

**MRSPTU B. SC. (DIALYSIS TECHNOLOGY) SYLLABUS
BATCH 2021 ONWARDS (4 YEARS COURSE)**

Total Credits: 25

Semester 1 ST		Contact Hours			Max Marks		Total Marks	Credits
Subject Code	Subject Name	L	T	P	Int.	Ext		
BDLTS1-101	Human Anatomy Part I	3	0	0	40	60	100	3
BDLTS1-102	Human Physiology Part I	3	0	0	40	60	100	3
BDLTS1-103	General Biochemistry & Nutrition	3	1	0	40	60	100	4
BDLTS1-104	Introduction to National HealthCare System (Multidisciplinary/ Interdisciplinary)	3	0	0	40	60	100	3
BDLTS1-105	Human Anatomy Part I- Practical	0	0	4	60	40	100	2
BDLTS1-106	Human Physiology Part I- Practical	0	0	4	60	40	100	2
BDLTS1-107	General Biochemistry - Practical	0	0	4	60	40	100	2
BDLTS1-108	English & Communication	3	0	0	40	60	100	3
BDLTS1-109	Drug abuse: problem, management and prevention	3	0	0	40	60	100	3
Total		-	-	-	420	480	900	25

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Total Credit: 26

Semester 2 nd		Contact Hours			Max Marks		Total Marks	Credits
Subject Code	Subject Name	L	T	P	Int.	Ext		
BDLTS1-201	Human Anatomy Part II	2	0	0	40	60	100	2
BDLTS1-202	Human Physiology Part II	2	0	0	40	60	100	2
BDLTS1-203	General Microbiology	3	0	0	40	60	100	3
BDLTS1-204	Basic Pathology & Hematology	3	1	0	40	60	100	4
BDLTS1-205	Introduction to Quality and Patient safety (Multidisciplinary/ Interdisciplinary)	3	0	0	40	60	100	3
BDLTS1-206	Human Anatomy Part II- Practical	0	0	4	60	40	100	2
BDLTS1-207	Human Physiology Part II- Practical	0	0	2	60	40	100	1
BDLTS1-208	General Microbiology- Practical	0	0	4	60	40	100	2
BDLTS1-209	Basic Pathology & Hematology- Practical	0	0	4	60	40	100	2
BDLTS1-210	Environmental Science	3	0	0	40	60	100	3
BDLTS1-211	Computer Fundamentals - Theory	2	0	0	40	60	100	2
Total		-	-	-	520	580	1100	26

Students shall undergo 4 weeks DLT Directed Clinical training after 2nd semester during summer vacation in hospitals, Lab, etc. as per the requirements of the program.

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HUMAN ANATOMY- PART I

Subject Code: BDLTS1-101

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

Duration: 45 (Hrs.)

Teaching Objective:

- To introduce the students to the concepts related to General anatomy, Muscular, Respiratory, Circulatory, Digestive and Excretory system

Learning Outcomes:

- Comprehend the normal disposition, interrelationships, gross, functional and applied anatomy of various structures in the human body.
- Demonstrate and understand the basic anatomy of Respiratory and Circulatory system
- Demonstrate and understand the basic anatomy of Digestive and Excretory system

Unit-1 (13 hrs.)

- **Introduction to Anatomy , Terminology, Cell and Cell division, Tissues of body, Skin**
- **Skeletal System:** Classification of bones, Parts of developing long bone and its blood supply, Joints I- Classification of joints, Joints II- Synovial Joint, Appendicular skeleton I- Bones of upper Limb, Appendicular skeleton II- Bones of lower limb, Axial skeleton-I, Axial skeleton-II.

Unit 2 (11 hrs.)

- **Muscular System:** Muscle I-Types, Muscle II- Muscle groups and movements, Muscles of Upper limb, Muscles of lower limb, Muscles of Neck, Muscles of back, Muscles of abdomen.
- **Joints:** Shoulder, Hip, Knee, Movements and muscle groups producing movements at other joints.

Unit 3 (11 hrs.)

- **Respiratory System:** Introduction to Respiratory system, Larynx, Thoracic cage and diaphragm, Lung & Pleura, Trachea & Bronchopulmonary segments, Mediastinum.
- **Circulatory System:** Types of blood vessels, Heart & Pericardium, Coronary Circulation, Overview of Media stenum, Blood vessels of Thorax.

Unit 4 (10 hrs.)

- **Digestive System:** GIT I- Pharynx, Oesophagus, GIT II- Stomach, GIT III- Small and Large Intestine, GIT IV- Liver & Gall Bladder, GIT V- Spleen, GIT VI- Pancreas , Salivary glands.
- **Excretory System:** Kidney, Ureter, Bladder, Urethra, Pelvis dynamic

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HUMAN ANATOMY PART I- PRACTICAL

Subject Code: BDLTS1-105

**L T P C
0 0 4 2**

Duration: 4 Hrs./ Week

EXPERIMENTS

- **Introduction to Anatomy, Terminology, Cell and Cell division, Tissues of body, Skin**
- **Skeletal System:** Classification of bones, Parts of developing long bone and its blood supply, Joints- Classification of joints, Joints II- Synovial Joint, Appendicular skeleton I- Bones of upper Limb, Appendicular skeleton II- Bones of lower limb, Axial skeleton-I , Axial skeleton-II.
- **Muscular System:** Muscle I-Types, Muscle II- Muscle groups and movements, Muscles of Upper limb, Muscles of lower limb, Muscles of Neck, Muscles of back, Muscles of abdomen.
- **Joints:** Shoulder, Hip, Knee, Movements and muscle groups producing movements at other joints.
- **Respiratory System:** Introduction to Respiratory system, Larynx, Thoracic cage and diaphragm, Lung & Pleura , Trachea & Bronchopulmonary segments , Mediastinum
- **Circulatory System:** Types of blood vessels, Heart& Pericardium, Coronary Circulation, Overview of media stenum , Blood vessels of Thorax
- **Digestive System:** GIT I- Pharynx, Oesophagus, GIT II-Stomach, GIT III- Small and Large Intestine, GIT IV-Liver & Gall Bladder, GIT V- Spleen, GIT VI-Pancreas , Salivary glands
- **Excretory System:** Kidney, Ureter, Bladder, Urethra, Pelvis dynamic

Text Books:

- Manipal Manual of Anatomy for Allied Health Sciences courses: Madhyastha S.
- G.J. Tortora& N.P Anagnostakos: Principles of Anatomy and Physiology
- B.D. Chaurasia: Handbook of General Anatomy

Reference books:

- B.D. Chaurasia: Volume I-Upper limb & Thorax, Volume II- Lower limb, Abdomen & Pelvis Volume III- Head, Neck, Face Volume IV- Brain-Neuroanatomy
- Vishram Singh: Textbook of Anatomy Upper limb & Thorax Textbook of Anatomy Abdomen & Lower limb Textbook of Head neck and Brain
- Peter L. Williams And Roger Warwick:- Gray's Anatomy - Descriptive and Applied, 36th Ed; Churchill Livingstone.
- T.S. Ranganathan: Text book of Human Anatomy
- Inderbirsingh, G P Pal: Human Embryology
- Textbook of Histology, A practical guide:- J.P Gunasegaran

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HUMAN PHYSIOLOGY PART I

Subject Code: BDLTS1-102

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

Duration: 45 (Hrs.)

Teaching objective:

- To teach basic physiological concepts related to General physiology, Hematology, Nerve-Muscle physiology, Cardiovascular, Digestive & Respiratory physiology

Learning outcomes:

- To understand the basic physiological concepts of General physiology
- To understand the basic physiological concepts of Hematology
- To understand the basic physiological concepts of Nerve-Muscle physiology
- To understand the basic physiological concepts of Respiratory physiology
- To understand the basic physiological concepts of Cardiovascular physiology

Unit 1

(13 hrs.)

- **General Physiology:** Introduction to physiology, Homeostasis, Transport Across cell membrane.
- **Blood:** Composition, properties and functions of Blood, Haemopoiesis, Haemogram (RBC, WBC, Platelet count, Hb Concentrations), Blood Groups– ABO and RH grouping, Coagulations & Anticoagulants, Anemias: Causes, effects & treatment, Body Fluid: Compartments, Composition, Immunity – Lymphoid tissue.

Unit 2

(10 hrs.)

- **Cardio vascular system:** Introduction, general organization, functions & importance of CVS, Structure of heart, properties of cardiac muscle, Junctional tissues of heart & their functions, Origin & spread of Cardiac Impulse, cardiac pacemaker, Cardiac cycle & ECG, Heart Rate & its regulation, Cardiac output, Blood Pressure definition & normal values, Physiological needs & variation, regulation of BP.

Unit 3

(7 hrs.)

- **Digestive system:** General Introduction, organization, innervations & blood supply of Digestive System, Composition and functions of all Digestive juices, Movements of Digestive System (Intestine), Digestion & Absorption of Carbohydrate, Proteins & Fats

Unit 4

(15 hrs.)

- **Respiratory System:** Physiologic anatomy, functions of respiratory system, non-respiratory functions of lung, Mechanism of respiration, Lung Volumes & capacities, Transport of Respiratory Gases O₂, Transport of Respiratory Gases CO₂, Regulation of Respiration.
- **Muscle nerve physiology:** Structure of neuron & types, Structure of skeletal Muscle, Sarcomere, Neuromuscular junction & Transmission. Excitation & contraction coupling (Mechanism of muscle contraction).

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HUMAN PHYSIOLOGY PART I – PRACTICAL

Subject Code: BDLTS1-106

**L T P C
0 0 4 2**

Duration: 4 Hrs./ Week

EXPERIMENTS

- Study of Microscope and its use, Collection of Blood and study of Haemocytometer
- Haemoglobinometry
- White Blood Cell count
- Red Blood Cell count
- Determination of Blood Groups
- Leishman's staining and Differential WBC Count
- Determination of Bleeding Time, Determination of Clotting Time
- Pulse & Blood Pressure Recording, Auscultation for Heart Sounds
- Artificial Respiration –Demonstration, Spirometry-Demonstration

Textbooks

- Basics of medical Physiology –D Venkatesh and H.H Sudhakar, 3rd edition.
- Principles of Physiology – DevasisPramanik, 5th edition.
- Human Physiology for BDS –Dr A.K. Jain, 5th edition.
- Textbook of human Physiology for dental students-Indukhurana 2nd edition.
- Essentials of medical Physiology for dental students –Sembulingum.

Reference books

- Textbook of Medical Physiology, Guyton , 2nd South Asia Edition.
- Textbook of Physiology Volume I & II (for MBBS) – Dr. A. K. Jain.
- Comprehensive textbook of Medical Physiology Volume I & II – Dr. G. K. Pal.

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GENERAL BIOCHEMISTRY & NUTRITION

Subject Code: BDLTS1-103

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

Duration: 60(Hrs.)

Teaching Objective:

- At the end of the course, the student demonstrates his knowledge and understanding on:
- Structure, function and interrelationship of biomolecules and consequences of deviation from normal.
- Integration of the various aspects of metabolism, and their regulatory pathways.
- Principles of various conventional and specialized laboratory investigations and instrumentation, analysis and interpretation of a given data.
- To diagnose various nutritional deficiencies
- Identify condition and plan for diet

Provide health education base on the client deficiencies

Learning Outcomes:

- Define “biochemistry.”
- Identify the five classes of polymeric biomolecules and their monomeric building blocks.
- Explain the specificity of enzymes (biochemical catalysts), and the chemistry involved in enzyme action.
- Explain how the metabolism of glucose leads ultimately to the generation of large quantities of ATP.
- Describe how fats and amino acids are metabolized, and explain how they can be used for fuel.
- Describe the structure of DNA, and explain how it carries genetic information in its base sequence.
- Describe DNA replication, RNA and protein synthesis.
- Explain how protein synthesis can be controlled at the level of transcription and translation.

Summarize what is currently known about the biochemical basis of Cancer.

Unit 1

(15hrs)

- Introduction and scope of biochemistry.
- **Chemistry of carbohydrates, proteins, lipids and nucleic acid–Chemistry of Carbohydrates:** Definition, Functions, Properties, Outline of classification with eg (Definition of Monosaccharides, Disaccharides, Polysaccharides and their examples).
- **Chemistry of Proteins:** Amino acids (total number of amino acids, essential and non-essential Amino acids). Definition, Classification of Proteins Structural organization of protein, Denaturation of Proteins.
- **Chemistry of Lipids:** Definition, functions, Classification (Simple Lipids, Compound

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Lipids, Derived Lipids). Essential Fatty Acids.

- **Chemistry of Nucleic acid:** Nucleosides and Nucleotides, Watson and Crick model of DNA, RNA- its type along with functions.

Unit 2 **(10 hrs)**

- **Elementary knowledge of enzymes:**
- Classification, mechanism of enzyme action, Factors Affecting Activity of enzymes, enzyme specificity, Enzyme inhibition, Isoenzymes and their diagnostic importance.
- **Biological oxidation:**
- Brief concept of biological oxidation: Definition of Oxidative phosphorylation Electron transport chain. Inhibitors and Uncouples briefly

Unit 3 **(15 hrs)**

- **Metabolism of Carbohydrate:**
- Glycolysis, TCA cycle, Definition and significance of glycogenesis and glycogenolysis. Definition and significance of HMP shunt, definition and significance of gluconeogenesis. Regulation of blood Glucose level, Diabetes Mellitus, Glycosuria. Glucose Tolerance Test.
- **Metabolism of Proteins:**
- Transamination, Trans methylation reactions. Urea cycle, Functions of glycine, tyrosine, phenylalanine, tryptophan and Sulphur containing amino acids.
- **Metabolism of Lipid:**
- Outline of beta oxidation with energetic, Ketone bodies (Enumerate) and its importance. Functions of cholesterol and its biomedical significance. Lipid profile and its diagnostic importance. Fatty liver, lipotropic factor, atherosclerosis.
- **Metabolism of Nucleic acid:**
- Purine catabolism (Formation of uric acid), Gout.

