



**CURRICULUM FOR BS RENAL DIALYSIS TECHNOLOGY**

**INSTITUTE OF PARAMEDICAL SCIENCES (IPMS)**

**KHYBER MEDICAL UNIVERSITY PESHAWAR**

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### **Mission of BS Dialysis Program:**

Mission of BS Dialysis program is to produce highly qualified, knowledgeable and skillful dialysis technologist by high qualified faculty, structured curriculum, video demonstration, clinical practice and advance dialysis setups to meet the future health care needs of the national and international level. Who will be contribute in the field of diagnosis, management, technical and teaching skills in health care institutes.

### **Objectives of BS Dialysis Program:**

1. To demonstrate in-depth knowledge of basic and dialysis both in their fundamental context and their application in the health care institutes.
2. To equip the students with relevant Professional Knowledge, Skills and Ethical values
3. To train the students in the different dialysis setups in tertiary care hospital.
4. To incorporate and demonstrate positive attitude and behavior to all personals
5. To train the students with basic research skills to understand and conduct research
6. To equip students with English language, computer and communication skills

## **SPECIFIC LEARNING OUTCOMES OF BS RENAL DIALYSIS TECHNOLOGY:**

Following competencies will be expected from a student completing 4 years degree course in Renal Dialysis Technology, the students will be able to

- Demonstrate Counseling of patient about procedure
- Analyze Inspects a patient's dialysis access
- Write document pre-dialysis vital signs, weight, and temperature
- Preparation of the dialyzer, reprocessing and delivery systems
- Equipment maintenance
- Skills to monitor and record a patient's vital signs during procedure
- Assessment of patients for any complications that occur during a procedure
- Prepare dialysate according to established procedures and the dialysis prescription
- Assembles and prepares the dialysis extracorporeal circuit according to protocol and Dialysis prescription
- Tests monitor and machine functions, including alarms, conductivity and temperature
- Sets monitor and alarms according to unit
- Administer local anesthesia, inserts needles, and initiates dialysis according to patient prescription
- Administer anticoagulant according to prescription
- Measure and adjust blood flow rate according to prescription
- Calculate and adjust fluid removal rates according to prescription
- Monitor patients and equipment, responds to alarms, and readjust treatment parameters as patient requirements
- Change fluid removal rate and patient position, and administers replacement saline as directed by the dialysis technologist, physician order
- Respond appropriately to dialysis-related emergencies such as hypotensive episodes, needle displacement or infiltration, clotting episodes, blood leaks, air emboli, etc.
- Initiate cardiopulmonary resuscitation (CPR) in the event of a cardiac arrest
- Discontinue dialysis and establishes hemostasis following according to protocol. Inspects, cleans, and dresses access etc
- Obtain and record post-dialysis vital signs, temperature, and weight.
- Discard dialysis supplies and sanitizes equipment according to manufacturer protocol.
- Patient training for at-home dialysis treatment and techniques to provide emotional support patients need for self-care.

- Maintain professional conduct, good communication skills, and confidentiality in the care of patients.
- Collaborate with the Renal Dialysis Technologist in identifying and meeting patient education goals.

**FRAME WORK FOR BS RENAL DIALYSIS TECHNOLOGY**  
**(4 YEAR PROGRAMME)**

- Total numbers of Credit hours                      130 (HEC recommended: 124-136)
- Duration                                                      4 years
- Semester duration                                        16-18 weeks
- Semesters                                                   8
- Course Load per Semester                        15-18 Credit hours
- Number of courses per semester                 4-6

