pharmacokinetics, Pharmacodynamics,
- c. Factors modifying drug response.
- d. Elementary knowledge of drug toxicity, drug allergy, drug resistance, drug potency, efficacy & drug antagonism.

• **Autonomic Nervous system**

- a. General considerations – The Sympathetic and Parasympathetic Systems, Receptors, Somatic Nervous System
- b. Cholinergic and Anti-Cholinergic drugs, Adrenergic and Adrenergic blocking drugs, Peripheral muscle relaxants.

**UNIT-2 (10 HOURS)**

• **Cardiovascular Pharmacology (in brief) :**

- a. Drugs Used in the Treatment of Heart Failure: Digitalis, Diuretics, Vasodilators, ACE inhibitors
- b. Antihypertensive Drugs: Diuretics, Beta Blockers, Calcium Channel Blockers, ACE Inhibitors, Central Acting Alpha Agonists, Peripheral Alpha Antagonists, Direct acting Vasodilators

• **Antiarrhythmic Drugs**

- a. Drugs Used in the Treatment of Vascular Disease and Tissue Ischemia: Vascular Disease, Hemostasis Lipid-Lowering agents, Antithrombotics, Anticoagulants and Thrombolytics
- b. Ischemic Heart Disease – Nitrates, Beta-Blockers, Calcium Channel Blockers
- c. Cerebral Ischemia
- d. Peripheral Vascular Disease

**UNIT-3 (10 HOURS)**

• **Neuropharmacology (in brief) :**

- a. Sedative-Hypnotic Drugs: Barbiturates, Benzodiazepines
- b. Antianxiety Drugs: Benzodiazepines, Other Anxiolytics
- c. Drugs Used in Treatment of Mood Disorders: Monoamine Oxidase Inhibitors, Tricyclic Antidepressants, Atypical Antidepressants, Lithium
- d. Antipsychotic drugs

• **Disorders of Movement (in brief) :**

- a. Drugs used in Treatment of Parkinson's Disease
- b. Antiepileptic Drugs
- c. Spasticity and Skeletal Muscle Relaxants
- **Inflammatory/Immune Diseases-**
  - a. Non-narcotic Analgesics and Nonsteroidal Anti-Inflammatory Drugs: Acetaminophen, NSAIDs, Aspirin, Nonaspirin NSAIDs, drug Interactions with NSAIDs
  - b. Glucocorticoids: Pharmacological Uses of Glucocorticoids, adverse effects, Physiologic Use of Glucocorticoids
  - c. Drugs Used in Treatment of Arthritic Diseases: Rheumatoid Arthritis, Osteoarthritis, Gout
  - d. Drugs Used in the Treatment of Neuromuscular Immune/Inflammatory Diseases: Myasthenia gravis, Idiopathic Inflammatory Myopathies, systemic lupus Erythmatosus, Scleroderma, Demyelinating Disease

**UNIT-4 (10 HOURS)**

- **Respiratory Pharmacology (in brief)** : Obstructive Airway Diseases, Drugs used in Treatment of Obstructive airway Diseases, Allergic Rhinitis
- **Digestion and Metabolism (in brief):**  
Gastrointestinal Pharmacology: Peptic Ulcer Disease, Constipation, Diarrhea  
Drugs Used in Treatment of Diabetes Mellitus: Insulin, Oral Hypoglycemics
- **Geriatrics:**  
Pharmacology and the geriatric Population: Adverse effects of special concern in the Elderly, Dementia, Postural hypotension, urinary incontinence.

**Recommended books:-**

- Basic & Clinical Pharmacology By Bertram Katzung
- Rang & Dale's Pharmacology (Ninth Edition)
- Pharmacology Review – A Comprehensive Reference Guide for Medical, Nursing, and Paramedic Students

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**BIOMECHANICS AND KINESIOLOGY**

**Subject Code: BPHTS1-304**

**L T P C**  
**4 1 0 5**

**Duration: 75 (Hrs.)**

**Course Objectives:**

- Describe the kinematics of projectile motion and factors influencing projectile trajectory.
- Identify, analyze, and solve various biomechanical problems.
- Demonstrate an understanding of kinetic concepts including inertia, force, torque, and impulse.
- Identify the major factors involved in the angular kinematics of human movement
- Define Newton's laws of physics.
- Identify the steps involved in finding the center of gravity.

**Course Outcomes:**

- Correctly apply fundamental human movement principles, from both natural and social science perspectives, to a variety of contexts and populations;
- Demonstrate an applied understanding of the form and function of the human body;
- Critically evaluate human movement research in order to design and implement activities to confirm/generate disciplinary knowledge

**Unit: 1 (20 Hrs.)**

**Biomechanics of the vertebral column -**

- a. General structure and function
- b. Regional structure and function – Cervical region, thoracic region, lumbar region, sacral region
- c. Muscles of the vertebral column
- d. General effects of injury and aging

**Unit: 1 (20 Hrs.)**

**Biomechanics of the peripheral joints -**

- The shoulder complex: Structure and components of the shoulder complex and their integrated function
- The elbow complex: Structure and function of the elbow joint – humeroulnar and humeroradial articulations, superior and inferior radioulnar joints; mobility and stability of the elbow complex; the effects of immobilization and injury.
- The wrist and hand complex: Structural components and functions of the wrist complex; structure of the hand complex; functional position of the wrist and hand.