Unit 4 **(20 hrs)**

- **Vitamins and Minerals:**
- RDA, Sources, functions and deficiency manifestations of Fat soluble vitamins. RDA, Sources, functions and deficiency manifestations of Water soluble vitamins. RDA, Sources, functions and deficiency manifestations of Calcium, Phosphorous, Iron, Iodine.
- **Principle and applications of:**
- Colorimeters, pH Meter
- **Pre examination Skills:**
- Collection and preservation of samples (Anticoagulants), transportation & Separation of biological specimens, Sample rejection criteria, Disposal of Biological Waste materials.
- **Nutrition:**
- History of Nutrition, Nutrition as a science, Food groups, RDA, Balanced diet, diet

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planning, Assessment of nutritional status.

- **Energy:** Units of energy, Measurements of energy and value of food, Energy expenditure, Total energy/calorie requirement for different age groups and diseases, Satiety value, Energy imbalance- obesity, starvation, Limitations of the daily food guide, Role of essential nutrients in the balanced diet.

Textbooks

- Textbook of Medical Laboratory Technology, Volume 1, 3rd Edition by Praful Ghodkar
- Textbook of Medical Laboratory Technology, Volume 2, 3rd Edition by Praful Ghodkar
- Medical Laboratory Technology (Volume 1): Procedure Manual for Routine Diagnostic, Kanai Mukharjee
- Medical Laboratory Technology (Volume 2): Procedure Manual for Routine Diagnostic, Kanai Mukharjee
- Medical Laboratory Technology (Volume 3): Procedure Manual for Routine Diagnostic, Kanai Mukharjee
- Essentials of Biochemistry, Second Edition, Dr. (Prof) Satyanarayan

Reference books

- An Introduction to Chemistry, 8th Edition by Mark Bishop
- Clinical Chemistry made easy, 1st Edition by Hughes
- Tietz Fundamentals of Clinical Chemistry, 7th Edition by Carl Burtis

GENERAL BIOCHEMISTRY - PRACTICAL

Subject Code BDLTS1-107	L T P C	Duration: 4 Hrs./ Week
	0 0 4 2	

EXPERIMENTS

- Introduction to Personnel protective equipment used in laboratory and their importance (LCD)
- Handling of colorimeters – operation and maintenance (LCD)
- Serum electrolytes measurement (only demo)
- Demonstration of semi-automated / fully automated blood analyzer
- Demonstration of tests for carbohydrates (Monosaccharides, disaccharides and polysaccharides)
- Precipitation Reactions of protein (only demonstration)
- Test on bile salts (only demonstration)
- Tests on Normal constituents of Urine (only demo)
- Tests on Abnormal constituents of Urine (only demo)

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Textbooks:

- Textbook of Medical Laboratory Technology, Volume 1, 3rd Edition by Praful Ghodkar
- Textbook of Medical Laboratory Technology, Volume 2, 3rd Edition by Praful Ghodkar
- Medical Laboratory Technology (Volume 1): Procedure Manual for Routine Diagnostic, Kanai Mukharjee
- Medical Laboratory Technology (Volume 2): Procedure Manual for Routine Diagnostic, Kanai Mukharjee
- Medical Laboratory Technology (Volume 3): Procedure Manual for Routine Diagnostic, Kanai Mukharjee
- Essentials of Biochemistry, Second Edition, Dr. (Prof) Satyanarayana
- Essentials of Biochemistry, 2nd Edition, Dr. Pankaja Naik
- Principles and Techniques of Biochemistry and Molecular Biology, 5th Edition, Wilson & Walker

Reference books:

- An Introduction to Chemistry, 8th Edition by Mark Bishop
- Clinical Chemistry made easy, 1st Edition by Hughes
- Tietz Fundamentals of Clinical Chemistry, 7th Edition by Carl Burtis

**INTRODUCTION TO NATIONAL HEALTH CARE SYSTEM (MULTIDISCIPLINARY/
INTERDISCIPLINARY)**

Subject Code: BDLTS1-104

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

Duration: 45 (Hrs.)

Teaching Objective:

- To teach the measures of the health services and high-quality health care
- To understand whether the health care delivery system is providing high-quality health care and whether quality is changing over time.
- To provide to the National Health Programme- Background objectives, action plan, targets, operations, in various National Health Programme.
- To introduce the AYUSH System of medicines.

Learning Outcomes:

- 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.

Unit 1

(18 hrs)

- **Introduction to healthcare delivery system:** Healthcare delivery system in India at primary, secondary and tertiary care; Community participation in healthcare delivery system; Health system in Developed countries; Private /Govt. Sector; National Health Mission; National

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Health Policy; 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 **(12 hrs)**

- **Introduction to AYUSH system of medicine:** Introduction to Ayurveda; Yoga and Naturopathy; Unani; Siddha; Homeopathy; Need for integration of various system of Medicine

Unit 3 **(7 hrs)**

- **Health scenario of India:** Past, present and future
- **Demography & Vital Statistics:** Demography – its concept; Census & its impact on health policy

Unit 4 **(8 hrs)**

- **Epidemiology:** Principles of Epidemiology; Natural History of disease; Methods of Epidemiological studies; Epidemiology of communicable & non-communicable diseases, disease, transmission, host defense immunizing agents, cold chain, Immunization, disease, monitoring and surveillance

Books:

- National Health Programs Of India National Policies and Legislations Related to Health: 1 J. Kishore (Author)
- A Dictionary of Public Health Paperback by J Kishor
- Health System in India: Crisis & Alternatives , National Coordination Committee, Jan Swasthya Abhiyan
- In search In Search of the Perfect Health System
- Central Bureau of Health Intelligence (1998). Health Information of India, Ministry of Health and Family Welfare, New Delhi.
- Goyal R. C. (1993). Handbook of Hospital Personal Management, Prentice Hall of India, New Delhi, 17–41. Ministry of Health and Family Welfare (1984). National Health Policy, Annual Report (1983–4), Government of India, New Delhi
- Historical Development of Health Care in India, Dr. Syed Amin Tabish,
- cultural Competence in Health Care by Wen-Shing Tseng (Author),Jon Streltzer(Author)
- Do We Care: India’s Health System by K. Sujatha Rao (Author)

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ABILITY ENHANCEMENT ELECTIVE COURSE

ENGLISH AND COMMUNICATION SKILLS

Subject Code: BDLTS1-108

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

Duration: 45 (Hrs.)

Teaching Objective:

- This course deals with essential functional English aspects of the of communication skills essential for the health care professionals.
- To train the students in oral presentations, expository writing, logical organization and Structural support.

Learning Outcomes:

- Able to express better.
- Grow personally and professionally and Develop confidence in every field

Unit 1

(15 hrs)

- **Basics of Grammar:** Vocabulary, Synonyms, Antonyms, Prefix and Suffix, Homonyms, Analogies and Portmanteau words
- **Basics of Grammar** –Active, Passive, Direct and Indirect speech, Prepositions, Conjunctions and Euphemisms
- **Writing Skills:** Letter Writing, Email, Essay, Articles, Memos, one word substitutes, note making and Comprehension

Unit 2

(08 hrs)

- Writing and Reading, Summary writing, Creative writing, newspaper reading
- Practical Exercise, Formal speech, Phonetics, semantics and pronunciation

Unit 3

(10 hrs)

- **Introduction to communication skills:** Communication process, Elements of communication, Barriers of communication and how to overcome them, Nuances for communicating with patients and their attenders in hospitals.
- **Speaking:** Importance of speaking efficiently, Voice culture, Preparation of speech. Secrets of good Delivery, Audience psychology, handling, Presentation skills, Individual feedback for each student, Conference/Interview technique.

Unit 4

(12 hrs)

- **Listening:** Importance of listening, Self-assessment, Action plan execution, Barriers in listening, Good and persuasive listening.

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- **Reading:** What is efficient and fast reading, Awareness of existing reading habits, tested techniques for improving speed, Improving concentration and comprehension through systematic study.
- **Non Verbal Communication:** Basics of non-verbal communication, Rapport building skills using neuro- linguistic programming (NLP), Communication in Optometry practice.

Text books:

- Graham Lock, Functional English Grammar: Introduction to second Language Teachers. Cambridge University Press, New York, 1996.
- Gwen Van Servellen. Communication for Health care professionals: Concepts, practice and evidence, Jones & Bartlett Publications, USA, 2009

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DRUG ABUSE: PROBLEM, MANAGEMENT AND PREVENTION

Subject Code: BDLTS1-109

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

Duration: 45 (Hrs.)

Course Objectives:

- To make students understand the concept of drug abuse and their impact on public health.
- To make students understand the types of drugs.
- To make them aware of the impact of drugs addiction on families and peers.
- To make students understand the management and prevention of drug abuse.

Course Outcomes:

- Students gain knowledge about detrimental impacts of drug on health and relations.
- Students become aware about the physiological and sociological causes of drug abuse.
- Students acquire knowledge about types of drugs.
- Students acquire knowledge about management and prevention of drug abuse.

Unit-1

(13 hrs)

- **Problem of Drug Abuse:** Concept and Overview; Types of Drug Often Abused
- **Concept and Overview:** What are drugs and what constitutes Drug Abuse?, Prevalence of menace of Drug Abuse, How drug Abuse is different from Drug Dependence and Drug Addiction?, Physical and psychological dependence-concepts of drug tolerance
- **Introduction to drugs of abuse:** Short Term, Long term effects & withdrawal symptoms
- **Stimulants:** Amphetamines, Cocaine, Nicotine
- **Depressants:** Alcohol, Barbiturates- Nembutal, Seconal, Phenobarbital Benzodiazepines Diazepam, Alprazolam, Flunitrazepam
- **Narcotics:** Opium, morphine, heroin
- **Hallucinogens:** Cannabis & derivatives (marijuana, hashish, hash oil), Steroids and inhalants.

Unit-2

(11 hrs)

- **Nature of the Problem:** Vulnerable Age Groups
- Signs and symptoms of Drug Abuse: Physical indicators, Academic indicators, Behavioral and Psychological indicators

Unit-3

(11 hrs)

- **Causes and Consequences of Drug Abuse**
- **Causes:** Physiological, Psychological & Sociological
- **Consequences of Drug Abuse:** For individuals, For families & For society & Nation

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Unit 4

(10 hrs)

- **Management & Prevention of Drug Abuse:** Management of Drug Abuse, Prevention of Drug Abuse & Role of Family, School, Media, Legislation & Deaddiction Centers

Recommended Text Books / Reference Books:

- Kapoor. T., Drug Epidemic among Indian Youth, Mittal Pub, New Delhi, 1985.
- Modi, Ishwar and Modi, Shalini, Drugs: Addiction and Prevention, Rawat Publication, Jaipur, 1997.
- Ahuja, Ram, Social Problems in India, Rawat Publications, Jaipur, 2003.
- National Household Survey of Alcohol and Drug Abuse. New Delhi, Clinical Epidemiological Unit
- All India Institute of Medical Sciences, 2004.
- World Drug Report, United Nations Office of Drug and Crime, 2011
- World Drug Report, United Nations Office of Drug and Crime, 2010.
- Extent, Pattern and Trend of Drug Use in India, Ministry of Social Justice and Empowerment, Government of India, 2004

2nd Semester

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HUMAN ANATOMY- PART II

Subject Code: BDLTS1-201

L T P C
2 0 0 2

Duration: 30 (Hrs.)

Teaching Objective:

- To teach the students the basic anatomy of Reproductive, Lymphatic Endocrine, Nervous system and Special senses.

Learning Outcomes:

- Demonstrate and understand the basic anatomy of Reproductive and Lymphatic system.
- Demonstrate and understand the basic anatomy of Endocrine, Nervous system.
- Demonstrate and understand the basic anatomy of Special senses.

Unit 1

(5 hrs)

- **Reproductive system:** Male- Testis, Spermatic Cord, Female- Ovaries & Fallopian tube, Uterus

Unit 2

(10 hrs)

- **Lymphatic system:** Lymphoid Organs, Lymph node groups- Cervical, Axillary, Inguinal
- **Endocrine system:** Thyroid, Parathyroid, Adrenal, Pituitary

Unit 3

(10 hrs)

- **Nervous system:** Introduction to nervous system(Neuron, ANS, PNS) Meninges, Cerebrum I, Cerebrum II, Cerebellum, Blood supply of Brain, Brain stem, Spinal cord, Cranial and peripheral nerves, CSF & Ventricles.

Unit 4

(5 hrs)

- **Sensory system:** Eye (Gross anatomy), Ear

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HUMAN PHYSIOLOGY PART II

Subject Code: BDLTS1-202

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

Duration: 30 (Hrs.)

Teaching Objective:

- To teach basic physiological concepts related to Renal physiology, Endocrinology & Reproductive physiology, CNS, Special senses.

Learning Outcomes:

- To understand the basic physiological concepts of Renal physiology
- To understand the basic physiological concepts of Endocrinology & Reproductive physiology
- To understand the basic physiological concepts of CNS, Special senses

Unit 1 (16 hrs)

- **Nervous system:** Functions of Nervous system, Neuron – Conduction of Impulses, factors affecting, Synapse- transmission, Receptors, Reflexes Ascending tracts, Descending tracts, Functions of various parts of the Brain. Cerebro-Spinal Fluid (CSF): Composition, functions & Circulation, Lumbar Puncture, Autonomic Nervous System (ANS): Functions.
- **Special senses: Vision:** Structure of Eye, functions of different parts, Refractive errors of Eye and correction, Visual Pathway, Colour vision & tests for colour Blindness, Hearing: Structure and function of ear, Mechanism of Hearing, Tests for Hearing (Deafness).

Unit 2 (6 hrs)

- **Skin:** Structure and function, Body temperature, Regulation of Temperature & fever.
- **Endocrine System:** Short description of various endocrine glands and their functions.

Unit 3 (4 hrs)

- **Reproductive systems:** Structure & Functions of Reproductive system, Male Reproductive System: spermatogenesis, Testosterone, Female reproductive system: Ovulation, Menstrual cycle, Oogenesis, Tests for Ovulation, Oestrogen & Progesterone, Pregnancy test, Parturition. Contraceptives, Lactation: Composition of Milk, advantages of breast Feeding

Unit 4 (4 hrs)

- **Excretory System-** General Introduction, structure & functions of kidney, Renal circulation, Glomerular filtration & tubular reabsorption, Nephron, Juxta Glomerular Apparatus, Mechanism of Urine formation, Micturition, Cystomatogram. Diuretics, Artificial Kidney.