## SCHEME OF STUDIES FOR 4 YEAR BS RENAL DIALYSIS TECHNOLOGY

Semester/Year	Name of Subject	CODE	Credits
<b>First</b>	BIOCHEMISTRY-I	PMS-101	3+1
	HUMAN PHYSIOLOGY-I	PMS-102	3+1
	HUMAN ANATOMY-I	PMS-103	3+1
	ENGLISH-I	PMS-104	2+0
	PAK STUDIES	PMS-105	2+0
	COMPUTER SKILLS	PMS-106	1+1
<b>Second</b>	BIOCHEMISTRY-II	PMS-107	3+1
	HUMAN PHYSIOLOGY-II	PMS-108	3+1
	HUMAN ANATOMY-II	PMS-109	3+1
	ENGLISH-II	PMS-110	2+0
	ISLAMIC STUDIES	PMS-111	2+0
<b>Third</b>	HAEMATOLOGY-I	PMS-204	2+1
	GENERAL PATHOLOGY-I	PMS-201	2+1
	MEDICAL MICROBIOLOGY-I	PMS-207	2+1
	Communication Skill	PMS-206	1+1
	G. PHARMACOLOGY-I	PMS-202	2+1
	ANTOMY AND PHYSIOLOGY OF KIDNEY	PMS-217	2+1
<b>Fourth</b>	HAEMATOLOGY-II	PMS-226	2+1
	GENERAL PHARMACOLOGY-II	PMS-220	2+1
	MEDICAL MICROBIOLOGY-II	PMS-227	2+1
	G. PATHOLOGY-II	PMS-221	2+1
	SPECIAL PATHOLOGY OF KIDNEY	PMS-228	2+1
	BEHAVIORAL SCIENCES	PMS-225	2+0
<b>Fifth</b>	KIDNEY FAILURE	PMS-334	2+1
	PRINCIPLE OF DIALYSIS	PMS-342	2+1
	DIALYSIS PROCEDURE	PMS-343	2+1
	ACUTE COMPLICATION OF DAILY SIS	PMS-344	2+1

	DIALYSIS IN SPECIAL SITUATION	PMS-345	2+1
	CHRONIC COMPLICATION OF DIALYSIS	PMS-347	2+1
			<b>18</b>
<b>Sixth</b>	SPECILIZED DIALYSIS	PMS-348	2+1
	PERITONEAL DIALYSIS	PMS-349	2+1
	COMPLICATION OF PERITONEA DIALYSIS	PMS-350	2+1
	DIALYSIS ADEQUACY	PMS-351	2+1
	RESEARCH METHODOLOGY	PMS-310	2+1
	BIO-STATISTIC	PMS-308	2+1
			<b>18</b>
<b>Seventh</b>	FUNDAMENTAL OF INFECTION CONTROL	PMS-402	1+1
	NUTRITION AND DIET THERAPY	PMS-429	2+1
	UROLOGICAL PROCEDURE-I	PMS-430	2+1
	EPIDIMIOLOGY	PMS-404	2+0
	RENAL PHARMACOLOGY	PMS-432	2+1
			<b>13</b>
<b>Eight</b>	RESEARCH PROJECT/FINAL PROJECT	PMS-407	6+0
	SEMINAR	PMS-408	1
	RENAL EMERGENCY	PMS-431	2+1
	UROLOGICAL PROCEDURE-II	PMS-433	2+1
			<b>13</b>
	<b>TOTAL CREDIT HOURS</b>		<b>130</b>

**Total credit hours= 130**

**HEC recommendation=124-136**

## 1<sup>st</sup> SEMESTER COURSES

- Biochemistry-I
- Human Physiology-I
- Human Anatomy-I
- PAK-Study
- English-I
- Computer Skill



**Course objectives:**

- To understand the chemical composition of macro and micro molecules of the cell
- To understand different biochemical reactions in cell

**Course Detail:**

Biochemical composition and functions of the cell, Chemistry of signals and receptors, Structure and function of Carbohydrates, Proteins and lipids, Classification of vitamins, their chemical structure & biochemical function, Sodium, potassium, chloride, calcium, phosphorus, magnesium, sulfur, iodine, fluoride, Composition, function and daily secretion of saliva, gastric juice, gastric acid(HCL), pancreatic juice, bile, and intestinal secretion, Digestion of proteins, carbohydrates, nucleic acids and lipids, Absorption of vitamins and minerals Sodium, potassium, chloride, calcium, phosphorus, magnesium, sulfur, iodine, fluoride, Respiratory chain and oxidative phosphorylation, components of respiratory chain, electron carriers, ATP synthesis coupled with electron flow, phosphorylation of ADP coupled to electron transfer, Ionization of water, weak acids and bases, pH and pH scale pK values, Body buffers and their mechanism of action, Acid base regulation in human body, Biochemical mechanisms for control of water and electrolyte balance, Types of particles in solution, Importance of selectively permeable membranes, osmosis and osmotic pressure, surface tension, viscosity, Structure & composition, Secretion, Mechanism of action of hormones

**Practicals:**

1. Good laboratory Practices
2. Preparation of Solutions
3. Principles of Biochemistry analyzers(spectrophotometer, flame photometer)
4. Determination of Cholesterol, Tg, HDL, LDL, sugar, calcium and phosphorus in blood
5. Introduction to electrophoresis, PCR, gel documentation
6. SOP of centrifuge, water bath and microscope