**Unit: 3 (15 Hrs.)**

- The hip complex: structure and function of the hip joint; hip joint pathology- arthrosis, fracture, bony abnormalities of the femur:
- The knee complex: structure and function of the knee joint – tibiofemoral joint and patellofemoral joint; effects of injury and disease.
- The ankle and foot complex.: structure and function of the ankle joint, subtalar joint, talocalcaneonavicular joint, transverse tarsal joint, tarsometatarsal joints,



metatarsophalangeal joints, interphalangeal joints, structure and function of the plantar arches, muscles of the ankle and foot, deviations from normal structure and function – Pes Planus and Pes Cavus

**Unit: 4 (20 Hrs.)**

- **Analysis of Posture and Gait** – Static and dynamic posture, postural control, kinetics and kinematics of posture, ideal posture analysis of posture, effects of posture on age, pregnancy, occupation and recreation; general features of gait, gait initiation, kinematics and kinetics of gait, energy requirements, kinematics and kinetics of the trunk and upper extremities in relation to gait, stair case climbing and running, effects of age, gender, assistive devices, disease, muscle weakness, paralysis, asymmetries of the lower extremities, injuries and malalignments in gait
- **Movement Analysis** : ADL activities like sitting – to standing, lifting, various grips , pinches

**Recommended books:-**

- Cynthia Levangie - Joint Structure and Function - 5th Ed
- Daniel & Worthingham's-Manual of muscle testing
- Lynn Lippert - Clinical
- Brunstroms - Clinical Kinesiology
- "Kinesiology of the Musculoskeletal System" by Donald A. Neumann
- "Basic Biomechanics" by Susan J. Hall

**FOUNDATION OF EXERCISE THERAPY AND THERAPEUTIC MESSAGE**

**Subject Code: BPHTS1-305**

**L T P C  
3 0 0 3**

**Duration: 45 (Hrs.)**

**COURSE OBJECTIVE:**

- The students will learn the principles and effects of exercise as a therapeutic modality and will learn the techniques in the restoration of physical functions.
- **The** students will be able to understand the concepts, different types and application of massage on patients during clinical practice.

**COURSE OUTCOME**

- Increased functional capacity and independence
- Decreased pain levels
- Improved joint mobility and muscle flexibility
- Enhanced muscle strength and endurance
- Better posture and body awareness
- Reduced inflammation and swelling
- Improved circulation and tissue healing
- Enhanced relaxation and stress reduction
- Improved sleep quality
- Better overall physical and mental well-being

**Unit: 1 (15 Hrs.)**

- **Introduction to Exercise Therapy** - The aims of Exercise Therapy, The techniques of Exercise Therapy, Approach to patient's problems, Assessment of patient's condition – Measurements of Vital parameters, Starting Positions – Fundamental positions & derived Positions, Planning of Treatment
- **Methods of Testing**
  - a. Functional tests
  - b. Measurement of Joint range: ROM-Definition, Normal ROM for all peripheral joints & spine, Goniometer-parts, types, principles, uses, Limitations of goniometry, Techniques for measurement of ROM for all peripheral joints
  - c. Tests for neuromuscular efficiency
    - i. Electrical tests
    - ii. Manual Muscle Testing: Introduction to MMT, Principles & Aims, Indications & Limitations, Techniques of MMT for group & individual: Techniques of MMT for upper limb / Techniques of MMT for lower limb / Techniques of MMT for spine.
    - iii. Anthropometric Measurements: Muscle girth – biceps, triceps, forearm, quadriceps, calf
    - iv. Static power Test
    - v. Dynamic power Test
    - vi. Endurance test
    - vii. Speed test
  - d. Tests for Co-ordination
  - e. Tests for sensation

- f. Pulmonary Function tests
- g. Measurement of Limb Length: true limb length, apparent limb length, segmental limb length
- h. Measurement of the angle of Pelvic Inclination

**Unit: 2 (20 Hrs.)**

- **Relaxation**
  - a. Definitions: Muscle Tone, Postural tone, Voluntary Movement, Degrees of relaxation, Pathological tension in muscle, Stress mechanics, types of stresses, Effects of stress on the body mechanism, Indications of relaxation, Methods & techniques of relaxation Principles & uses: General, Local, Jacobson's, Mitchel's, additional methods.
- **Passive Movements**
  - a. Causes of immobility, Classification of Passive movements, Specific definitions related to passive movements, Principles of giving passive movements, Indications, contraindications, effects of uses, Techniques of giving passive movements.
- **Active Movements**
  - a. Definition of strength, power & work, endurance, muscle actions.
  - b. Physiology of muscle performance: structure of skeletal muscle, chemical & mechanical events during contraction & relaxation, muscle fiber type, motor unit, force gradation.
  - c. Causes of decreased muscle performance
  - d. Physiologic adaptation to training: Strength & Power, Endurance.
  - e. Types of active movements

**Unit: 3 (5 Hrs.)**

- **Free exercise:** Classification, principles, techniques, indications, contraindications, effects and uses
- **Active Assisted Exercise:** principles, techniques, indications, contraindications, effects and uses Assisted-Resisted Exercise: principles, techniques, indications, contraindications, effects and uses Resisted Exercise: Definition, principles, indications, contraindications, precautions & techniques, effects and uses
- **Types of resisted exercises:** Manual and Mechanical resistance exercise, Isometric exercise, Dynamic exercise: Concentric and Eccentric, Dynamic exercise: Constant versus variable resistance, Isokinetic exercise, Open-Chain and Closed-Chain exercise.