**MRSPTU B. SC. (DIALYSIS TECHNOLOGY) SYLLABUS
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GENERAL MICROBIOLOGY

Subject Code: BDLTS1-203

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

Duration: 45 (Hrs.)

Teaching Objective:

- To introduce basic principles and then applies clinical relevance in four segments of the academic preparation for paramedical: immunology, bacteriology, mycology, and virology. This rigorous course includes many etiological agents responsible for global infectious diseases.

Learning Outcomes:

- Upon completion, students should be able to demonstrate knowledge of microorganisms and the Disease process as well as aseptic and sterile techniques.
- Perform microbiological laboratory procedures according to appropriate safety standards

Unit 1

(15 hrs)

- **Concepts and Principles of Microbiology:** Historical Perspective, Koch's Postulates, Importance of Microbiology, Microscopy, Classification of Microbes.
- **General Characters of Microbes:** Morphology, staining methods, Bacterial growth & Nutrition, Culture media and culture methods +ABS, Collection of specimen, transport and processing, Antimicrobial mechanism and action, Drug Resistance minimization.
- **Sterilization and Disinfection:** Concept of sterilization, Disinfection aseptis, Physical methods of Sterilization, Chemical methods (Disinfection), OT Sterilization, Biological waste and Biosafety & Biohazard.

Unit 2

(15 hrs)

- **Infection and Infection Control:** Infection, Sources, portal of entry and exit, Standard (Universal) safety Precautions & hand hygiene, Hospital acquired infections & Hospital Infection Control.
- **Immunity:** Types Classification, Antigen, Antibody – Definition and types, Ag-Ab reactions –Types and examples, Procedure of Investigation & Confidentiality, Immunoprophylaxis – Types of vaccines, cold chain, Immunization Schedule.
- **Systemic Bacteriology (Morphology, diseases caused, specimen collection & lists of laboratory tests)** Introduction, Gram Positive Cocci & Gram Negative Cocci, Enterobacteraceae & Gram negative bacilli, Mycobacteria, Anaerobic bacteria & Spirochaetes, Zoonotic diseases, Common Bacterial infections of eye

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Unit 3 **(10 hrs)**

- **Mycology:** Introduction, Classification, outline of lab diagnosis, List of Fungi
- **Causing:** Common fungal infections of eyes, Superficial Mycoses, Deep mycoses & opportunistic, Fungi.
- **Virology:** Common Viral infection of eye, Introduction, General Properties, outline of lab diagnosis & Classification, HIV Virus, Hepatitis -B Virus.

Unit 4 **(5 hrs)**

Parasitology: Morphology, Life Cycle & Outline of Lab Diagnosis & Classification, Common Parasite infection of eye, Protozoa- E, histolytica, Malarial Parasite, General properties, classification, List of diseases caused by: Cestodes and Trematodes, Intestinal Nematodes & Tissue Nematodes, Vectors.

BASIC PATHOLOGY & HEMATOLOGY

Subject Code: BDLTS1-204

L T P C
3 1 0 4

Duration: 60 (Hrs.)

Teaching Objective:

- Understand the importance of clinical information in supporting a timely, accurate pathological diagnosis.
- Describe normal and disordered hematopoiesis
- Develop implement and monitor a personal continuing education strategy and critically appraise sources of pathology related medical information.
- Describe mechanisms of on cogenesis & demonstrate an understanding of genetics and cytogenetics pertaining to hematology

Learning Outcomes:

- The student should submit the appropriate tissue sections per protocol to demonstrate the lesion and other clinically-relevant information needed for the final pathologic report.
- To aid hematology in the reference ranges for hemoglobin, hematocrit, erythrocytes, and leukocytes in infants, children and adult.

Unit 1 **(13 hrs)**

- Introduction to Pathology
- Working and maintenance of instruments
- General principles of Haematology techniques, blood collection, anticoagulants, fixation,

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processing, routine staining, Haemoglobin, TLC, DLC, Peripheral smear (CBC report), platelet counts, cell counter working.

Unit 2 **(18 hrs)**

- General principles of Histopathology techniques collection, fixation, processing & routine staining.
- General principles of Cytopathology techniques collection, fixation, processing & routine staining.
- General principles of Clinical Pathology techniques sample collection, Processing for routine test, Normal urine & urine examination, urine strip, introductions to body fluids (Distinguish between Transudate and exudate)

Unit 3 **(09 hrs)**

- General principles of Blood Bank techniques antigen, antibody, ABO & Rh system
- General principles of Autopsy & Museum.

Unit 4 **(16 hrs)**

- **General Pathology including introduction to :**Cell Injury (Reversible, Irreversible cell injury) Inflammation (Acute inflammation, cells, chronic inflammation, granuloma and examples Circulatory disturbances (Thrombosis, Embolism, Edema- ascetic, pleural, pericardial- effusions, Shock, Allergy, Anaphylaxis-Definition, Morphological features and distinguishing features) Neoplasia (Definition of Anaplasia, dysplasia, metaplasia and metastasis and difference between benign and malignant lesions).

Unit 5 **(04 hrs)**

- Maintenance and medico legal importance of records and specimens, Lab information system (LIMS).
- Biomedical Waste, Universal Safety Precaution (Protocol to be followed after-Needle injury, chemical Injury).

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INTRODUCTION TO QUALITY AND PATIENT SAFETY

Subject Code: BDLTS1-205

L T P C
3 0 0 3

Duration: 45 (Hrs.)

Teaching 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.
- To understand the basics of emergency care and life support skills.
- To Manage an emergency including moving a patient
- To help prevent harm to workers, property, the environment and the general public.
- To provide a broad understanding of the core subject areas of infection prevention and control
- To provide knowledge on the principles of on-site disaster management

Learning Outcomes:

- Upon completion, Students should be able to apply healthcare quality improvement and patient safety principles, concepts, and methods at the micro-, meso-, and macro-system levels

Unit 1

(14 hrs)

- **Quality assurance and management:** Concepts of Quality of Care, Quality Improvement Approaches, Standards and Norms, Introduction to NABH guidelines
- **Basics of emergency care and life support skills:** Basic life support (BLS), Vital signs and primary assessment, Basic emergency care – first aid and triage, Ventilations including use of bag-valve-masks (BVMs), Choking, rescue breathing methods, One- and Two-rescuer CPR.

Unit 2

(16 hrs)

- **Bio medical waste management and environment safety:** Definition of Biomedical Waste, Waste minimization, BMW – Segregation, collection, transportation, treatment and disposal (including Color coding), Liquid BMW, Radioactive waste, Metals / Chemicals / Drug waste, BMW Management & methods of disinfection, Modern technology for handling BMW, Use of Personal protective Equipment (PPE), Monitoring & controlling of cross infection (Protective devices).
- **Infection prevention and control:** Evidence-based infection control principles and practices [such as sterilization, disinfection, effective hand hygiene and use of Personal protective equipment (PPE)], Prevention & control of common healthcare associated infections, Components of an effective infection control program, Guidelines (NABH and JCI) for Hospital Infection Control.

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Unit 3

(10 hrs)

- **Antibiotic Resistance:**History of Antibiotics, How Resistance Happens and Spreads, Types of resistance- Intrinsic, Acquired, Passive, Trends in Drug Resistance, Actions to Fight Resistance, Bacterial persistence, Antibiotic sensitivity, Consequences of antibiotic resistance

Unit 4

(5 hrs)

- **Disaster preparedness and management:** Fundamentals of emergency management, Psychological impact management, Resource management, Preparedness and risk reduction, information management, incident command and institutional mechanisms.

Reference Books:

- Washington Manual of Patient Safety and Quality Improvement Paperback – 2016 by Fondahn (Author)
- Understanding Patient Safety, Second Edition by Robert Wachter(Author)
- Handbook of Healthcare Quality& Patient Safety Author : Girdhar J Gyani, Alexander Thomas
- Researching Patient Safety and Quality in Healthcare: A Nordic Perspective Karina Aase, LeneSchibevaag
- Old) Handbook Of Healthcare Quality & Patient Safety by GyaniGirdhar J (Author)
- Handbook of Healthcare Quality & Patient Safety by .Gyani G J/Thomas A
Quality Management in Hospitals by S. K. Jos

HUMAN ANATOMY PART II (DEMONSTRATION)

Subject Code: BDLTS1-206

**L T P C
0 0 4 2**

Duration: 4 Hrs./week

Experiments

- **Reproductive system:** Male- Testis, Spermatic Cord, Female- Ovaries & Fallopian tube, Uterus
- **Lymphatic system:** Lymphoid Organs, Lymph node groups- Cervical, Axillary, Inguinal
- **Endocrine system:** Thyroid, Parathyroid, Adrenal, Pituitary
- **Nervous system:** Introduction to nervous system (Neuron, ANS, PNS) Meninges, Cerebrum I, Cerebrum II, Cerebellum, Blood supply of Brain, Brainstem, Spinal cord, Cranial and peripheral nerves, CSF & Ventricles
- **Sensory system:** Eye (Gross anatomy), Ear

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Textbooks:

- Manipal Manual of Anatomy for Allied Health Sciences courses: Madhyastha S.
- G.J. Tortora & N.P. Anagnostakos: Principles of Anatomy and Physiology
- B.D. Chaurasia: Handbook of General Anatomy

Reference books:

- B.D. Chaurasia : Volume I-Upper limb & Thorax,
Volume II- Lower limb, Abdomen & Pelvis
Volume III- Head, Neck, Face
Volume IV- Brain-Neuroanatomy
- Vishram Singh: Textbook of Anatomy Upper limb & Thorax Textbook of Anatomy
Abdomen & Lower limb Textbook of Head neck and Brain
- Peter L. Williams And Roger Warwick:- Gray's Anatomy - Descriptive and Applied,
36th Ed; Churchill Livingstone.
- T.S. Ranganathan : Text book of Human Anatomy
- Inderbirsingh, G P Pal : Human Embryology
- Textbook of Histology, A practical guide:- J.P Gunasegaran

HUMAN PHYSIOLOGY PART II – (DEMONSTRATION)

Subject Code: BDLTS1-207

L T P C
0 0 2 1

Duration: 4 Hrs./week

Experiments

- Recording of body temperature
- Examination of sensory system
- Examination of motor system
- Examination of Eye
- Examination of ear

Textbooks:

- Basics of medical Physiology –D Venkatesh and H.H Sudhakar, 3rd edition.
- Principles of Physiology – DevasisPramanik, 5th edition.
- Human Physiology for BDS –Dr A.K. Jain, 5th edition.
- Textbook of human Physiology for dental students-Indukhurana 2nd edition.
- Essentials of medical Physiology for dental students –Sembulingum.

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Reference books:

- Textbook of Medical Physiology, Guyton , 2nd South Asia Edition.
- Textbook of Physiology Volume I & II (for MBBS) – Dr. A. K. Jain.
- Comprehensive textbook of Medical Physiology Volume I & II – Dr. G. K. Pal.

GENERAL MICROBIOLOGY (DEMONSTRATION)

Subject Code: BDLTS1-208

**L T P C
0 0 4 2**

Duration: 4 Hrs./week

Experiments

- Concepts and Principles of Microbiology
- General Characters of Microbes
- Sterilization and Disinfection
- Infection and Infection Control
- Immunity
- Systemic Bacteriology (Morphology, diseases caused, specimen collection & lists of laboratory test)
- Mycology
- Virology
- Parasitology

Text Book:

- Text Book of Microbiology for Nursing Students, Anant Narayan Panikar
- Text Book of Ophthalmology, Khurana

Reference Book:

- Text Book of Microbiology, Baveja.

BASIC PATHOLOGY & HEMATOLOGY (DEMONSTRATION)

Subject Code: BDLTS1-209

**L T P C
0 0 4 2**

Duration: 4 Hrs./week

Experiments

- Working and maintenance of instruments.
- General principles of Haematology techniques, blood collection, anticoagulants, fixation, processing, routine staining, Haemoglobin, TLC, DLC, Peripheral smear (CBC report),

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- platelet counts, cell counter working.
- General principles of Histopathology techniques collection, fixation, processing & routine staining.
 - General principles of Cytopathology techniques collection, fixation, processing & routine staining
 - General principles of Clinical Pathology techniques sample collection, processing for routine test, normal Urine & urine examination, urine strip, introductions to body fluids (Distinguish between Transudate and exudate).
 - General principles of Blood Bank techniques antigen, antibody, ABO & Rh system.
 - General principles of Autopsy & Museum.

Reference Books:

- *A Handbook of Medical Laboratory (Lab) Technology: Editor) Second Edition. V.H. Talib(Ed.).*
- Comprehensive Textbook of Pathology for Nursing: Pathology Clinical Pathology Genetics. AkMandalShramana Choudhury, Published by Avichal Publishing Compnay | Language English
- Textbook of Medical Laboratory Technology- PrafulB. Godkar, Darshan P. Godkar
- Medical Laboratory Technology. Methods and Interpretations – RamnikSood (volume 1&2)
- Medical Laboratory technology a procedure manual for routine diagnostic test – vol – I, II, III. Kanai
L. Mukharjee Tata Mc graw hill pub. New Delhi.
- Practical Pathology P. Chakraborty Gargi Chakraborty New Central Book Agency, Kolkata.
- Theory & Practice of Histological Techniques John D. Bancroft^{et.al}. Churchill Livingstone Printed in China.
- Histochemistry in Pathology M.I. Filipe^{et.al}. Churchill Livingstone, London
- Hand Book of Histopathological & Histochemical Techniques C.F.A. Culling Butterworths Company Ltd. London.
- A Handbook of Medical Laboratory (Lab) Technology. By V.H Talib

**MRSPTU B. SC. (DIALYSIS TECHNOLOGY) SYLLABUS
BATCH 2021 ONWARDS (4 YEARS COURSE)**

ENVIRONMENTAL SCIENCES

Subject Code: BDLTS1-210

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

Duration: 45 (Hrs.)

Teaching Objective:

- To understand and define terminology commonly used in environmental science.
- To teach students to list common and adverse human impacts on biotic communities, soil, water, and air Quality.
- To understand the processes that govern the interactions of organisms with the biotic and abiotic.
- Understand the relationship between people and the environment; Differentiate between key ecological terms and concepts

Learning Outcomes:

- Current environmental issues and highlight the importance of adopting an interdisciplinary approach.
- Sample an ecosystem to determine population density and distribution Create food webs and analyze possible disruption of feeding relationships.