**Recommended Books**

- Harper's Biochemistry
- Medical Biochemistry vol. I and II

**Course Objectives:**

- To understand the basic concepts of physiology beginning from the cell organization to organ system function.
- To understand the organization of cell, tissue organ and system with respect to their functions.
- To Understand the physiology of Respiration, G.I.T, Urinary system and Endocrine system

**Course Detail:**

Functional organization of human body, , Mechanism of Homeostasis, Cell structure and its function, function of different Tissue, Functions of the skin, , Types and function of muscle, Neuromuscular junction, functions of the endocrine glands, Breathing Mechanism, Exchange of respiratory Gaseous, Transport of respiratory gases, Function of different part of Digestive system, Function of liver and pancreas, Digestion and Absorption in Gastrointestinal tract, Patho-Physiology of Gastrointestinal Disorders, Formation of Urine by the Kidney, Glomerular filtration, Renal and associated mechanism for controlling ECF, Regulation of Acid-Base Balance, Male Reproductive System ( Male ), Prostate gland, Spermatogenesis, Female Reproductive System, Menstrual Cycle and Pregnancy and parturition, Mammary Glands and Lactation and Fertility Control

**Practicals:**

1. Introduction to microscope
2. Bleeding time and Clotting time
4. WBCs count and RBCs count
6. Platelets count and Reticulocytes count

**Recommended Books:**

- Essentials of Medical Physiology K Sembulingam, Prema Sembulingam Sixth Edition 2013
- Concise Physiology Dr. Raja Shahzad 1<sup>st</sup> Edition 2012
- Guyton And Hall Textbook Of Medical Physiology John E. Hall, Arthur C. Guyton Professor and Chair 2006
- Ross and Wilson Anatomy and Physiology in Health And Illness 11<sup>th</sup> Edition Anne Waugh, Allison Grant 2010

**Objectives:**

- To understand the basic concepts of general anatomy including skeleton and musculo skeleton.
- To Understand the anatomy of Thorax Abdomen and pelvis

**Course Contents:**

Musculo skeletal system(Axial and Appendicular), Axial Skeleton, Different bones of human body, Axial and Appendicular Skeleton, Classification on the basis of development, region and function, General concept of ossification of bones, parts young bone, Blood supply of long bones, Joints Structural Regional and functional classification of joints, Characteristics of synovial joints, Classification of synovial joints, Movements of synovial joints, Muscular System Parts of muscle Classification of muscles(skeletal, Cardiac, smooth), Thoracic wall: Muscles of thorax, Surface Anatomy, Trachea, lungs, pleura, mammary glands(breast), Heart and thoracic vessels, Thoracic cavity: Mediastinum, Lungs, bronchi, blood supply and lymphatics, Abdominal wall: Skin, nerve and blood supply, Muscles of anterior abdominal wall, Abdominal cavity: General Arrangement of the Abdominal Viscera, Peritoneum, Omenta, mesenteries, Stomach, blood, nerve, lymphatic supply, Small intestine, blood, nervous and lymphatic supply, Large intestine: blood nerve and lymphatic supply. The pelvic wall: Anterior, posterior wall, diaphragm, Pelvic cavity: Ureters, urinary bladder Male genital organs, Female genital organs, Muscles of pelvic region, blood supply, nerve supply, Special Senses.

**Practicals:**

- Study Axial and Appendicular skeleton on human skeletal model.
- Study musculo skeletal system on human musculo skeletal model.
- Study organs of special senses.
- Study and understand anatomy of Thorax, Abdomen and Pelvis through
- Human Models
- Video demonstration.

**Recommended Books**

- Essentials of Anatomy and Physiology by Seelay, Stephens and Tate. 4<sup>th</sup> edition
- Ross & Wilson Anatomy and Physiology.
- Human Physiology. Stuart Ira Fox. 7<sup>th</sup> edition
- Text Book of Medical Physiology Guyton
- Essential of Medical Physiology Vol.I & II by Mushtaq Ahmad.
- Lecture notes on human physiology by Bray JJ, Cragg, PA MacKnight

**Course Objective:**

- To enable the students to meet their real life communication needs
- To enhance language skills and develop critical thinking

**Course Contents:**

Vocabulary Building Skills: Antonyms, Synonyms, Homonyms, One word Substitute, Prefixes and suffixes, Idioms and phrasal verbs, Logical connectors, Check spellings, Practical Grammar & Writing Skill: Parts of Speech, Tenses, Paragraph writing: Practice in writing a good, unified and coherent paragraph, Précis writing and comprehension, Translation skills: Urdu to English, Reading skills: Skimming and scanning, intensive and extensive, and speed reading, summary and comprehension Paragraphs, Presentation skills: Developing, Oral Presentation skill, Personality development (emphasis on content, style and pronunciation)

**Recommended books:**

- Practical English Grammar by A.J. Thomson and A.V. Martinet. Exercises 2. Third edition. Oxford University Press 1986. ISBN 0 19 431350 6.
- Reading. Advanced. Brian Tomlinson and Rod Ellis. Oxford Supplementary Skills. Third Impression 1991. ISBN 0 19 453403 0.