**Unit: 4 (5 Hrs.)**

- **THERAPEUTIC MASSAGE**
  - a. History and Classification of Massage Technique
  - b. Principles, Indications and Contraindications
  - c. Technique of Massage Manipulations
  - d. Physiological and Therapeutic Uses of Specific Manipulations

**Recommended books:-**

- "Therapeutic Exercise: Foundations and Techniques" by Carolyn Kisner and Lynn Allen Colby
- "Massage Therapy: Principles and Practice" by Susan G. Salvo
- "Orthopedic Physical Assessment" by David J. Magee
- "Therapeutic Modalities in Rehabilitation" by William E. Prentice
- "Trail Guide to the Body" by Andrew Biel
- "Clinical Massage Therapy: Understanding, Assessing and Treating over 70 Conditions" by Fiona Rattray and Linda Ludwig
- "Exercise Therapy: Prevention and Treatment of Disease" by John Gormley and Juliette Hussey
- "Foundations of Therapeutic Recreation" by Terry Robertson and Terry Long
- The Principles Of Exercise Therapy By M Dena Gardiner (S)

**PATHOLOGY - PRACTICAL**

**Subject Code: BPHTS1-306**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>0</b>	<b>0</b>	<b>2</b>	<b>1</b>

1. Collection of blood and anticoagulants used.
2. Discussion about parts of microscope and different types of microscopes used in pathology.
3. Staining of slide by Leishman method.
4. Study of peripheral blood smear.
5. Estimation of hemoglobin by Sahli's method and discussion of other methods used.
6. ESR
7. Identification of various instruments in pathology lab & their uses (eg. Neubauer chamber, RBC, WBC, pipette etc.).
8. Bleeding Time, Clotting Time.

**MICROBIOLOGY - PRACTICAL**

**Subject Code: BPHTS1-307**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>0</b>	<b>0</b>	<b>4</b>	<b>2</b>

1. Demonstration of Microscopes and its uses
2. Principles, uses and demonstration of common sterilization equipment
3. Demonstration of common culture media
4. Demonstration of motility by hanging drops method
5. Demonstration of Gram Stain, ZN Stain
6. Demonstration of Serological test: ELISA
7. Demonstration of Fungus

**BIOMECHANICS AND KINESIOLOGY - PRACTICAL**

**Subject Code: BPHTS1-308**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>0</b>	<b>0</b>	<b>6</b>	<b>3</b>

1. Goniometry – measurement of joint ROM
2. Identify Muscle work of various movements in body at different angle.
3. Identify normal and abnormal posture.
4. Normal gait with it parameters and identify abnormal gait with the problems in it.

**FOUNDATION OF EXERCISE THERAPY AND THERAPEUTIC MASSAGE –  
PRACTICAL**

**Subject Code: BPHTS1-309**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>0</b>	<b>0</b>	<b>4</b>	<b>2</b>

1. Different test methods
2. Demonstrate relaxation techniques.
3. Demonstrate to apply the technique of passive movements
4. Demonstrate various techniques of Active movements
5. Demonstrate massage technique application according to body parts.



**MRSPTU BACHELOR OF PHYSIOTHERAPY  
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**INTRODUCTION TO QUALITY AND PATIENT SAFETY**

**Subject Code: BPHTS1-310**

**L T P C**

**Duration: 15 (Hrs.)**

**1 0 0 1**

**COURSE OBJECTIVE:**

- The objective of the course is to help students understand the basic concepts of quality in health Care and develop skills to implement sustainable quality assurance program in the health system.
- The student is also expected to learn about basic emergency care including first aid and triage.
- The objective will be to provide a broad understanding of the core subject areas of infection prevention and control and to equip AHPs with the fundamental skills required to reduce the incidence of hospital acquired infections and improve health outcomes.
- The aim will be to help prevent harm to workers, property, the environment and the general public.
- The objective will be to provide knowledge on the principles of on-site disaster management

**COURSE OUTCOME**

- Ability to assess and improve healthcare quality and patient safety
- Skill in implementing quality improvement initiatives
- Understanding of how to reduce medical errors and adverse events
- Knowledge of best practices in patient safety
- Ability to use data for quality improvement decision-making
- Competence in applying regulatory and accreditation standards
- Skills in fostering teamwork and communication for patient safety
- Understanding of systems thinking in healthcare quality

**Unit: 1 (3 HOURS)**

- **Quality assurance and management -**
  - a. Concepts of Quality of Care
  - b. Quality Improvement Approaches
  - c. Standards and Norms
  - d. Quality Improvement Tools
  - e. Introduction to NABH guidelines

**Unit: 2 (3 HOURS)**

- **Basics of emergency care and life support skills** - Basic life support (BLS) is the foundation for saving lives following cardiac arrest. Fundamental aspects of BLS include immediate recognition of sudden cardiac arrest (SCA) and activation of the emergency response system, early cardiopulmonary resuscitation (CPR), and rapid defibrillation with an automated external defibrillator (AED). Initial recognition and response to heart attack and stroke are also considered part of BLS. Topics to be covered under the subject are as follows:
  - a. Vital signs and primary assessment
  - b. Basic emergency care – first aid and triage

- c. Ventilations including use of bag-valve-masks (BVMs)
- d. Choking, rescue breathing methods
- e. One- and Two-rescuer CPR
- f. Using an AED (Automated external defibrillator).
- g. Managing an emergency including moving a patient