Unit 1

(13 hrs)

- **Components of Environment:** Hydrosphere, lithosphere, atmosphere and biosphere – definitions with examples; Interaction of man and environment;
- **Ecosystem:** Basic concepts, components of ecosystem, Tropic levels, food chains and food webs, Ecological pyramids, ecosystem functions, Energy flow in ecological systems, Characteristics of terrestrial fresh water and marine ecosystems
- **Global Environmental Problems:** Green House Effect, Acid rain, El Nino, Ozone depletion, deforestation, desertification, salination, biodiversity loss; chemical and radiation hazards.

Unit 2

(14 hrs)

- **Environmental pollution and degradation:** Pollution of air, water and land with reference to their Causes, nature of pollutions, impact and control strategies; perspectives of pollution in Urban, industrial and rural areas. Habitat Pollution by Chlorinated Hydrocarbons (DDT, PCBs, Dioxin etc, Endocrine Disrupting chemicals, Nutrient pollution.
- **Environmental Management:** Concept of health and sanitation, environmental diseases – infectious (Water and air borne) and pollution related, spread and control of these diseases, Health hazards due to pesticide and metal pollution, waste treatment, solid waste management, environmental standards and quality monitoring.

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Unit 3

(18 hrs)

- **Environmental Protection Act:** Environmental Laws, national movements, environmental ethics – Holistic approach of environmental protection and conservation, IUCN – role in environmental Protection. Concept with reference to UN – declaration, aim and objectives of human right policies With reference to India, recent north-south debate on the priorities of implementation, Environmental Protection Agency (EPA)
- **Bioremediation:** Oil spills, Wastewater treatment, chemical degradation, heavy Metals.

Books

- Gleeson, B. and Low, N. (eds.) 1999. Global Ethics and Environment, London, Routledge.
- Gleick, P. H. 1993. Water in Crisis. Pacific Institute for Studies in Dev., Environment & Security. Stockholm Env. Institute, Oxford Univ. Press.
- Groom, Martha J., Gary K. Meffe, and Carl Ronald Carroll. Principles of Conservation Biology. Sunderland: Sinauer Associates, 2006.
- Grumbine, R. Edward, and Pandit, M.K. 2013. Threats from Indidum, E.P., Odum, , I.L., Gerba, C.
- Rao, M.N. &Datta, A.K. 1987. Waste Water Treatment. Oxford and IBH Publishing Co. Pvt. Ltd.
- Raven, P.H., Hassenzahl, D.M. & Berg, L.R. 2012. Environment. 8th edition. John Wiley & Sons.
- Rosencranz, A., Divan, S., & Noble, M. L. 2001. Environmental law and policy in India. Tripathi 1992.
- Sengupta, R. 2003. Ecology and economics: An approach to sustainable development. OUP.
- Singh, J.S., Singh, S.P. and Gupta, S.R. 2014. Ecology, Environmental Science and Conservation. S. Chand Publishing, New Delhi.
- Sodhi, N.S., Gibson, L. & Raven, P.H. (eds). 2013. Conservation Biology: Voices from the Tropics. John Wiley & Sons.
- Thapar, V. 1998. Land of the Tiger: A Natural History of the Indian Subcontinent.
- Warren, C. E. 1971. Biology and Water Pollution Control. WB Saunders.
- Wilson, E. O. 2006. The Creation: An appeal to save life on earth. New York: Norton.
- World Commission on Environment and Development. 1987. Our Common Future. Oxford University Press

**MRSPTU B. SC. (DIALYSIS TECHNOLOGY) SYLLABUS
BATCH 2021 ONWARDS (4 YEARS COURSE)**

COMPUTER FUNDAMENTAL

Subject Code: BDLTS1-211

L T P C
2 0 0 2

Duration: 60 (Hrs.)

Course Objectives:

- Upon completion of the course the student shall be able to know the various types of application of computers in pharmacy
- know the various types of databases
- Know the various applications of databases in pharmacy.

Course Outcomes:

- This subject deals with the introduction Database, Database Management system, computer application in clinical studies and use of databases.

Unit -1

(5 hrs)

- **Number system: Binary number system, Decimal number system, Octal number system, Hexadecimal number systems, conversion decimal to binary, binary to decimal, octal to binary etc, binary addition, binary subtraction – One's complement ,Two's complement method, binary multiplication, binary division.**
- **Concept of Information Systems and Software:** Information gathering, requirement and feasibility analysis, data flow diagrams, process specifications, input/output design, process life cycle, planning and managing the products.

Unit-2

(5 hrs)

- **Web technologies:** Introduction to HTML, XML, CSS and Programming languages, introduction to web servers and Server Products.
- **Introduction to databases:** MYSQL, MS ACCESS, Pharmacy Drug Database

Unit 3

(7.5 hrs)

- **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.

Unit-4

(12.5 hrs)

- **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

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document, spell checking, printing the document file, creating and editing of table, mail merge.

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.
- **Introduction of Operating System:** Introduction, operating system concepts, types of Operating system.
- **Computers as data analysis in Preclinical development.** Chromatographic data analysis (CDS), Laboratory Information management System (LIMS) and Text Information Management System (TIMS).

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Total Credits: 22

Semester 3 RD		Contact Hours			Max Marks		Total Marks	Credits
Subject Code	Subject Name							
		L	T	P	Int.	Ext		
BDLTS1-301	Introduction To Dialysis	4	0	0	40	60	100	4
BDLTS1-302	Fundamentals of Dialysis	3	0	0	40	60	100	3
BDLTS1-303	Pharmacology in Dialysis	2	0	0	40	60	100	2
BDLTS1-304	Community Orientation & Clinical Visit (Including related practical to the parent course)	0	0	8	60	40	100	4
BDLTS1-305	Introduction To Dialysis Practical	0	0	2	60	40	100	1
BDLTS1-306	Fundamentals of Dialysis Practical	0	0	4	60	40	100	2
BDLTS1-307	Medical Bioethics & IPR	3	0	0	60	40	100	3
BDLTS1-308	Organizational Behavior	3	0	0	60	40	100	3
Total		-	-	-	420	380	800	22

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Total Credit: 25

Semester 4 TH		Contact Hours			Max Marks		Total Marks	Credits
Subject Code	Subject Name	L	T	P	Int.	Ext		
BDLTS1-401	Concept of Renal Disease & Disorders	3	1	0	40	60	100	4
BDLTS1-402	Nutrition in Dialysis	3	0	0	40	60	100	3
BDLTS1-403	MDT Directed Clinical Education-II (One month in vacation)	0	0	0	50	0	50	8
BDLTS1-404	Concept of Renal Disease & Disorders - Practical	0	0	2	60	40	100	1
BDLTS1-405	Seminar	0	0	6	50	0	50	3
BDLTS1-406	Human Rights & Professional Values/ Pursuit of Inner Self Excellence (POIS)	3	0	0	40	60	100	3
BDLTS1-407	Biostatistics and Research Methodology	3	0	0	40	60	100	3
Total		-	-	-	320	280	600	25

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Total Credits: 22

Semester 5 TH		Contact Hours			Max Marks		Total Marks	Credits
Subject Code	Subject Name	L	T	P	Int.	Ext		
BDLTS1-501	Applied Dialysis Technology– I	4	0	0	40	60	100	4
BDLTS1-502	Advance Dialysis Technology– I	4	0	0	40	60	100	4
BDLTS1-503	Community Orientation & Clinical Visit (Including related practical's to the parent course)	0	0	8	60	40	100	4
BDLTS1-504	Applied Dialysis Technology:– I Practical	0	0	4	60	40	100	2
BDLTS1-505	Advance Dialysis Technology– 1 Practical	0	0	4	60	40	100	2
BDLTS1-506	Basics of Clinical Skills Learning	3	0	0	40	60	100	3
BDLTS1-507	Hospital Operation Management	3	0	0	40	60	100	3
Total		-	-	-	340	360	700	22

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Total Credits: 20

Semester 6TH		Contact Hours			Max Marks		Total Marks	Credits
Subject Code	Subject Name	L	T	P	Int.	Ext		
BDLTS1-601	Applied Dialysis Technology II	4	0	0	40	60	100	4
BDLTS1-602	Advance Dialysis Technology II	4	0	0	40	60	100	4
BDLTS1-603	MDT Directed Clinical Education-IV (240 hr)	0	0	0	50	0	50	8
BDLTS1-604	Applied Dialysis Technology II Practical	0	0	4	60	40	100	2
BDLTS1-605	Advance Dialysis Technology II Practical	0	0	4	60	40	100	2
Total		-	-	-	250	200	450	20

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Semester 7th		Contact Hours			Max Marks		Total Marks	Credits
Subject Code	Subject Name	L	T	P	Int.	Ext.		
BDLTS1-701	Project	0	0	30	0	500	500	15
Total							500	15

The candidates will be supervised by the concern faculty & and the project report will be submitted following competitions. The Viva-Voce examination shall be conducted by external expert.

Semester 8th		Contact Hours			Max Marks		Total Marks	Credits
Subject Code	Subject Name	L	T	P	Int.	Ext.		
BDLTS1-801	Internship	0	0	30	0	500	500	15
Total							500	15

The candidate shall undergo internship of Six months in Medical Dialysis department. The internship report shall be submitted to the principal & Viva-Voce examination shall be conducted by external expert.

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Semester	Credit
1st	25
2nd	26
3rd	22
4th	25
5th	22
6th	20
7th	15
8th	15
Total	170

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INTRODUCTION TO DIALYSIS

Course Code: BDLTS1-301

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

Duration - 60 hrs

Course Objective:

- To enable students, understand the fundamental of dialysis
- To teach students about maintenance of the Dialysis machine, tubing's.

Course Outcomes

- Practice personal safety & standard precautions.
- Handling complications during dialysis procedures.
- Understand Infectious diseases, mode of transmission, prevention & care of the patient in a Dialysis Unit.

Unit:1 (20 Hrs)

- **Anatomy & Physiology** (normal kidney structure and functions), Derangement of kidney functions (aetiology, clinical manifestation, diagnosis of acute and chronic renal failure)

Unit:2 (15 Hrs)

- **Dialysis** – the concept (Brief history, definition, mechanism) Components of Dialysis Access, blood flow, anticoagulant, dialysate)

Unit:3 (15 Hrs)

- **Hemodialysis** – Basics (Blood circuit: tubing, pump, dialyzer, flow rate, dialysate circuit, concentrates, delivery systems, flow rate)

Unit:4 (10 Hrs)

- **Anticoagulation** (Heparin, alternatives to Heparin, regional no anticoagulation), Vascular access (Temporary, Permanent).
- **Dialysis water and water treatment:** Dialysis and Dialyzer (including reuse)

Reference books

- Tripathi K.D. (2008) Essentials of Pharmacology 6th Ed, Jaypee Brothers medical publishers: New Delhi
- Rang H.P., (1995) Pharmacology 3rd Ed, and Churchill Livingstone: Michigan
- Himmelfarb, J., Savegh, M. H.,(2010) Chronic Kidney disease, Dialysis, transplantation: Companion to Brenner & Rector's Kidney 3rd Ed,Elsevier: St Louis
- Tripathi, K.D.,(2010). Pharmacological Classification of drugs, doses and Preparations 4th Ed, Jaypee Brothers medical publishers: New Delhi
- Dialysis Technology – A Manual for Dialysis Technicians by Jim Curtis, Philip Varughese

**MRSPTU B. SC. (DIALYSIS TECHNOLOGY) SYLLABUS
BATCH 2021 ONWARDS (4 YEARS COURSE)**

INTRODUCTION TO DIALYSIS PRACTICAL

Course Code: BDLTS1-305

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

Duration - 30 hrs

Course Objective:

- To enable students, understand the fundamental of dialysis
- To teach students about maintenance of the Dialysis machine, tubing's.

Course Outcomes

- Practice personal safety & standard precautions.
- Handling complications during dialysis procedures.
- Understand Infectious diseases, mode of transmission, prevention & care of the patient in a Dialysis Unit.

Experiment:

- A Hemodialysis unit
- Demineralization plant
- Machine
- Initiation of Dialysis
- Conduction of Dialysis
- Dialysis – closure
- Washing, cleaning, reuse
- Maintenance of hygiene in Dialysis unit
- Access – core
- Anticoagulation

Reference books

- Tripathi K.D. (2008) Essentials of Pharmacology 6th Ed, Jaypee Brothers medical publishers: New Delhi
- Rang H.P., (1995) Pharmacology 3rd Ed, and Churchill Livingstone: Michigan
- Himmelfarb, J., Savegh, M. H.,(2010) Chronic Kidney disease, Dialysis, transplantation: Companion to Brenner & Rector's Kidney 3rd Ed,Elesvier: St Louis
- Tripathi, K.D.,(2010). Pharmacological Classification of drugs, doses and Preparations 4th Ed, Jaypee Brothers medical publishers: New Delhi
- Dialysis Technology – A Manual for Dialysis Technicians by Jim Curtis, Philip Varughese

FUNDAMENTAL OF DIALYSIS

Course Code- BDLTS1-302

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

Duration: 45 Hrs

Course Objective

- To enable students, understand the correct cannulation techniques.
- To demonstrate patient positioning and preparation
- To teach students about maintenance of the Dialysis machine, tubing's.

Course Outcome

- Practice personal safety & standard precautions.
- Handling complications during dialysis procedures.

**MRSPTU B. SC. (DIALYSIS TECHNOLOGY) SYLLABUS
BATCH 2021 ONWARDS (4 YEARS COURSE)**

- Understand Infectious diseases, mode of transmission, prevention & care of the patient in a Dialysis Unit.

Unit:1 (10 Hrs)

- **Medical Abbreviations Patient pedigree:** Common medical abbreviations, Patient encounter, History taking of patient: - Present, Past, Family History.
- **Physical Examination:** Inspection of whole body of the patient e.g. Chest, abdomen, pedal edema & Facial edema. Significance of edema as per the dialysis patient concern. Palpation – Method for palpation, Percussion - Resonance, hyper-resonance and dullness, Heart sounds & murmurs & any other abnormal body sound.