**Course Objectives:**

- To develop vision of Historical Perspective, Government, Politics, Contemporary Pakistan, ideological background of Pakistan.
- To study the process of governance, national development, issues arising in the modern age and posing challenges to Pakistan.

**Course Contents:**

Historical Perspective: Ideological rationale with special reference to Sir Syed Ahmed Khan, Allama Muhammad Iqbal and Quaid-i-Azam Muhammad Ali Jinnah, Factors leading to Muslim separatism, People and Land, Indus Civilization, Muslim advent, Location and Geo-Physical features. Government and Politics in Pakistan: Political and constitutional phases: 1947-58, 1958-71, 1971-77, 1977-88, 1988-99, 1999 onward

Contemporary Pakistan: Economic institutions and issues, Society and social structure, Ethnicity, Foreign policy of Pakistan and challenges, Futuristic outlook of Pakistan

**Books Recommended:**

1. Akbar, S. Zaidi. *Issue in Pakistan's Economy*. Karachi: Oxford University Press, 2000.
2. Mehmood, Safdar. *Pakistan Kayyun Toota*, Lahore: Idara-e-Saqafat-e-Islamia, Club Road, nd.
3. Amin, Tahir. *Ethno - National Movement in Pakistan*, Islamabad: Institute of Policy Studies, Islamabad.
4. Afzal, M. Rafique. *Political Parties in Pakistan*, Vol. I, II & III. Islamabad: National Institute of Historical and cultural Research, 1998.

**Course objectives:**

- To understand the basic of computer
- To utilize the MS office, internet and email

**Course Contents:**

- Introduction to Computer and Window XP/7.
- MS Office 2007 (Word, Excel, PowerPoint).
- Internet access and different data bases available on the internet
- Email

**Recommended Books:**

- Computer science by Muhammad Ashraf, edition 1<sup>st</sup> 2010

## 2<sup>nd</sup> SEMESTER COURSES

- Biochemistry-II
- Human Physiology-II
- Human Anatomy-II
- English-II
- Islamic Studies

**Course Objectives:**

- To understand the metabolism of carbohydrates, lipids and proteins.
- To understand clinical role of enzymes in human being.
- To understand about the nutrition.

**Course Contents:**

Balance food, Major food groups, Nutritional status of Pakistani nation, Metabolic changes in starvation, Protein energy malnutrition, Regulation of food intake, Obesity; metabolism of carbohydrates (Citric Acid Cycle, Glycolysis, Pentose Phosphate Pathway), proteins (urea and corie cycle), nucleotides (uric acid formation) and lipids (beta oxidation); Respiratory chain and oxidative phosphorylation, components of respiratory chain, electron carriers, ATP synthesis coupled with electron flow, phosphorylation of ADP coupled to electron transfer; clinical diagnostic enzymology.

**Practicals:**

1. Determination of liver, cardiac, pancreatic enzymes
2. Determination of urea and uric acid

**Recommended Books:**

- Harper's Biochemistry Robert K. Murray, Daryl K. Granner 28<sup>th</sup> edition 2009
- Medical Biochemistry Mushtaq Ahmad vol. I and II 8<sup>th</sup> edition 2013



**Course Objectives:**

- To understand the basic concepts of physiology beginning from the organization of the systems to their role in the body
  - a. Understand the organization and function of various systems
  - b. Understand the physiology of Blood, CVS, Nervous System and special senses
  - c. Students will be able to understand immunity, its types and immune reactions

**Course Contents:**

Physiology of Nervous System, Function of various cranial nerves, Functions of somatic motor nervous system Functions of the autonomic nervous system, function of neurons, neuroglial cells and their components. Resting membrane potential and an action potential, function of a synapse and reflex arc, functions of the specialized sense organs: Eye, physiology of site, accommodation, optic nerve and optic chiasma, Ear, functions of the internal, middle and external ear Physiology of the hearing and balance, Smell, physiology of olfactory nerve. Taste, physiology of taste Location of the taste buds Physiology of speech, Blood: Composition and function of Blood , haematoposis, Blood grouping, Coagulation mechanism, Physiology of Cardiovascular system The Physiology of Pulmonary Systemic Circulation: Arteries Veins Local Control of Blood Vessels Nervous Control of Blood Vessels Regulation of Arterial Pressure, The function of Lymphatic System, tonsils, lymph nodes, the spleen and the thymus, Classification and physiology of Immune system, Antigens and Antibodies, Primary and secondary responses to an antigen Antibody-mediated immunity and cell-mediated immunity Role of lymphocyte in immunity regulation.