**Unit: 3 (4 HOURS)**

- **Bio medical waste management and environment safety-** The aim of this section will be to help prevent harm to workers, property, the environment and the general public. Topics to be covered under the subject are as follows:
  - a. Definition of Biomedical Waste
  - b. Waste minimization
  - c. BMW – Segregation, collection, transportation, treatment and disposal (including color coding)
  - d. Liquid BMW, Radioactive waste, Metals / Chemicals / Drug waste
  - e. BMW Management & methods of disinfection
  - f. Modern technology for handling BMW
  - g. Use of Personal protective equipment (PPE)
  - h. Monitoring & controlling of cross infection (Protective devices)
- **Infection prevention and control** - The objective of this section will be to provide a broad understanding of the core subject areas of infection prevention and control and to equip AHPs with the fundamental skills required to reduce the incidence of hospital acquired infections and improve health outcomes. Concepts taught should include –
  - a. Evidence-based infection control principles and practices [such as sterilization, disinfection, effective hand hygiene and use of Personal protective equipment (PPE)],
  - b. Prevention & control of common healthcare associated infections,
  - c. Components of an effective infection control program, and
  - d. Guidelines (NABH and JCI) for Hospital Infection Control

**Unit: 4 (5 HOURS)**

- **Antibiotic Resistance-**
  - a. History of Antibiotics
  - b. How Resistance Happens and Spreads
  - c. Types of resistance- Intrinsic, Acquired, Passive
  - d. Trends in Drug Resistance
  - e. Actions to Fight Resistance
  - f. Bacterial persistence
  - g. Antibiotic sensitivity
  - h. Consequences of antibiotic resistance
  - i. Antimicrobial Stewardship- Barriers and opportunities, Tools and models in hospitals

- **Disaster preparedness and management.** Concepts to be taught should include-
  - a. Fundamentals of emergency management,
  - b. Psychological impact management,
  - c. Resource management,
  - d. Preparedness and risk reduction,
  - e. Key response functions (including public health, logistics and governance, recovery, rehabilitation and reconstruction), information management, incident command and institutional mechanisms.

**Recommended books:-**

- "Understanding Patient Safety" by Robert M. Wachter and Kiran Gupta
- "The Healthcare Quality Book: Vision, Strategy, and Tools" by Maulik S. Joshi, Elizabeth R. Ransom, David B. Nash, and Scott B. Ransom
- "Patient Safety: A Case-Based Comprehensive Guide" by Abha Agrawal
- "Fundamentals of Health Care Improvement: A Guide to Improving Your Patients' Care" by Gregory S. Ogrinc and Linda A. Headrick
- "To Err is Human: Building a Safer Health System" by Institute of Medicine (US) Committee on Quality of Health Care in America
- "Crossing the Quality Chasm: A New Health System for the 21st Century" by Institute of Medicine (US) Committee on Quality of Health Care in America
- "Quality and Safety in Nursing: A Competency Approach to Improving Outcomes" by Gwen

**INTRODUCTION TO QUALITY AND PATIENT SAFETY - PRACTICAL**

**Subject Code: BPHTS1-311**

**L T P C  
0 0 2 1**

- Basic life support (BLS)
- Sudden cardiac arrest (SCA)
- Cardiopulmonary resuscitation (CPR),
- Rapid defibrillation with an automated external defibrillator (AED)
- Biomedical waste
- Infection control principles and practices [such as sterilization, disinfection, effective hand hygiene and use of Personal protective equipment (PPE)]

# **FOURTH SEMESTER**

**EXERCISE THERAPY**

**Subject Code: BPHTS1-401**

**L T P C**  
**4 1 0 5**

**Duration: 75 (Hrs.)**

**Course Objectives:**

- This course will include therapeutic exercise involving movement prescribed to correct impairments, restore muscular and skeletal function and/or maintain a state of well-being or prevent injuries and improve functional outcomes.

**Course Outcomes:**

- The goals of therapeutic exercises include the restoration of movement, improvement of function and strength, improvement in gait and balance, and the prevention and promotion of health, wellness, and fitness. Specific exercises are aimed at restoring strength, power and work, or endurance, or a combination.

**Unit: 1 (20 Hours)**

- Specific exercise regimens
  - a. Isotonic: de Lormes, Oxford, MacQueen, Circuit weight training
  - b. Isometric: BRIME (Brief Resisted Isometric Exercise), Multiple Angle
  - c. Isometrics Isokinetic regimens
- Proprioceptive Neuromuscular Facilitation
  - a. Definitions & goals
  - b. Basic neurophysiologic principles of PNF: Muscular activity, Diagonals patterns of movement: upper limb, lower limb
  - c. Procedure: components of PNF
  - d. Techniques of facilitation
  - e. Mobility: Contract relax, Hold relax, Rhythmic initiation
  - f. Strengthening: Slow reversals, repeated contractions, timing for emphasis, rhythmic stabilization Stability: Alternating isometric, rhythmic stabilization

**Skill: timing for emphasis, resisted progression Endurance: slow reversals, agonist reversal**

- Suspension Therapy
  - a. Definition, principles, equipments & accessories, Indications & contraindications, Benefits of suspension therapy
  - b. Types of suspension therapy: axial, vertical, pendular Techniques of suspension therapy for upper limb Techniques of suspension therapy for lower limb
- Functional Re-education
  - a. Lying to sitting: Activities on the Mat/Bed, Movement and stability at floor level; Sitting activities and gait; Lower limb and Upper limb activities.