Unit:2 (15 Hrs)

- **Vital signs:** Assessing Pulse - Radial, Brachial, Apical & Femoral, Assessing Respiration - Normal rhythm and rate, Common disorders, Assessing Blood Pressure - Normal values, Hyper and hypotension, Assessing Temperature - Methods, Common abnormalities.
- **Essential Care:** Blood leaks, clotting, acute bleeding, hypotension, hypertension, fever, nausea, pyrogenic vomiting, headache, cardiac arrhythmias, chest pain, reactions muscle cramps, restlessness pruritus, convulsion, hemolysis.
- **Total patient care:** Nutritional consideration in CKD and dialysis patient, Diet, hygiene, fluid, rehabilitation. Recording and reporting.

Unit:3 (5 Hrs)

- **Safety Practices:** Identify specific risks associated with any work activities undertaken as a renal dialysis technician, The principles and practice of health and safety at work. Safe lifting and handling techniques when moving equipment and/or supplies. Correct handling procedures for chemicals and toxic agents. Health and Safety regulations and guidance, the consequences of current flow within the body& control measures to be taken to manage risks, clinical risks posed by the application of technologies to treat

Unit:4 (15Hrs)

- **Aseptic Technique:** Hand Washing: Medical & surgical Management, use of appropriate personal protective equipment for all personnel involved in the renal area, type and range of personal protective equipment and the reasons for their use. Procedures for infection control within the renal environment. Methods to control spread of infection by hospital personnel.
- **Patient Management:** Cannulating, Line cannula termination. Positioning during the procedure of dialysis.

Reference books

- Water quality in hemodialysis by E. Bonnie - Schorn, A, Grassmann, I. Uhlenbusch-Korwer, C.Weber, J.Vienken
- Orientation to National Kidney Foundation Hemodialysis Program – Training Manual by Gay Martin.
 - Dialysis Technology – A Manual for Dialysis Technicians by Jim Curtis, Philip Varughese

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FUNDAMENTALS OF DIALYSIS PRACTICAL

Course Code- BDLTS1-306

**L T P C
0 0 4 2**

Duration:60 Hrs

Course Objective

- To enable students, understand the correct cannulation techniques.
- To demonstrate patient positioning and preparation
- To teach students about maintenance of the Dialysis machine, tubing's.

Course Outcome

- Practice personal safety & standard precautions.
- Handling complications during dialysis procedures.

Understand Infectious diseases, mode of transmission, prevention & care of the patient in a Dialysis Unit

Experiment:

- Checking Vitals
- Physical Examination
- Patient and Technologist safety practices
- Aseptic Techniques
- Medication techniques (Demo): Oral, IM, IS, IV & cathedral
- Diet Plan & Intake and output plan

Reference books

- Water quality in hemodialysis by E. Bonnie - Schorn, A, Grassmann, I. Uhlenbusch-Korwer, C.Weber, J.Vienken
- Orientation to National Kidney Foundation Hemodialysis Program – Training Manual by Gay Martin.
- Dialysis Technology – A Manual for Dialysis Technicians by Jim Curtis, Philip Varughese.

PHARMACOLOGY IN DIALYSIS

Course Code- BDLTS1-303

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

Duration: 30 Hrs

Course Objective

- This course is designed to enable students to acquire understanding of Pharmacodynamics
- Pharmacokinetics and principles of therapeutics and Dialysis implications.

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Course Outcomes

At the end of the course the students are able to:

- Understand the basic concepts of pharmacology
- Understand the pharmacology of common chemotherapeutics.
- Understand common antiseptics, disinfectants and insecticides.
- Understand drug acting on various systems of the human body.
- Understand alternative systems of medicines.

Unit:1 (10Hrs)

- **Introduction to Pharmacology:** Definitions, Terminology used, Types: Classification, Pharmacodynamics: Actions, therapeutic, Adverse, toxic effects, Pharmacokinetics: Absorption, distribution, metabolism, interaction, excretion, Review: Routes and principles of administration of drugs, Indian pharmacopoeia: Legal issues, Storage of various drugs, Calculation of drugs dosage, Rational use of drugs, Principles of therapeutics in Kidney Dialysis.
- **Fluid therapy with special emphasis in renal diseases:** Define IV fluids, differentiate the various IV fluids. Use of crystalloids and colloids in renal diseases. Mode of action, contraindication, precautions and side effects of using various IV fluids.

Unit:2 (10 Hrs)

- **Antihypertensive:** Definition, classification, actions, dosage, side effects & contraindications, special reference during dialysis, vasopressors, drugs used in Hypotension.
- **Drugs & dialysis:** Dose & duration of drugs used in dialysis. The administration of drugs and the effect of dialysis on the action of drugs, Dialyzable drugs List of drugs that are dialyzable, action, dosage, side effects and contraindications of phenobarbitone, lithium, methanol etc.

Unit:3 (05 Hrs)

- **Heparin including low molecular weight heparin:** Introduction to heparin and Low molecular weight heparin. Description of Heparin & LMWH, pharmacokinetics, mode of action, indications and use, dosage and route of administration & side effects Protamine sulphate
- **Introduction to protamine,** mode of action, pharmacokinetics, indications,uses, dosage, route of administration, side effects, precautions, contraindications Formalin, sodium hypochlorite, hydrogen peroxide Action, characteristics, the use of the drugs and its role as disinfectants & adverse effects of residual particles applicable too formalin.

Unit:4 (05 Hrs)

- **Hemodialysis:** concentrates Composition & dilution (acetate & bicarbonates). Peritoneal dialysis fluid in particular hypertonic solutions – composition Fluids used in peritoneal dialysis, the composition and strength of concentration. Mode of action, uses, indications and precaution

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Potassium exchange resins with special emphasis on mode of administration Introduction to potassium exchange resins, chemical composition. Types, mode of action, indications for use, side effects, precautions and contraindications

Recommended Text Books:

- Satoskar, Bhandarkar, Ainapure: Pharmacology and Pharmacotherapeutics, 18 Edition Popular Prakashan Mumbai.
- M M Das: Pharmacology, Books & Allied (p) Ltd, 4 Edition 2001.
- Rodman & Smith: Clinical pharmacology in nursing, 2 Edition, J B Lippincott company, Philadelphia.
- Tripathi K.D. (2008) Essentials of Pharmacology 6th Ed, Jaypee Brothers medical publishers: New Delhi 2. Rang H.P., (1995) Pharmacology 3rd Ed, and Churchill Livingstone: Michigan
- Himmelfarb, J., Savegh, M. H.,(2010) Chronic Kidney disease, Dialysis, transplantation: Companion to Brenner & Rector's Kidney 3rd Ed, Elesvier: St Louis.
- Tripathi, K.D.,(2010). Pharmacological Classification of drugs, doses and Preparations 4th Ed, Jaypee Brothers medical publishers: New Delhi
- Ajay, P., Medhi - Bikash (2010). Pharmacology, Jaypee Brothers medical publishers: New Delhi

COMMUNITY ORIENTATION & CLINICAL VISIT (INCLUDING RELATED PRACTICAL TO THE PARENT COURSE)

Course Code- BDLTS1-304

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

Duration: 360 Hrs

Students will gain additional skills in clinical procedures, interaction with patients and professional personnel. Students will apply knowledge from clinical learning experience under the supervision of a senior technologist Students are tested on intermediate clinical cardiac care skills.

MEDICAL BIOETHICS & IPR

Course Code- BDLTS1-307

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

Duration: 45 Hrs

Course Objective

- To introduce the wide range of ethical issues in health care.
- To provide basic skills in: A) Approaching ethical issues. B) Analysis and statement of issues. C) Understanding the relevant ethical principles invoked.
- Imparting knowledge and skills that will enable students to develop ethical answers to these issues
- To acquire specialized knowledge of law and IPR.
- The main objective of the IPR is to make the students aware of their rights for the protection of their invention done in their project work.

Course Outcomes

- Upon successful completion of the course, students will be able to: Recognize what constitutes an ethical concern in health care
- Understanding ethical issues in Health care.
- Understand better the complexity and multi-dimensionality of medical ethical concerns and uniqueness of each problem.
- Capacity to rationally justify your decision
- Develop the ability to reason through difficult medical/clinical ethical issues both orally, in the context of a group of their peers, and through written
- The students get awareness of acquiring the patent and copyright for their innovative works.
- They also get the knowledge of plagiarism in their innovations which can be questioned legally.

Unit:1 (15 Hrs)

- **Introduction to Bioethics:** Bioethical issues related to Healthcare & Medicine
- **Anatomy** - Cadaver ethics, Human dignity, PNDD, Disposal of cadaver, Genetic Counseling
- **Physiology** - Animal ethics, Health policy privacy.

Unit:2 (10 Hrs)

- **Biochemistry & Pathology** - Prudence of investigation confidentiality, Patients bill of rights, Disposal of investigative material, Integrity, Blood transfusion
- **Pharmacology** - Rational drug prescribing, Clinical trials, Risk minimization, Animal Ethics

Unit:3 (5 Hrs)

- **Microbiology** - Hand wash, Drug resistance minimization, Prudence of investigation confidentiality, Sterilization procedure, Biosafety and biohazard. Medico legal aspects of medical records

Unit:4 (15 Hrs)

- **Introduction to Intellectual Property:** Concept of Intellectual Property Kinds of Intellectual Property Patents, Copyrights Designs, Trademarks, Geographical Indication, Infringement of IPR, Its protection and Remedies Licensing and its types

Reference Books:

- Contemporary issues in bioethics – Beauchamp & Walters (B&W) 4th edition.
- Classic philosophical questions by Glouck (8th Edition)
- Case book series and booklets by UNESCO Bioethics Core curriculum 2008
- Encyclopedia of Bioethics 5 vol set, (2003) ISBN-10: 0028657748
- Intellectual property rights- Ganguli-Tat Mc Grawhill. (2001) ISBN-10: 0074638602,
- Intellectual Property Right- Wattal- Oxford Publication House.(1997) ISBN:0195905024.

ORGANIZATIONAL BEHAVIOR

Course Code- BDLTS1-308

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

Duration: 45 Hrs

Course Objective

- To understand the initial insights into underlying principles and fundamental theories of organizational behavior.
- The Student should develop a sense of what falls under the domain of organizational behavior.
- He should develop an understanding of academic views on the behavior and motivations of people in organizations and the purposes of organizations.
- This course clearly takes an academic and scientific lens with the aim of understanding human behavior in organizations.

Course Outcomes

- Describe and apply motivation theories to team and organizational scenarios in order to achieve a team's or an organization's goals and objectives.
- Explain the effect of personality, attitudes, perceptions and attributions on their own and others' behaviors in team and organizational settings.
- Explain types of teams and apply team development, team effectiveness, and group decision making models and techniques.
- Analyze and apply leadership theories and better understand their own leadership style.

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Unit:1 (15 Hrs)

- **Organizational Behavior:** Definition - Importance - Historical Background – Fundamental concepts of OB - 21st Century corporate - Different models of OB i.e. autocratic, custodial, supportive
- **Organization Structure and Design:** Authority and Responsibility Relationships - Delegation of Authority and Decentralization - Interdepartmental Coordination - Emerging Trends in Corporate Structure, Strategy and Culture - Impact of Technology on Organizational design Mechanistic vs Adaptive Structures – Formal and Informal Organization.

Unit:2 (15 Hrs)

- **Perception Process** - Nature & Importance - Perceptual Selectivity - Perceptual Organization -Social Perception - Impression Management
- **Learning** - Process of Learning - Principles of Learning - Organizational Reward Systems - Behavioral Management

Unit:3 (10 Hrs)

- **Motivation** - Motives - Characteristics - Classification of motives - Primary Motives - Secondary motives - Morale - Definition and relationship with productivity - Morale Indicators
- **Leadership** - Definition - Importance - Leadership Styles - Models and Theories of Leadership Style

Unit:4 (5 Hrs)

- **Conflict Management** - Traditional vis-a-vis Modern view of conflict - Constructive and Destructive conflict - Conflict Process - Strategies for encouraging constructive conflict Strategies for resolving destructive conflict

Reference Books:

- Organizational Behavior, 9th Ed. - Stephen Robbins
- Human Behavior at work - Davis and Newstrom
- Organizational Behavior - Uma Sekaran
- Organizational Behavior - Fred Luthans
- Organizational Behavior - K.Aswathappa
- Human Behavior at Work - Keith Davis
- Organizational Behavior - Jit S.Chandran
- Human Relations & Organizational Behavior - R.S.Dwivedi
- Organizational Behavior - McShane

4th Semester

CONCEPT OF RENAL DISEASE & DISORDERS

Course Code- BDLTS1-401

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

Duration: 60Hrs

Course Objective

- Describe the purpose, significance of results related to diagnostic studies of the urinary system.
- Comprehend the congenital abnormalities of the urinary system.
- Describe the appropriate techniques used in the physical assessment and significant subjective and objective data related to the urinary system.
- Describe the purpose, significance of results related to diagnostic studies of the urinary system
- Comprehend the congenital abnormalities of the urinary system
- Classify and enumerate kidney diseases, including Glomerular, tub interstitial and vascular diseases

Course Outcomes

- To develop understanding regarding different disorder and its management.
- To develop knowledge in childhood anomalies' and it's significance.

Unit:1 (15 Hrs)

- **Assessment and Diagnostic studies of the Urinary system:** Physical assessment of a person with kidney disease, basics of assessment, list various diagnostic tests done for kidney diseases, Laboratory tests, imaging studies, normal values, interpretation of the tests including the roles and responsibilities of a technologist.

Unit:2 (15 Hrs)

- **Classification of renal diseases:** Define renal disorders, introduction to the classification of the various types of renal disorders.
- **Glomerular diseases:** causes, types & pathology: Definition, etiology, type's pathophysiology, medical and surgical management.
- **Tubulo interstitial diseases & Renal vascular disorders, asymptomatic urinary abnormalities:** Definition, etiology, type's pathophysiology, medical and surgical management.

Unit:3 (15 Hrs)

- **Obstructive Diseases:** Acute Kidney Injury & End stage renal diseases, Obstructive Uropathies– Causes & pathology, renal calculi & renal tumors: definition, etiology, type's pathophysiology, medical and surgical management.
- **Congenital & Inherited Renal Diseases:** Peniel, scrotum, urinary bladder, Kidney: size, shape, positioning malformation: definition, cause and its management.