**Practicals**

1. Spirometry and Electrocardiography
3. Blood Pressure Measurement and Normal and abnormal ECG interpretation
5. Pulse rate measurement and Heart sounds

**Recommended Books**

- Essentials of Anatomy and Physiology by Seelay, Stephens and Tate. 4<sup>th</sup> edition
- Ross & Wilson Anatomy and Physiology.
- Human Physiology. Stuart Ira Fox. 7<sup>th</sup> edition
- Text Book of Medical Physiology Guyton

**Course Objective**

- To understand the anatomy of upper limb, lower limb and head and neck.

**Course Contents:**

The upper limb: Bones of shoulder girdle and Arm, Muscles, Axilla, Brachial plexus, Cubital fossa The forearm, hand bones, muscles, Blood supply, Nerve supply, lymphatics, The lower limb, Fascia, Bones, Muscles, Femoral triangle, Blood supply ,Nerve supply, Lymphatic supply.

Head and neck: Skull, Mandible, Cranial nerves, Cranial cavity, Meninges, Brain, Orbit, Neck, Endocrine System Classification of endocrine glands, Pituitary glands, Thyroid Glands, Adrenal gland and differences between the cortex and medulla.

**Practicals:**

Study and understand anatomy of Upper limb, Lower limb, Head and Neck through:

- Human Models
- Video demonstration
- Study radiographs of upper and lower limb

**Recommended Books:**

- Essential books (text books):
- Ross and Wilson Anatomy and Physiology in health and illness 11<sup>th</sup> Edition Waugh Grant.
- Clinical Anatomy (By regions) 9<sup>th</sup> edition, Richard S. Snell.
- Reference books :
- Netter Atlas of human anatomy 5<sup>th</sup> Edition Saunders.
- Gray's Anatomy for students 2<sup>nd</sup> Edition Drake Vogal Mitcell.
- BD. Churasia Human Anatomy (All regions)

**Course Objectives:**

- To enhance students writing, reading and listening skills.
- To enhance language skills and develop critical thinking.

**Course contents:**

Writing Skill: CV and job application, Technical Report writing, Writing styles, Changing narration: Converting a dialogue into a report, Converting a story into a news report, Converting a graph or picture into a short report or story, Active and Passive voice, Letter / memo writing and minutes of the meeting, use of library and internet recourses, Essay writing, Phrases - Types and functions, Clauses - Types and functions, Punctuation: Tenses - Types, Structure, Function, Conversion into negative and interrogative. Speaking Skill: Group Discussion (Various topics given by the teacher), Presentation by the students (individually), Role Play Activities for improving Speaking. Listening Skill: Listening Various Documentaries, Movies, and online listening activities to improve the listening as well as pronunciation of the words.

**Recommended Books:**

- Practical English Grammar by A.J. Thomson and A.V. Martinet. Exercises 2. Third edition. Oxford University Press 1986. ISBN 0 19 431350 6.
- Practical English Grammar by A.J. Thomson and A.V. Martinet. Exercises 1. Third edition. Oxford University Press. 1997. ISBN 0194313492.
- Practical English Grammar by A.J. Thomson and A.V. Martinet. Exercises 2. Third edition. Oxford University Press. 1997. ISBN 0194313506
- Intermediate by Marie-Christine Boutin, Suzanne Brinand and Françoise Grellet. Oxford Supplementary Skills. Fourth Impression 1993. ISBN 0 19 435405 7 Pages 20-27 and 35-41.
- Reading. Upper Intermediate. Brian Tomlinson and Rod Ellis. Oxford Supplementary Skills. Third Impression 1992. ISBN 0 19 453402 2.

**Objectives:**

- To learn about Islam and its application in day to day life.
- To provide Basic information about Islamic Studies
- To enhance understanding of the students regarding Islamic Civilization
- To improve Students skill to perform prayers and other worships
- To enhance the skill of the students for understanding of issues related to faith and religious life.