**Unit: 2 (20 Hours)**

- Aerobic Exercise
  - Definition and key terms; Physiological response to aerobic exercise, Examination and evaluation of aerobic capacity – Exercise Testing, Determinants of an Exercise Program, The Exercise Program, Normal and abnormal response to acute aerobic exercise, Physiological changes that occur with training, Application of Principles of an Aerobic conditioning program for patients – types and phases of aerobic training.
- Stretching
  - Definition of terms related to stretching; Tissue response towards immobilization and elongation, Determinants of stretching exercise, Effects of stretching, Inhibition and relaxation procedures, Precautions and contraindications of stretching, Techniques of stretching.
- Manual Therapy & Peripheral Joint Mobilization
  - a. Schools of Manual Therapy, Principles, Grades, Indications and Contraindications, Effects and Uses – Maitland, Kaltenborn, Mulligan
  - b. Biomechanical basis for mobilization, Effects of joint mobilisation, Indications and contraindications, Grades of mobilization, Principles of mobilization, Techniques of mobilization for upper limb, lower limb, Precautions.

**Unit: 3 (20 Hours)**

- Balance - Definition
  - a. Physiology of balance: contributions of sensory systems, processing sensory information, generating motor output
  - b. Components of balance (sensory, musculoskeletal, biomechanical)
  - c. Causes of impaired balance, Examination & evaluation of impaired balance, Activities for treating impaired balance: mode, posture, movement, Precautions & contraindications, Types Balance retraining.
- Co-ordination Exercise
  - a. Anatomy & Physiology of cerebellum with its pathways Definitions: Co-ordination, Inco-ordination
  - b. Causes for Inco-ordination, Test for co-ordination: equilibrium test, non-equilibrium test Principles of co-ordination exercise.
  - c. Frenkel's Exercise: uses of Frenkel's exercise, technique of Frenkel's exercise, progression, home exercise.
- Posture
  - a. Definition, Active and Inactive Postures, Postural Mechanism, Patterns of Posture, Principles of re-education: corrective methods and techniques, Patient education.
- Walking Aids
  - a. Types: Crutches, Canes, Frames; Principles and training with walking aids

**Unit: 4 (15 Hours)**

- Basics in Manual Therapy & Applications with Clinical reasoning
  - a. Examination of joint integrity
    - i. Contractile tissues
    - ii. Non contractile tissues
  - b. Mobility - assessment of accessory movement & End feel
  - c. Assessment of articular & extra-articular soft tissue status
    - i. Myofascial assessment
    - ii. Acute & Chronic muscle hold
    - iii. Tightness
    - iv. Pain-original & referred
  - d. Basic principles, Indications & Contra-Indications of mobilization skills for joints & soft tissues.
    - i. Maitland
    - ii. Mulligan
    - iii. Mckenzie
    - iv. Muscle Energy Technique
    - v. Myofascial stretching
    - vi. Cyriax
    - vii. Neuro Dynamic Testing
- Hydrotherapy
  - a. Definitions, Goals and Indications, Precautions and Contraindications, Properties of water, Use of special equipment, techniques, Effects and uses, merits and demerits
- Individual and Group Exercises
  - a. Advantages and Disadvantages, Organization of Group exercises, Recreational Activities and Sports

**Recommended textbooks/reference books:**

- McArdle WD, Katch FI, Katch VL. Essentials of exercise physiology. Lippincott Williams & Wilkins; 2006.
- Hale T. Exercise physiology: a thematic approach. John Wiley & Sons; 2004.
- Clarke D. Exercise physiology. Prentice-Hall.
- Wolinsky I, editor. Nutrition in exercise and sport. CRC press.
- Brooks GA, Fahey TD, White TP. Exercise physiology: human bioenergetics and its applications. Mayfield publishing company.



**MRSPTU BACHELOR OF PHYSIOTHERAPY  
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**BIO PHYSICS**

**Subject Code: BPHTS1-402**

**L T P C**

**Duration: 15 (Hrs.)**

**1 0 0 1**

**Course Objective:**

- Understand fundamental physical principles governing biological systems
- Apply quantitative methods to analyze biological phenomena
- Explore the structure and function of biomolecules from a physical perspective
- Learn about various biophysical techniques and their applications
- Develop critical thinking skills in interpreting biophysical data
- Understand the role of thermodynamics and kinetics in biological processes

**Course Outcome:**

- After completing this course, students should be able to:
- Apply physical laws and principles to biological systems
- Analyze biological processes using mathematical and physical models
- Interpret data from common biophysical techniques
- Understand the physical basis of biomolecular structure and function
- Critically evaluate biophysical research literature
- Apply biophysical concepts to solve biological problems

**Unit 1 (5 Hours)**

- Physical principles
  - a. Structure and properties of matter -solids, liquids and gases, adhesion, surface tension, viscosity, density and elasticity.
  - b. Structure of atom, molecules, elements and compound
  - c. Electricity: Definition and types. Therapeutic uses. Basic physics of construction. Working
  - d. Importance of currents in treatment.
  - e. Static Electricity: Production of electric charge. Characteristic of a charged body.
  - f. Characteristics of lines of forces. Potential energy and factors on which it depends. Potential difference and EMF.
  - g. Current Electricity: Units of Electricity: farad, Volt, Ampere, Coulomb, Watt
  - h. Condensers: Definition, principle, Types- construction and working, capacity & uses.
  - i. Magnetism: Definition. Properties of magnets. Electromagnetic induction. Transmission by contact. Magnetic field and magnetic forces. Magnetic effects of an electric field.
  - j. Conductors, Insulators, Potential difference, Resistance and intensity
  - k. Ohm's law and its application to DC and AC currents. Fuse: construction, working and application.
  - l. Transmission of electrical energy through solids, liquids, gases and vacuum.
  - m. Rectifying Devices-Thermionic valves, Semiconductors, Transistors, Amplifiers, transducer and Oscillator circuits.
  - n. Display devices and indicators-analogue and digital.
  - o. Transformer: Definition, Types, Principle, Construction, Eddy current, working uses
  - p. Chokes: Principle, Construction and working, Uses

**Unit 2 (5 Hours)**

- Effects of Current Electricity
  - a. Chemical effects-Ions and electrolytes, Ionisation, Production of an EMF by chemical actions.
  - b. Ionization: Principles, effects of various technique of medical ionization.
  - c. Electromagnetic Induction.
  - d. Electromagnetic spectrum.