Unit:4 (15 Hrs)

- **Pathology of kidney in hypertension, diabetes mellitus, pregnancy:** Pathology of peritoneum – peritonitis – bacterial, tubercular & sclerosing Peritonitis, urinary tract infections, Pyelonephritis & tuberculosis pyelonephritis
- **Pathology of peritoneum, UTI & nephritis:** peritonitis, bacterial, tubercular & sclerosing Peritonitis, Pathology of urinary tract infections- common organisms involved, Pyelonephritis & tuberculous pyelonephritis: definition, etiology, types pathophysiology, medical and surgical management.
- **Dialysis In ICU:** Emergency care & Intensive care of a dialysis patient, Principles of Extracorporeal Short-Wave Lithotripsy, Plasmapheresis, CRRT & SLED, common urosurgical procedures & instruments and their maintenance, Preparation of dialysis patients for various surgical procedure and post-operative Dialysis support, Basic and advanced cardiac life support.

Reference books:

- Davison A.M., (2010) Oxford textbook of Nephrology Volume 4 Oxford University Press
- Brenner B.M., et al. (2011) Brenner and Rector's The Kidney 9th Ed, Elsevier Health Sciences.
- Schrier R.W., (2006) Diseases of the Kidney and the urinary tract (Vol I, II, & III) 8th Ed, Lippincott Williams & Wilkins
- Claude Jacobs (1996) Replacement of Renal Function by Dialysis Springer
- Nissenson, A. R., Fine R.N., (2002) Textbook of Dialysis therapy 3rd Ed Hanley

CONCEPT OF RENAL DISEASE & DISORDERS PRACTICAL

Course Code- BDLTS1 404

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

Duration: 30 Hrs

- Describe the purpose, significance of results related to diagnostic studies of the urinary system.
- Comprehend the congenital abnormalities of the urinary system.
- Describe the appropriate techniques used in the physical assessment and significant subjective and objective data related to the urinary system.
- Describe the purpose, significance of results related to diagnostic studies of the urinary system
- Comprehend the congenital abnormalities of the urinary system
- Classify and enumerate kidney diseases, including Glomerular, tub interstitial and vascular diseases

Course Outcomes

- To develop understanding regarding different disorder and its management.
- To develop knowledge in childhood anomalies' and it's significance

Experiment:

- Care of Patient with CKD
- Care of Patient with ARF
- Health teaching on prevention of UTI
- Health teaching on prevention of peritonitis

Reference books:

- Davison A.M., (2010) Oxford textbook of Nephrology Volume 4 Oxford University Press
- Brenner B.M., et al. (2011) Brenner and Rector's The Kidney 9th Ed, Elsevier Health Sciences.
- Schrier R.W., (2006) Diseases of the Kidney and the urinary tract (Vol I, II, & III) 8th Ed, Lippincott Williams & Wilkins
- Claude Jacobs (1996) Replacement of Renal Function by Dialysis Springer
- Nissenson, A. R., Fine R.N., (2002) Textbook of Dialysis therapy 3rd Ed Hanley

NUTRITION IN DIALYSIS

Course Code-BDLTS1-402

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

Duration: 45 Hrs

Course Objective

- Discuss the basic nutrition and their role in growth, development, maintained and restoration
- Articulate the rationale for calculating body mass index (BMI) in nutritional assessment of dialysis patients.

Course Outcomes

- To describe basic nutrient and their role in growth, development, health maintained and restoration.
- To identify and interpret appropriate dietary plan for dialysis patient.

Unit:1 (5 Hrs)

- **Introduction Nutrition in Dialysis:** Concept and definition of terms-Nutrition, Malnutrition and Health: Scope of Nutrition, food selection, storage & preservation, prevention of food adulteration.
- **Types of nutrients:** protein, carbohydrate, lipids, vitamins, minerals, water. And their calorie values and calculation.

Unit:2 (10 Hrs)

- **Carbohydrates:** Monosaccharides: glucose, fructose, galactose. Disaccharides - Maltose, lactose, sucrose. Polysaccharide: Dextrin, starch, glycogen, resistance starch.
- **Proteins** - Sources, daily requirements, functions. Effect of too high - too low proteins on health. Digestion & absorption. Assessment of Protein quality (BV, PER, NPU). Factors affecting protein bio-availability including anti-nutritional factors.
- **Lipids** - Sources, daily requirements, functions. Digestion & Absorption. Role & nutritional significances of PUFA, MUFA, SFA, W-3 fatty acid.

Unit:3 (10 Hrs)

- **Water** – sources of drinking water, requirements, preservation of water. Vitamins - types, sources, requirements deficiencies of vitamins.
- **Energy in Human Nutrition:** Idea of Energy and its unit, Energy Balance, Assessment of Energy Requirements deficiency and excess, Determination of Energy in food, B.M.R. and its regulation, -S.D.

Unit:4 (20 Hrs)

- **Clinical Signs:** Need & Importance's, identifying signs of PEM, vitamin A deficiency and iodine deficiency, Interpretation of descriptive list of clinical signs, other disease and disorders in relation with renal conditions.
- **Nutritional anthropometry:** Need and importance, standard for reference, techniques of measuring height, weight, head, chest and arm circumference, interpretation of these measurements. Use of growth chart of dialysis patient.
- **Minimum Nutritional Requirement for dialysis patients and RDA:** Formulation of RDA and Dietary Guidelines Reference Man and Reference Woman. Adult consumption unit. Planning nutritional diet & maintenance of Intake output charts of dialysis patient.

Reference book

- Jelliffe, D. B. : Assessment of the Nutritional Status of the Community; World Health Organisation.
- Sain, D. R. Lockwood, R., Scrimshaw, N. S. : Methods the Evaluation of the Impact of Food and Nutrition Programmes, United Nations University.
- Ritchie, J.A.S. : Learning Better Nutrition FAO, Rome.
- Gopalan. C.; Nutrition Foundation of India, Special Publication service.
- Beghin, I. Cap. M: Dujardan. B. : A Guide to Nutrition Status Assessment.
- W. H. O. Geneva. Gopaldas, t. Seshadri, S. : Nutrition Monitoring a Assessment: Oxford University Press.
- Mason, J. B., Habicht, J. P.; Tabatabai. H. Valverde. U. :Nutritional Surveillance, W.H.O.

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MDT DIRECTED CLINICAL EDUCATION – II (ONE MONTH IN VACATION)

Course code- BDLTS1-403

(Total-450 hrs)

Students will gain additional skills in medical equipment and radiation safety techniques. Students apply knowledge from previous clinical learning experience under the supervision of a senior technologist. Students are tested on intermediate technical skills.

SEMINAR

Course Code- BDLTS1-405

L T P C

0 0 6 3

For seminar/presentation there will be a maximum of 50 marks. Seminar / presentations will be evaluated by the teachers of the dept. The marks obtained in the same will be kept confidentially with the Head of the Dept. and will be submitted along with the internal assessment marks.

**HUMAN RIGHTS & PROFESSIONAL VALUES /PURSUIT OF INNER SELF
EXCELLENCE (POIS)**

Course Code- BDLTS1-406

L T P C

Duration: 45 Hrs

3 0 0 3

Course Objective

- To understand interaction between society and educational institutions.
- To sensitize the citizens so that the norms and values of human rights and duties of education programmes are realized.
- To encourage research activities.
- To encourage research studies concerning the relationship between Human Rights and Duties Education.
- To inculcate moral values in students – Self-Discipline, Time Management, Develop attitude of Service with humility, Empathy, Compassion, brotherhood, Respect for teachers, colleagues & society members.
- Develop Effective means of communication & presentation skills in students
- To develop wisdom in students for deciding their career based on their areas of interest and inner skills.
- Introduce techniques for Relaxation, Meditation & Connecting with inner self.

Course Outcomes

- This course will aim at making the learners acquire conceptual clarity and develop respect for norms and values of freedom, equality, fraternity and justice.
- It will include awareness of civil society organizations and movements promoting human rights. This will make the students realize the difference between the values of human rights and their duties

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- Students will become self-dependent, more decisive and develop intuitive ability for their study and career related matter.
- Student's ability to present their ideas will be developed.
- Enhanced communication skills, public speaking & improved Presentation ability.
- Students will be able to explore their inner potential and inner ability to become a successful researcher or technician & hence become more focused

Unit:1 (10 Hrs)

- **Background** - Introduction, Meaning, Nature and Scope, Development of Human Rights, Theories of Rights, Types of Rights.
- **Human rights at various level-** Human Rights at Global Level UNO,
- **Instruments:** U.N. Commission for Human Rights, European Convention on Human Rights.

- **Spiritual Values for human excellence** : The value of human integration; Compassion, universal love and brotherhood (Universal Prayer) ; Heart based living ; Silence and its values, Peace and non-violence in thought, word and deed ; Ancient treasure of values - Shatsampatti , Patanjali's Ashtanga Yoga , Vedic education - The role of the Acharya , values drawn from various cultures and religious practices - Ubuntu, Buddhism, etc.; Why spirituality? Concept – significance ; Thought culture

Unit:2 (10 Hrs)

- **Human rights in India** - Development of Human Rights in India, Human Rights and the Constitution of India, Protection of Human Rights Act 1993. National Human Rights Commission, State Human Rights Commission, Composition Powers and Functions, National Commission for Minorities, SC/ST and Woman.

- **Ways and Means** : Correlation between the values and the subjects ;Different teaching techniques to impart value education; Introduction to Brighter Minds initiative; Principles of Communication; Inspiration from the lives of Masters for spiritual values - Role of the living Master

Unit:3 (10 Hrs)

- **Human Rights Violations** -Human Rights Violations against Women, Children, Violations against Minorities SC/ST and Trans-genders, Preventive Measures.
- **Professional values-** Integrity, Objectivity, Professional competence and due care, Confidentiality.

- **Integrating spiritual values and life:** Relevance of VBSE (Value Based Spiritual Education) in contemporary life ; Significant spiritual values ; Spiritual destiny ; Principles of Self-management; Designing destiny

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BATCH 2021 ONWARDS (4 YEARS COURSE)**

Unit:4 (15 Hrs)

- **Personal values-** ethical or moral values, Attitude and behavior- professional behavior, treating people equally.
- **Code of conduct-** professional accountability and responsibility, misconduct, Cultural issues in the healthcare environment.
- **Experiencing through the heart for self-transformation (Heart fullness Meditation):** Introduction to Relaxation; Why, what and how HFN Meditation?; Journal writing for Self-Observation ; Why, what and how HFN Rejuvenation (Cleaning)? ; Why, what and how HFN connect to Self (Prayer)?; Pursuit of inner self excellence ; Collective Consciousness-concept of egregore effect

Reference book

- Jagannath Mohanty Teaching of Humans Rights New Trends and Innovations Deep & Deep Publications Pvt. Ltd. NewDelhi2009
- Ram Ahuja: Violence Against Women Rawat Publications Jewahar Nager Jaipur.1998
- Sivagami Parmasivam Human Rights Salem 2008
- Hingorani R.C.: Human Rights in India: Oxford and IBA New Delhi.
- The Art of Learning: A Journey in the Pursuit of Excellence, [Josh Waitzkin](#), Simon and Schuster, 2007
- Reality at Dawn. By Shri Ram Chandra, Published by ISRC

BIOSTATISTICS AND RESEARCH METHODOLOGY

Course Code- BDLTS1 407

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

Duration: 45 Hrs

Course Objective

- To enable students to present, analyze and interpret data.
- To enable students to use concepts of probability in business situations.
- To enable students to make inferences from samples drawn from large datasets.
- To enable students to apply univariate and multivariate statistical techniques.

Course Outcomes

- To understand the importance & Methodology for research
- To learn in detail about sampling, probability and sampling distribution, significance tests correlation and regression, sample size determination, study design and multivariate analysis.

Unit 1 (10 hrs.)

- **Introduction:** Statistics, Biostatistics, Frequency distribution
- **Measures of central tendency:** Mean, Median, Mode-
- **Measures of dispersion:** Dispersion, Range, standard deviation,

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- **Correlation:** Definition, Karl Pearson's coefficient of correlation, Multiple correlation

Unit 2 (10 hrs.)

- **Regression:** Curve fitting by the method of least squares, fitting the lines $y = a + bx$ and $x = a + by$, Multiple regression, standard error of regression
- **Probability:** Definition of probability, Binomial distribution, Normal distribution, Poisson's distribution, properties – problems Sample, Population, large sample, small sample, Null hypothesis, alternative hypothesis, sampling, essence of sampling, types of sampling, Error-I type, Error-II type, Standard error of mean (SEM)
- **Parametric test:** t-test(Sample, Pooled or Unpaired and Paired) , ANOVA, (One way and Two way), Least Significance difference

Unit 3 (15 hrs.)

- **Non Parametric tests:** Wilcoxon Rank Sum Test, Mann-Whitney U test, Kruskal-Wallis test, Friedman Test
- **Introduction to Research:** Need for research, Need for design of Experiments, Experiential Design Technique, plagiarism

Unit 4 (10 hrs.)

- **Graphs:** Histogram, Pie Chart, Cubic Graph, response surface plot, Counter Plot graph
- **Designing the methodology:** Sample size determination and Power of a study, Report writing and presentation of data, Protocol, Cohorts studies, Observational studies, Experimental studies, Designing clinical trial, various phases.

Reference Book

- Mausner & Bahn : Epidemiology-An Introductory text, 2nd Ed., W.B. Saunders Co.
- Richard f. Morton & j. Richard Hebd : A study guide to Epidemiology and Biostatistics, 2nd Ed., University Park Press, Baltimore.
- Sylvia W Smoller, J Smoller, Biostatistics & Epidemiology A Primer for health and Biomedical professionals, 4th edition, Springs, 2015

5th Semester

**MRSPTU B. SC. (DIALYSIS TECHNOLOGY) SYLLABUS
BATCH 2021 ONWARDS (4 YEARS COURSE)**

APPLIED DIALYSIS TECHNOLOGY – I

Course Code- BDLTS1-501

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

Duration: 60 Hrs

Course Objective

- Students explain the history of Dialysis and nephrology.
- Students' understanding of the underlying anatomy and physiology on which peritoneal dialysis is based.
- Understands and demonstrate the Physiology of Dialysis
- Describes, procedure of Venipuncture and demonstrate it
- Able to maintain Records and Reports and demonstrate the procedure.

Course Outcomes

- Describes the anatomy and Physiology
- Performs Physiological principles of Dialysis
- Demonstrated Procedures as Venipuncture, Cannulation and maintenance of Sterilization of Equipment's and Dialysis Unit
- Demonstrate maintenance of Records and Reports

Unit:1 (15 Hrs)

- **History of Dialysis** –Indian History of dialysis
- **History of Nephrology** : Acute Kidney Injury, Renal angiogram , Biopsy and Transplant
- **Anatomy & Physiology of dialysis:** Peritoneal Anatomy (Basic), The peritoneal membrane as a “dialyzer.”, The three-pore model. Peritoneal Physiology, Diffusion Ultra diffusion , Absorption, Clinical Assessment.
- **Principles of Dialysis, quantification of adequacy:** Principles of diffusion, filtration, ultrafiltration, convection, and osmosis. Solute transport and fluid movement during dialysis. Principles of fluid dynamics. Hemodialysis& Peritoneal Dialysis. Measuring dialysis adequately: Urea reduction ratio - Urea Kinetic Modeling. Pre –dialysis and post dialysis - BUN Measurement. Measurement of KT/V.

Unit:2 (15 Hrs)

- **Vascular Access – Temporary & Permanent:** Types of vascular access – Fistulae, Grafts, Catheters. Pre- dialysis assessments for all types of vascular access. Methods of needle insertion for AVFs and grafts. Pre - dialysis assessment, accessing procedure, exit site care, and monitoring of catheters.
- **Types of Dialysis:** Genesis of dialysis, invention and the process involved in the evolution of dialysis, indication of dialysis. Types of dialysis and classification. Dialysis for acute kidney injury, dialysis for chronic kidney disease. Introduction to Continuous renal replacement therapy (CRRT).

Unit:3 (15 Hrs)

- **Equipment, Accessories & Function** (hemodialysis machine, peritoneal dialysis machine): Types of equipment used in the dialysis process. Parts of a dialysis machine, tubing's and the water supply for dialysis. Overview of the various equipment, accessories and working of a dialysis machine-The technology, functioning, calibration, and sterilization of dialysis machine according to their: Type/ brand, Frequency and duration of use, Importance of Calibration and Sterilization , Recording (Calibration, Sterilization and set up details), Planning and Organizing Scheduled Maintenance, Various indicators, alarms and sensors of the dialysis machine. Corrective steps to be taken when a particular alarm goes off

Unit:4 (15 Hrs)

- **Infection control and sterilization:** Morphology of microorganisms, Sterilization and Disinfection, Microbiology of vascular access infection (femoral, jugular, subclavian catheters), Sampling methodologies for culture & sensitivity, Principles and Practice of Biomedical waste management
- **Renal data maintenance:** Records and reports maintained in the dialysis unit. Need for maintenance of records and report. The technologist's responsibility in maintenance of records and report. Medico legal aspects of maintenance of records

Recommended Text Books:

- Water quality in hemodialysis by E.Bonnie-Schorn, A, Grassmann, I. Uhlenbusch-Korwer, C.Weber, J.Vienken
- Brenner B.M., et al. (2011) Brenner and Rector's The Kidney 9th Ed, Elsevier Health Sciences
- Schrier R.W., (2006) Diseases of the Kidney and the urinary tract (Vol I, II, & III) 8th Ed, Lippincott Williams & Wilkins.
- Claude Jacobs (1996) Replacement of Renal Function by Dialysis Springer.
- Nissenson, A. R., Fine R.N., (2002) Textbook of Dialysis therapy 3rd Ed Hanley & Belfus.
- Orientation to National Kidney Foundation Hemodialysis Program – Training Manual by Gay Martin.
- Orientation to National Kidney Foundation Hemodialysis Program – Training Manual by Gay Martin.
- Dialysis Technology – A Manual for Dialysis Technicians by Jim Curtis, Philip

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APPLIED DIALYSIS TECHNOLOGY – I PRACTICAL

Course Code- BDLTS1-504

**L T P C
0 0 4 2**

Duration: 60Hrs

Course Objective

- Students explain the history of Dialysis and nephrology.
- Students' understanding of the underlying anatomy and physiology on which peritoneal dialysis is based.
- Understands and demonstrate the Physiology of Dialysis
- Describes, procedure of Venipuncture and demonstrate it
- Able to maintain Records and Reports and demonstrate the procedure.

Course Outcomes

- Describes the anatomy and Physiology
- Performs Physiological principles of Dialysis
- Demonstrated Procedures as Venipuncture, Cannulation and maintenance of Sterilization of Equipment's and Dialysis Unit
- Demonstrate maintenance of Records and Reports

Experiment:

- A.V. Cannulation
- A.V. Fistula
- Initiation of dialysis through central venous catheters – Internal
- Jugular – Femoral – Subclavian vein Packing and sterilization of dialysis trays
- Termination Dialysis

Reference book:

- Water quality in hemodialysis by E.Bonnie-Schorn, A, Grassmann, I. Uhlenbusch-Korwer, C.Weber, J.Vienken
- Brenner B.M., et al. (2011) Brenner and Rector's The Kidney 9th Ed, Elsevier Health Sciences
- Schrier R.W., (2006) Diseases of the Kidney and the urinary tract (Vol I, II, & III) 8th Ed, Lippincott Williams & Wilkins.
- Claude Jacobs (1996) Replacement of Renal Function by Dialysis Springer.
- Nissenson, A. R., Fine R.N., (2002) Textbook of Dialysis therapy 3rd Ed Hanley & Belfus.
- Orientation to National Kidney Foundation Hemodialysis Program – Training Manual by Gay Martin.
- Orientation to National Kidney Foundation Hemodialysis Program – Training Manual by Gay Martin.

- Dialysis Technology – A Manual for Dialysis Technicians by Jim Curtis, Philip Varughese

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BATCH 2021 ONWARDS (4 YEARS COURSE)**

ADVANCE DIALYSIS TECHNOLOGY - I

Course Code- BDLTS1-502

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

Duration: 60 Hrs

Course Objective

- Students Learn about Types of Dialysis and its Implications
- Comprehend the various modalities of renal replacement therapy with the knowledge of merits and demerits of each
- Differentiate between peritoneal dialysis, SLED, CRRT, High efficiency dialysis & Hemodialysis in terms of purpose, indications, advantages, disadvantages and the responsibilities of a technologist.

Course Outcomes

- Practice and perform independently the water maintenance for the Hemodialysis room
- Independently maintain the Hemodialysis machine with respect to disinfection and priming.

Unit:1 (15 Hrs)

- **Hemodialysis:** The process of Haemodialysis, vascular access, Starting Haemodialysis, priming of the dialyser, alarms and the settings of a dialyser, completion of Haemodialysis, closing the Haemodialysis. Cleaning of the tubing and dialyser and the dialysis machine.
- **Complications of Haemodialysis Acute & chronic Complications of Haemodialysis:** acute complications – monitoring, prevention for acute complications. Chronic complications – list, prevention strategies, monitoring for chronic complications.

Unit:2 (15 Hrs)

- **Preparation and positioning of patient for dialysis, Patient Assessment – Pre, intra & post dialysis & Machine and patient monitoring during Hemodialysis:** Introduction to patient assessment, Understanding a treatment plan, Equipment preparation – Dialysate - Dialyser and Blood lines, Decisions regarding the appropriate size and type of catheter/ IV tubing to be used Connecting patients to the machine- Initiation of dialysis - Removing fluid - Replacing fluid - Drawing blood samples - Testing blood samples.
- **Measuring dialysis adequately:** Urea reduction ratio - Urea Kinetic Modelling. Pre –dialysis and post dialysis - BUN Measurement. Factors affecting dialysis treatment, communicating and documenting the findings prior to the dialysis process.
- **Starting the dialysis treatment:** Monitoring during dialysis - Patient Monitoring (blood pressure, temperature, rate of blood flow, proper mixture of dialysate, presence of air bubbles)- Technical Monitoring.

Unit:3 (15 Hrs)

- **Importance of reporting, HD Complications during dialysis:** Clinical complications - Technical Complications- Procedure to disconnect the patient - procedure for removing the IV

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cannula- Post dialysis procedures, Post dialysis patient evaluation, Recording of the Treatment, Recording changes in Patient's condition, Preparation of status and progress reports, Equipment clean up and Maintenance, Recording the dialysis procedure on the medical report/chart of the patient.

- **Dialysate delivery system:** Definition of a delivery system, types of delivery systems.
- **Composition of dialysate:** Various dialysate compositions, its uses and indications. Method for obtaining various compositions of dialysate
- **Anticoagulation** Use of anticoagulation in the dialysis setting, various anticoagulants used Monitoring during use of anticoa. Method of administration Calculation of anticoagulant use & complications. Heparin free dialysis - need and indication. Regional citrate anticoagulation.
- **High flux / high efficiency dialysis:** Definition of high flux / high efficiency dialysis, differences between high flux dialysis and Haemodialysis, used and indications for high flux dialysis, complications of high flux dialysis, precautions and contraindications. Care during a high flux dialysis.

Unit:4 (15 Hrs)

- **Peritoneal Dialysis:** Acute and Chronic Peritoneal Dialysis. PD – Transport kinetics, ultrafiltration, UF, Intermittent PD, Continuous Ambulatory Peritoneal Dialysis, Automated Peritoneal Dialysis, Dialysis Solutions, Novel uses of PD. Adequacy of peritoneal dialysis chronic peritoneal Dialysis - KT/V Creatinine clearance. PET - Peritoneal Equilibrium test and interpretation.
- **Infectious and noninfectious complications of PD Introduction to complications in peritoneal dialysis. List of Complications:** Catheter Infections Peritonitis Inadequate flow or drainage of the dialysis fluid Lesions Ultrafiltration failure. Management of exit site infection, Early Exit Site Care. Chronic Care of the Healed Exit Site Diagnosing Exit Site Infections Treatment of exit-site infections Technique to culture exit site infection Medical management of CAPD peritonitis Initiation of therapy based on gram stain results Antibiotic selection. Medications in dialysis, Nutrition management in dialysis patients. Common drugs used for a patient on dialysis, Use of antibiotics during and post dialysis, considerations to be taken, Erythropoietin use in patients on dialysis - dosage and administration, Antihypertensive use - considerations during dialysis, Vaccines for patients on haemodialysis - need and the schedule, Introduction to nutrition and RDA's. Renal diet, Teaching for a patient on renal diet, Diet & method of cooking to be employed, Planning a renal diet for a patient with CRF

Reference book

- **Davison A.M., (2010) Oxford textbook of Nephrology Volume 4 Oxford University Press.**
- Brenner B.M., et al. (2011) Brenner and Rector's The Kidney 9th Ed, Elsevier Health Sciences
- 3. Schrier R.W., (2006) Diseases of the Kidney and the urinary tract (Vol I, II, & III) 8th Ed, Lippincott Williams & Wilkins.
- Claude Jacobs (1996) Replacement of Renal Function by Dialysis Springer.
- Nissenson, A. R., Fine R.N., (2002) Textbook of Dialysis therapy 3rd Ed Hanley & Belfus.

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- Khanna,R., Krediet R.T.,(2009) Nolph and Gokal's Textbook of Peritoneal Dialysis, 3rd Ed Springer. Feehally J., Floege, J., Johnson R.J., (2007) Comprehensive Clinical Nephrology 3rd Ed Mosby

ADVANCE DIALYSIS TECHNOLOGY – I PRACTICAL

Course Code- BDLTS1 505

L T P C

Duration: 60 Hrs

0 0 4 2

Course Objective

- Students Learn about Types of Dialysis and its Implications
- Comprehend the various modalities of renal replacement therapy with the knowledge of merits and demerits of each
- Differentiate between peritoneal dialysis, SLED, CRRT, High efficiency dialysis & Hemodialysis in terms of purpose, indications, advantages, disadvantages and the responsibilities of a technologist.

Course Outcomes

- Practice and perform independently the water maintenance for the Hemodialysis room
- Independently maintain the Hemodialysis machine with respect to disinfection and priming

Experiment:

- Setting up a dialysis machine for dialysis
- Preparation of concentrates – depending on the situation
- Reuse of dialysis apparatus
- Isolated ultrafiltration.
- Performance of peritoneal dialysis exchange – manually
- Setting up of automated peritoneal dialysis equipment

Reference book

- Davison A.M., (2010) Oxford textbook of Nephrology Volume 4 Oxford University Press.
- Brenner B.M., et al. (2011) Brenner and Rector's The Kidney 9th Ed, Elsevier Health Sciences
- 3.Schrier R.W., (2006) Diseases of the Kidney and the urinary tract (Vol I, II, & III) 8th Ed, Lippincott Williams & Wilkins.
- Claude Jacobs (1996) Replacement of Renal Function by Dialysis Springer.
- Nissenson, A. R., Fine R.N., (2002) Textbook of Dialysis therapy 3rd Ed Hanley & Belfus.
- Khanna,R., Krediet R.T.,(2009) Nolph and Gokal's Textbook of Peritoneal Dialysis, 3rd Ed Springer. Feehally J., Floege, J., Johnson R.J., (2007) Comprehensive Clinical Nephrology 3rd Ed Mosby

COMMUNITY ORIENTATION & CLINICAL VISIT (INCLUDING RELATED PRACTICAL'S TO THE PARENT COURSE)

Course Code- BDLTS1-503

L T P C

Duration: 360 Hrs

0 0 8 4

Students will gain additional skills in interventional procedures, cardiac pharmacology and recent advancements. Students apply knowledge from previous clinical learning experience under the supervision of a senior technologist. Students are tested on intermediate pharmacological and invasive techniques.

BASICS OF CLINICAL SKILL LEARNING

Course Code- BDLTS1-506

L T P C

Duration: 45 Hrs

3 0 0 3

Course Objective

- To Understand the basic ideas on how to check for Vital Signs of the Patient.
- This course the Student will learn how to handle the patients and their positioning.
- They will also learn on the Basics of Nasal-Gastric Tube.
- The Students will learn on Administration of IV, IV and Medication.
- Also they will know about Cleanliness in the Asepsis.

Course Outcomes

- After successful accomplishment of the course, the students would be able to Measure Vital Signs, do basic physical Examination of the patients, NG tube basics, Administration of Medicines.
- The students will learn about Asepsis, and the Cleanliness related to asepsis and on mobility of the patients.