**Unit 3 (2 Hours)**

- Electrical Supply
  - a. Brief outline of main supply of electric current
  - b. Dangers-short circuit, electric shocks: Micro/ Macro shocks
  - c. Precaution-safety devices, earthing, fuses etc.
  - d. First aid and initial management of electric shock
  - e. Burns: electrical & chemical burns, prevention and management

**Unit 4 (3 Hours)**

- Various agents
  - a. Thermal agents: Physical Principles of cold, Superficial and deep heat.
  - b. Ultrasound: Physical Principles of Sound
  - c. Electro- magnetic Radiation: Physical Principles and their Relevance to Physiotherapy Practice
  - d. Electric Currents: Physical Principles and their Relevance to Physiotherapy Practice.
- Section II – Therapeutic Electricity

**Recommended textbooks/reference books:**

- "Biophysics: Searching for Principles" by William Bialek
- "Physical Biology of the Cell" by Rob Phillips, Jane Kondev, and Julie Theriot
- "Molecular Driving Forces: Statistical Thermodynamics in Biology, Chemistry, Physics, and Nanoscience" by Ken A. Dill and Sarina Bromberg
- "Biophysical Chemistry" by Charles R. Cantor and Paul R. Schimmel
- "Biophysics: An Introduction" by Roland Glaser
- "Principles of Physical Biochemistry" by Kensal E. van Holde, W. Curtis Johnson, and P. Shing Ho
- "Introduction to Biological Physics for the Health and Life Sciences" by Kirsten Franklin, Paul Muir, Terry Scott, and Lara Wilcocks
- "Biophysics: Tools and Techniques" by Betty Karasek

**MRSPTU BACHELOR OF PHYSIOTHERAPY  
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**ELECTROTHERAPY (LMHF & EQUIPMENT CARE)**

**Subject Code: BPHTS1-403**

**L T P C  
4 1 0 5**

**Duration: 75 (Hrs.)**

**COURSE OBJECTIVE –**

- The student will learn the Principles, Techniques, Effects, Indication, Contra-Indication and the dosage parameter for various indications of electro therapeutic modalities in the restoration of physical function.
- The student will be able to list the indications, contra indications, dosages of electro therapy modalities, demonstrates the different techniques, and describe their effects on various conditions.

**COURSE OUTCOME:**

- Understand the principles of low and medium high frequency electrotherapy
- Explain the physiological effects of various electrotherapy modalities
- Identify appropriate electrotherapy treatments for different conditions
- Describe the proper setup and application of electrotherapy equipment
- Understand safety considerations and contraindications for electrotherapy
- Demonstrate knowledge of equipment care, maintenance, and troubleshooting
- Explain the rationale for selecting specific electrotherapy parameters
- Understand the integration of electrotherapy in comprehensive treatment plans
- Critically evaluate research on electrotherapy effectiveness
- Demonstrate awareness of current trends and advances in electrotherapy

**UNIT 1 (20 HOURS)**

- Low frequency Currents
  1. Basic types of current
    - a. Direct Current: types, physiological & therapeutic effects.
    - b. Alternating Current
  2. Types of Current used in Therapeutics
    - a. Modified D.C
      - i. Faradic Current
      - ii. Galvanic Current
    - b. Modified A.C
      - i. Sinusoidal Current
      - ii. Diadynamic Current.
  3. Faradic Current: Definition, Modifications, Techniques of Application of Individual, Muscle and Group Muscle stimulation, Physiological & Therapeutic effects of Faradic Current, Precautions, Indications & Contra-Indications, Dangers.
  4. Galvanic Current: Definition, Modifications, Physiological & Therapeutic effects of Galvanic Current, Indications & Contra-Indications, Dangers, Effect of interrupted galvanic current on normally innervated and denervated muscles and partially denervated muscles.

5. Sinusoidal Current & Diadynamic Current in Brief.
6. HVPGS – Parameters & its uses
7. Ionization / Iontophoresis: Techniques of Application of Iontophoresis, Indications, Selection of Current, Commonly used Ions (Drugs) for pain, hyperhydrosis, wound healing.
8. Cathodal / Anodal galvanism.
9. Micro Current & Macro Current
10. Types of Electrical Stimulators
  - a. NMES- Construction component.
  - b. Neuro muscular diagnostic stimulator- construction component.
  - c. Components and working Principles
11. Principles of Application: Electrode tissue interface, Tissue Impedance, Types of Electrode, Size & Placement of Electrode – Waterbath, Unipolar, Bi-polar, Electrode coupling, Current flow in tissues, Lowering of Skin Resistance.
12. Nerve Muscle Physiology: Action Potential, Resting membrane potential, Propagation of Action Potential, Motor unit, synapse, Accommodation, Stimulation of Healthy Muscle, Stimulation of Denervated Muscle, and Stimulation for Tissue Repair.
13. TENS: Define TENS, Types of TENS, Conventional TENS, Acupuncture TENS, Burst TENS, Brief & Intense TENS, Modulated TENS. Types of Electrodes & Placement of Electrodes, Dosage parameters, Physiological & Therapeutic effects, Indications & Contraindications.
14. Pain: Define Pain, Theories of Pain (Outline only), Pain Gate Control theory in detail. [2 Hours]

## **UNIT 2 (20 HOURS)**

### **Electro-diagnosis**

1. FG Test
2. SD Curve: Methods of Plotting SD Curve, Apparatus selection, Characters of Normally innervated Muscle, Characters of Partially Denervated Muscle, Characters of Completely denervated Muscle, Chronaxie & Rheobase.
3. Nerve conduction velocity studies
4. EMG: Construction of EMG equipment.
4. Bio-feedback.