Unit:1 (10 Hrs)

- **Measuring vital signs:** temperature: axillaries temperature, pulse: sites of pulse, measurement, respiratory, blood pressure, pain: pain scale
- **Physical examination:** observation, auscultation (chest), palpation, percussion, history taking

Unit:2 (20 Hrs)

- **Feeding: entral feeding, ng tube:** measurement, procedure, care, removal of nasal-gastric tube, nasal-gastric tube feeding, and parenteral nutrition.
- **Administrations:** oral, intravenous, intramuscular, subcutaneous, recapping of syringe, loading of drugs, calculation of drugs, venipuncture, iv infusion, cannula, attachment of iv infusion

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set, fluid collection, heparin lock, maintenance of iv set, performing nebulizer therapy, inhaler, oxygen therapy (nasal, prongs, nasal catheter, venturi mask, face mask).

Unit: 3(10 Hrs)

- **Asepsis:** hand wash techniques, (medical, surgical) universal precaution, protecting
- **Equipments:** using sterile gloves, opening a sterile package and establishing a sterile field, sterile dressing changes, surgical attire, wound dressing, suture removal, cleaning and application of sterile dressing, wearing and removal of personal protective equipment.

Unit: 4 (5 Hrs)

- **Mobility and support:** Moving and positioning, range of Motion exercises (Active & Passive) Assisting for Transfer, Application of Restraints.

Reference Book:

- Jansen van Vuuren, M. V. (2005). A framework for a skills laboratory curriculum in an undergraduate medical programme in South Africa (Doctoral dissertation, University of the Free State).

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HOSPITAL OPERATION MANAGEMENT

Course Code- BDLTS1-507

L T P C

Duration: 45 Hrs

3 0 0 3

Course Objective:

- To promote scientific management of hospitals and advancement of health care systems so as to make it rational, responsive and cost efficient.
- To promote the development of high quality hospital care in the community and the country.
- It has to provide a satisfactory environment to the patient and also to the doctors for clinical research.

Course Outcomes:

- Understand and apply resource management concepts (personnel, finance, and material resources) and the processes and strategies needed in specific hospital sectors.
- Communicate effectively and develop their leadership and teambuilding abilities.
- Apply modern change management and innovation management concepts to optimize structures.
- Analyze existing hospital service policies and enhance their alignment within the local and national context

Unit 1 (15 hrs.)

- **Medico-legal cases:** introduction, laws associated with medico-legal cases, three core contents in medico-legal cases w.r.t doctors, patient & profession,
- **Considerations of ethics:** consent, confidentiality, mental health, end of life and organ transportation, research & clinical trials

Unit 2 (10 hrs.)

- **Hospital information system (his):** hospital information system management, software applications in registration, billing, investigations, reporting, medical records management, security and ethical challenges.

Unit 3 (10 hrs.)

- **Equipment operations management:** hospital equipment repair and maintenance, types of maintenance, job orders, equipment maintenance log books, amcs.

Unit 4 (10 hrs.)

- **Role of medical records in health care management:** computers for medical records, developments of computerized medical record information processing system(emr's), computer stored (vs) manual hand written record, advantages of emr (vs) manual

Reference Book

- Hospital Operations: Principles of High Efficiency Health Care William S. Lovejoy
- Handbook of Healthcare Operations Management Brian T. Denton

6th Semester

APPLIED DIALYSIS TECHNOLOGY - II

Course Code- BDLTS1-601

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

Duration: 60 Hrs

Course Objective

- Enumerate on the various complications of Hemodialysis in terms of the technologist's responsibility in prevention and worsening of the complications
- Dialysis in special Cases
- Students learns about various conditions and their association in Dialysis
- Student demonstrated Skills in Follow up care and quality maintenance in terms of renal dialysis treatment Modalities and Procedures

Course Outcomes

- Train patients in performing peritoneal dialysis, and personal care.
- Practice personal safety & standard precautions.
- Handling complications during dialysis procedures.
- Maintain quality and safety.

Unit:1 (10 Hrs)

- **Acute and chronic dialysis prescription/ consideration:** Common drugs for patients with ARF & CRF, Actions, side effects
- **Special considerations:** Patients with Renal anemia, Congestive cardiac failure (CCF), advanced liver disease, Positive with HIV, HBSAG & HCV. Failed Transplant, Poisoning cases & pregnancy.

Unit:2 (15 Hrs)

- **Dialysis in Neonates, infants, children & adolescence:** Dialysis for infants and neonates, vascular access in this special group, dialysis settings, Monitoring for complications and management of complications. Role of technician in nosocomial infection & infection control.
- **Special Problems in dialysis patients:** Cardiovascular diseases, Diabetes, Hypertension, Infections (HBV, HCV, HIV), Bone diseases, Aluminum toxicity. Role of technician in nosocomial infection & infection control.

Unit:3 (15 Hrs)

- **Psychosocial aspects & patient education Psychological impact of a chronic disease:** Psychology of patient with disease prognosis, the financial implications of the disease, the family and its role in the care of the patient with CRF. Patient education on diet, prevention of complications, drug compliance. Rehabilitation for acute and chronic CKD or dialysis patient.

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Unit:4 (20 Hrs)

- **Instruct patients about in-home treatment and precaution:** Identification of the type of patient for whom in house treatment is possible and in line with doctor's advice, procedure of in-house treatment options, pros and cons of in-house treatment options, the relevant protocol and procedures to be followed to carry out the process.
- **General principle of hospital:** practice Hospital structure and organization, Care of Patient , Basic Assessment Skills, First aid & Basic Life Support, Maintenance of Hygiene & Infection Control Practices, Principles of asepsis, Maintenance of Medications in the department, Specialized Investigations - Care of Patients, Medico - Legal Issues.
- **Quality assurance in dialysis:** Standards of practice, Various risks to quality and safety, JCI recommendations, NABH recommendations. Infection control policies and procedures in the dialysis unit.

Reference book:

- Brenner B.M., et al. (2011) Brenner and Rector's The Kidney 9th Ed, Elsevier Health Science
- Schrier R.W., (2006) Diseases of the Kidney and the urinary tract (Vol I, II, & III) 8th Ed, Lippincott Williams & Wilkins.
- Claude Jacobs (1996) Replacement of Renal Function by Dialysis Springer.
- Nissenson, A. R., Fine R.N., (2002) Textbook of Dialysis therapy 3rd Ed Hanley & Belfus.
- Orientation to National Kidney Foundation Hemodialysis Program – Training Manual by Gay Martin.
- Dialysis Technology – A Manual for Dialysis Technicians by Jim Curtis, Philip Varughese.

APPLIED DIALYSIS TECHNOLOGY – II PRACTICAL

Course Code- BDLTS1-604

**L T P C
0 0 4 2**

Duration: 60 Hrs

Course Objective

- Enumerate on the various complications of Hemodialysis in terms of the technologist's responsibility in prevention and worsening of the complications
- Dialysis in special Cases
- Students learns about various conditions and their association in Dialysis
- Student demonstrated Skills in Follow up care and quality maintenance in terms of renal dialysis treatment Modalities and Procedures

Course Outcomes

- Train patients in performing peritoneal dialysis, and personal care.
- Practice personal safety & standard precautions.
- Handling complications during dialysis procedures.
- Maintain quality and safety.

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BATCH 2021 ONWARDS (4 YEARS COURSE)**

Experiment:

- Dialysis Unit priming (Setting)
- A.V. Cannulation & Termination
- A.V. Fistula / A.V. Grafting
- Dialysis catheterization (Internal Jugular – Femoral – Subclavian vein)
- Packing) including sterilization.

Reference Book

- Brenner B.M., et al. (2011) Brenner and Rector's The Kidney 9th Ed, Elsevier Health Science
- Schrier R.W., (2006) Diseases of the Kidney and the urinary tract (Vol I, II, & III) 8th Ed, Lippincott Williams & Wilkins.
- Claude Jacobs (1996) Replacement of Renal Function by Dialysis Springer.
- Nissenson, A. R., Fine R.N., (2002) Textbook of Dialysis therapy 3rd Ed Hanley & Belfus.
- Orientation to National Kidney Foundation Hemodialysis Program – Training Manual by Gay Martin.
- Dialysis Technology – A Manual for Dialysis Technicians by Jim Curtis, Philip Varughese.

ADVANCE DIALYSIS TECHNOLOGY - II

Course Code- BDLTS1-602

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

Duration: 60 Hrs

Course Objective

- Students learn about Advancements in Dialysis.
- Practice independently SLED, CRRT and high efficiency dialysis.
- Learn different Advanced Renal therapies.

Course Outcomes

- Demonstrate Knowledge about Advancements in Renal Dialysis and in renal therapies.
- Demonstrate peritoneal dialysis, and its self care.
- Involves family centered approach while providing patient care.
- Handling complications during dialysis procedures.

Unit:1 (15 Hrs)

- **New generation dialysis:** Recent advances in hemodialysis, Nocturnal dialysis, online dialysis, Daily dialysis, Telemedicine in dialysis practices.
- **Water treatment-pretreatment, deionizer, Reverse Osmosis:** Purpose of water treatment for dialysis. Components of a dialysis Centre's water treatment system. Advantages and disadvantages of water softeners, carbon tanks, reverse osmosis, deionization, and ultraviolet irradiation in the treatment of water for dialysis. Monitoring of water treatment systems –

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disinfection, microbiological testing, water sampling and chemical monitoring. Method for microbiological testing of the water treatment system.

Unit:2 (15 Hrs)

● **Typical water treatment monitoring schedule, reverse osmosis process and system:** definition of RO, cartridge pre-filter, reverse osmosis pump and monitor assembly, RO membranes, Quality assessment mechanisms, JCI requirements, ISO requirements, checklists and tools used for optimal compliance.

Unit:3 (15 Hrs)

● **Dialysis reuse:** History of dialyzer reprocessing. Reason for dialysis reprocessing. Steps involved in dialyzer reprocessing. Hazards of dialyzer reprocessing. Documentation for dialyzer reprocessing.

Unit:4 (15 Hrs)

- **Dialyzer Membranes:** Introduction to dialyzer membranes. Composition of the dialyzer membranes, types its use and sizes of the various membranes. Principles on which the dialyzer membranes work.
- **Renal Therapies (continuous):** Definition, indications, uses, method of initiation of dialysis, contraindications of therapy. Complications of therapy and ways to prevent complications. Monitoring during MARS dialysis, SLED and CRRT. Technologist's roles and responsibilities during MARS dialysis CRRT & SLED. Continuous therapies in hemodialysis, Hemo perfusion, Plasma Pheresis.

Recommended Text Books:

- Water quality in hemodialysis by E.Bonnie-Schorn, A, Grassmann, I. Uhlenbusch-Korwer, C.Weber, J.Vienken
- Brenner B.M., et al. (2011) Brenner and Rector's The Kidney 9th Ed, Elsevier Health Sciences
- Schrier R.W., (2006) Diseases of the Kidney and the urinary tract (Vol I, II, & III) 8th Ed, Lippincott Williams & Wilkins.
- Claude Jacobs (1996) Replacement of Renal Function by Dialysis Springer.
- Nissenson, A. R., Fine R.N., (2002) Textbook of Dialysis therapy 3rd Ed Hanley &Belfus.
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ADVANCE DIALYSIS TECHNOLOGY – II PRACTICAL

Course Code- BDLTS1-605

L T P C

Duration: 60 Hrs

0 0 4 2

Course Objective

- Students learn about Advancements in Dialysis.
- Practice independently SLED, CRRT and high efficiency dialysis.
- Learn different Advanced Renal therapies.

Course Outcomes

- Demonstrate Knowledge about Advancements in Renal Dialysis and in renal therapies.
- Demonstrate peritoneal dialysis, and its self care.
- Involves family centered approach while providing patient care.
- Handling complications during dialysis procedures

Experiment:

- First assistant in minor procedures
- Dialysis Reuse
- CPR Demonstrations
- Prepare Presentations based on various kinds of data collection

Recommended Text Books:

- Water quality in hemodialysis by E.Bonnie-Schorn, A, Grassmann, I. Uhlenbusch-Korwer, C.Weber, J.Vienken
- Brenner B.M., et al. (2011) Brenner and Rector's The Kidney 9th Ed, Elsevier Health Sciences
- Schrier R.W., (2006) Diseases of the Kidney and the urinary tract (Vol I, II, & III) 8th Ed, Lippincott Williams & Wilkins.
- Claude Jacobs (1996) Replacement of Renal Function by Dialysis Springer.
- Nissenson, A. R., Fine R.N., (2002) Textbook of Dialysis therapy 3rd Ed Hanley & Belfus.
- Orientation to National Kidney Foundation Hemodialysis Program – Training Manual by Gay Martin.

MDT DIRECTED CLINICAL EDUCATION – IV

Course Code- BDLTS1-603

Duration: 240 Hrs

Students will gain additional skills in diagnosis in pediatric cases and pediatric interventional procedures. Students apply knowledge from previous clinical learning experience under the supervision of a senior technologist. Students are tested on intermediate clinical diagnostic and therapeutic skills.

INTERNSHIP

Guidelines:

- The internship shall commence after the student has completed and passed all subjects up to VI semesters.
- The internship is compulsory.
- The duration of the internship shall be one year.
- The degree of Bachelor in Allied Health Sciences shall be awarded after the satisfactory completion of the internship.

Evaluation of Internees:

Formative Evaluation:

Day to day assessment of the internees during their internship postings should be done by the Head of the Department/Faculty assigned. The objective is that all the interns must acquire necessary minimum skills required for carrying out day to day professional work competently. This can be achieved by maintaining Records /Log Book by all internees. This will not only provide demonstrable evidence of the processes of training but more importantly of the internee's own acquisition of competence as related to performance.

Summative Evaluation:

It shall be based on the observation of the Sr. Technical staff / Faculty of the department concerned and Record / Log book maintained by the interns. Based on these two evaluations, the Head of the Department shall issue a certificate of satisfactory completion of training, following which the university shall award the degree or declare him/her eligible for it.

To implement the project work uniformly for all the specialties in view of the curriculum and training to be acceptable internationally and the students to get opportunity for higher studies and employment.

Internship Programme: 05 days for orientation programme 120 days in Dialysis Unit 30 days in Nephrology Ward 60days in Nephrology OT 30 days for Nephrology OPD