## **UNIT 3 (20 HOURS)**

### **• Medium Frequency**

1. Interferential Therapy: Define IFT, Principle of Production of IFT, Static Interference System, Dynamic Interference system, Dosage Parameters for IFT, Electrode placement in IFT, Physiological & Therapeutic effects, Indications & Contraindications.
2. Russian Current

3. Rebox type Current

• **Thermo & Actinotherapy (High Frequency Currents)**

1. Electro Magnetic Spectrum.
2. SWD: Define short wave, Frequency & Wavelength of SWD, Principle of Production of SWD, Circuit diagram & Production of SWD, Methods of Heat Production by SWD treatment, Types of SWD Electrode, Placement & Spacing of Electrodes, Tuning, Testing of SWD Apparatus, Physiological & Therapeutic effects, Indications & Contraindications, Dangers, Dosage parameters.
3. Pulsed Electro Magnetic Energy: Principles, Production & Parameters of PEME, Uses of PEME.
4. Micro Wave Diathermy: Define Microwave, Wave length & Frequency, Production of MW, Applicators, Dosage Parameters, Physiological & Therapeutic effects, Indications & Contraindications, Dangers of MWD.
5. Ultrasound: Define Ultrasound, Frequency, Piezo Electric effects: Direct, Reverse, Production of US, Treatment Dosage parameters: Continuous & Pulsed mode, Intensity, US Fields: Near field, Far field, Half value distance, Attenuation, Coupling Media, Thermal effects, Non-thermal effects, Principles & Application of US: Direct contact, Water bag, Water bath, Solid sterile gel pack method for wound. Uses of US, Indications & Contraindications, Dangers of Ultrasound. Phonophoresis: Define Phonophoresis, Methods of application, commonly used drugs, Uses. Dosages of US.
6. IRR: Define IRR, wavelength & parameters, Types of IR generators, Production of IR, Physiological & Therapeutic effects, Duration & frequency of treatment, Indication & Contraindication.
7. UVR: Define UVR, Types of UVR, UVR generators: High pressure mercury vapour lamp, Water cooled mercury vapour lamp, Kromayer lamp, Fluorescent tube, Theraktin tunnel, PUVA apparatus. Physiological & Therapeutic effects. Sensitizers & Filters. Test dosage calculation. Calculation of E1, E2, E3, E4 doses. Indications, contraindications. Dangers. Dosages for different therapeutic effects, Distance in UVR lamp
8. LASER: Define LASER. Types of LASER. Principles of Production. Production of LASER by various methods. Methods of application of LASER. Dosage of LASER. Physiological & Therapeutic effects of LASER. Safety precautions of LASER. Classifications of LASER. Energy density & power density

**UNIT 4 (15 HOURS)**

• **Superficial heating Modalities**

1. Wax Therapy: Principle of Wax Therapy application – latent Heat, Composition of Wax Bath Therapy unit, Methods of application of Wax, Physiological & Therapeutic effects, Indications & Contraindication, Dangers.
2. Contrast Bath: Methods of application, Therapeutic uses, Indications & Contraindications.

3. Moist Heat Therapy: Hydro collator packs – in brief, Methods of applications, Therapeutic uses, Indications & Contraindications.
4. Cyclotherm: Principles of production, Therapeutic uses, Indications & Contraindications.
5. Fluidotherapy: Construction, Method of application, Therapeutic uses, Indications & Contraindications.
6. Whirl Pool Bath: Construction, Method of Application, Therapeutic Uses, Indications & Contraindications.
7. Magnetic Stimulation, Principles, Therapeutic uses, Indications & contraindication.
8. Cryotherapy: Define- Cryotherapy, Principle- Latent heat of fusion, Physiological & Therapeutics effects, Techniques of Applications, Indications & Contraindications, Dangers, Methods of application with dosages.

#### **REFERENCE BOOK**

- "Electrotherapy: Evidence-Based Practice" by Tim Watson
- "Electrotherapy Explained: Principles and Practice" by Val Robertson, Alex Ward, John Low, and Ann Reed
- "Clayton's Electrotherapy: Theory and Practice" by Sheila Kitchen
- "Therapeutic Modalities in Rehabilitation" by William E. Prentice
- "Physical Agents in Rehabilitation: From Research to Practice" by Michelle H. Cameron
- "Electrophysical Agents: Evidence-Based Practice" by Alain-Yvan Belanger
- "Electrical Stimulation in Clinical Practice" by Charles Jerzak and Mark Harlache
- "Principles and Practice of Electrotherapy" by Joseph Kahn
- "Electrotherapy: Clinical Procedures Manual" by Roger M. Nelson, Dean P. Currier, and Karen W. Hayes
- "Electrotherapy and Electrodiagnosis" by Stanley Licht

**EXERCISE THERAPY - PRACTICAL**

**Subject Code: BPHTS1-404**

**L T P C  
0 0 8 4**

The students of exercise therapy are to be trained in Practical Laboratory work for all the topics discussed in theory. The student must be able to evaluate and apply judiciously the different methods of exercise therapy techniques on the patients. They must be able to:

1. Demonstrate the technique of measuring using goniometry
2. Demonstrate muscle strength using the principles and technique of MMT
3. Demonstrate the techniques for muscle strengthening based on MMT grading
4. Demonstrate the PNF techniques
5. Demonstrate exercises for training co-ordination – Frenkel's exercise
6. Demonstrate the techniques of massage manipulations
7. Demonstrate techniques for functional re-education
8. Assess and train for using walking aids
9. Demonstrate mobilization of individual joint regions
10. Demonstrate to use the technique of suspension therapy for mobilizing and strengthening joints and muscles
11. Demonstrate the techniques for muscle stretching
12. Assess and evaluate posture and gait
13. Demonstrate techniques of strengthening muscles using resisted exercises
14. Demonstrate techniques for measuring limb length and body circumference.



**BIO PHYSICS - PRACTICAL**

**Subject Code: BPHTS1-405**

**L T P C**

**0 0 2 1**

- List, describe, draw various electrical components like diodes & triodes, rheostat, capacitor, potentiometer, switches, plugs and pulse generator
- Apply technique of testing of mains supply
- Draw free body diagrams, force vectors during walking and further applications



**ELECTROTHERAPY (LHMF & EQUIPMENT CARE) - PRACTICAL**

**Subject Code: BPHTS1-406**

**L T P C  
0 0 8 4**

- The student of Electrotherapy must be able to demonstrate the use of electrotherapy modalities applying the principles of electrotherapy with proper techniques, choice of dosage parameters and safety precautions.
  1. Demonstrate the technique for patient evaluation – receiving the patient and positioning the patient for treatment using electrotherapy.
  2. Collection of materials required for treatment using electrotherapy modalities and testing of the apparatus.
  3. Demonstrate placement of electrodes for various electrotherapy modalities
  4. Electrical stimulation for the muscles supplied by the peripheral nerves
  5. Faradism under Pressure for UL and LL
  6. Plotting of SD curve with chronaxie and rheobase
  7. Demonstrate FG test
  8. Application of Ultrasound for different regions-various methods of application
  9. Demonstrate treatment techniques using SWD, IRR and Microwave diathermy
  10. Demonstrate the technique of UVR exposure for various conditions – calculation of test dose
  11. Demonstrate treatment method using IFT for various regions
  12. Calculation of dosage and technique of application of LASER
  13. Technique of treatment and application of Hydrocollator packs, cryotherapy, contrast bath, wax therapy
  14. Demonstrate the treatment method using whirl pool bath
  15. Winding up procedure after any electrotherapy treatment method.
- **Equipment care -**
  1. Checking of equipments
  2. Arrangement of exercise therapy and electro therapy equipment.
  3. Calibration of equipment
  4. Purchase, billing, document of equipment.
  5. Safety handling of equipments.
  6. Research lab equipment maintenance.
  7. Stock register, movement register maintenance

**MRSPTU BACHELOR OF PHYSIOTHERAPY  
SYLLABUS 2023 BATCH ONWARDS**

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**MEDICAL/PHYSIOTHERAPY LAW AND ETHICS**

**Subject Code: BPHTS1-407**

**L T P C  
2 0 0 2**

**Duration: 30 (Hrs.)**

**COURSE OBJECTIVE:**

- The students understand the concept and basic principles to know electrotherapy equipment's is given under this topic.
- The student will be learn about physics related to electrotherapy and application on human body tissues

**COURSE OUTCOME:**

- Understand the moral values and meaning of ethics.
- Develop psychomotor skills for physiotherapist-patient relationship
- Develop bed side behavior, respect & maintain patients' confidentiality

Legal and ethical considerations are firmly believed to be an integral part of medical practice in planning patient care. Advances in medical sciences, growing sophistication of the modern society's legal framework, increasing awareness of human rights and changing moral principles of the community at large, now result in frequent occurrences of healthcare professionals being caught in dilemmas over aspects arising from daily practice.

Medical/ Physiotherapy ethics has developed into a well based discipline which acts as a "bridge" between theoretical bioethics and the bedside. The goal is "to improve the quality of patient care by identifying, analyzing, and attempting to resolve the ethical problems that arise in practice". Doctors are bound by, not just moral obligations, but also by laws and official regulations that form the legal framework to regulate medical practice. Hence, it is now a universal consensus that legal and ethical considerations are inherent and inseparable parts of good medical practice across the whole spectrum. Few of the important and relevant topics that need to focus on are as follows:

**UNIT 1 (5 HOURS)**

- Medical ethics versus medical law - Definition - Goal - Scope
- Introduction to Code of conduct
- Basic principles of medical ethics – Confidentiality
- Malpractice and negligence - Rational and irrational drug therapy

**UNIT 2 (10 HOURS)**

- Autonomy and informed consent - Right of patients
- Care of the terminally ill- Euthanasia
- Organ transplantation
- Medical diagnosis versus physiotherapy diagnosis.

**UNIT 3 (10 HOURS)**

- Medico legal aspects of medical records – Medico legal case and type- Records and document related to MLC - ownership of medical records - Confidentiality Privilege

communication - Release of medical information - Unauthorized disclosure - retention of medical records - other various aspects.

- Professional Indemnity insurance policy
- Development of standardized protocol to avoid near miss or sentinel events

**UNIT 4 (5 HOURS)**

- Obtaining an informed consent.
- Biomedical ethical principles
- Code of ethics for physiotherapists
- Ethics documents for physiotherapists
- Laws affecting physiotherapy practice

**REFERENCE BOOK**

Physical agents in physiotherapy principles & Practice vol-1 Biophysics and therapeutic electricity by subin solomen, pravin aaron