**Course Detail:**

Fundamental beliefs of Islam, Belief of Tawheed, Belief in Prophet hood, Belief in the Day of Judgment, Worships, Salaat / Prayer, Zakat /Obligatory Charity, Saum / Fasting, Hajj / Pilgrimage, Jihad, Importance of Paramedics In Islam, Ethics, Religion and Ethics, Higher Intentions / Objectives of Islamic Sharia and Human Health, Importance and Virtues of Medical Profession, Contribution and Achievements of Muslim Doctors, Knowledge of the Rights, Wisdom and Prudence, Sympathy /Empathy, Responsible Life, Patience, Humbleness, Self Respect, Forgiveness, Kindhearted, Beneficence, Self Confidence, Observing Promise, Equality, Relation among the Doctors, Jealousy, Backbiting, Envy, Etiquettes of Gathering, Relation between a Doctor and a Patient, Gentle Speaking, Mercy and Affection, Consoling the Patient, To inquire the health of Patient, Character building of the Patient, Responsibilities of a Doctor,

**Recommended Books:**

- Islamiyat (Compulsory) for Khyber Medical University, Medical Colleges and Allied Institutes

### **3<sup>rd</sup> SEMESTER COURSE**

- Hematology-I
- General Pathology-I
- Medical Microbiology-I
- General Pharmacology-I
- Communication Skill
- Anatomy and Physiology of kidney

**Course Objectives:**

- To introduce the students about the basic concepts in Hematology and acquire skill in practical work to produce students steeped in knowledge of Hematology.
- To equip students with latest advancements in the field of hematology.

**Course Outlines:**

Introduction to hematology, physiology of blood and composition, introduction to bone marrow, structure and function of bone marrow, blood formation in the body (Intra-uterine and extra-uterine), factors governing hematopoiesis, erythropoiesis, different stages and factor effecting on erythropoiesis, granulopoiesis, different stages and factor effecting on granulopoiesis, megakariopoiesis, different stages and factor effecting on megakariopoiesis, introduction to hemoglobin structure, synthesis and function, complete blood count and its importance, morphology of red blood cells and white blood cells, introduction to anemia and classification of anemia, introduction to hemolysis (physiological and pathological), introduction to WBC disorders, introduction to leukemia, etiology, pathogenesis and its classification, leukocytosis, leukopenia, neutrophilia, condition related to neutrophilia, neutropenia, condition related to neutropenia, eosinophilia, condition related to eosinophilia, eosinopenia, condition related to eosinopenia, monocytosis, condition related to monocytosis, monocytopenia, condition related to monocytopenia, lymphocytosis, condition related to lymphocytosis, lymphopenia, condition related to lymphopenia, basophilia, condition related to basophillia, introduction to hemostasis, mechanism of hemostasis, function of platelets and coagulation factors, coagulation cascade, quantitative disorder of platelets, , qualitative disorder of platelets.

**Practical:**

1. collection of blood sample and preparation and staining of peripheral blood smear
2. total leucocyte count, RBC count and determination of absolute values
3. differential leucocyte count; platelets count and reticulocytes count
4. to determine the ESR
5. determine bleeding time; prothrombin time; activated partial thromboplastin time

**Recommended Books:**

0. Essential of Hematology, A.V Hoff Brand, 6<sup>th</sup> edition 2006
1. Clinical Hematology, G.C Degrunchi, 5<sup>th</sup> edition 2002
2. Practical Hematology, Dacie J.V. 10<sup>th</sup> edition 2012

**Course Objectives:**

- To understand different pathological processes
- To the processes blood coagulation and embolism
- To understand the mechanism of wound healing and regeneration

**Course Contents:**

Introduction to pathology, Cell injury, Cellular adaptation, Acute Inflammation, Chronic Inflammation, Cell Repair & Wound Healing, Regeneration & Repair, Haemodynamic Disorders, Edema, Haemorrhage, Thrombosis, Embolism, Infarction & Hyperaemia, Shock, compensatory mechanism of shock, possible consequences of thrombosis & difference between arterial & venous emboli, Neoplasia, Dysplasia, benign and malignant neoplasms, metastasis

**Practicals:**

1. Estimation of Prothrombin Time
2. Estimation of Clotting Time
3. Estimation of Bleeding Time
4. Estimation of Activated Partial Tromboplastin Time

**Recommended Books:**

1. Robbins Basic Pathology by Kumar, Abbas and Aster; 9<sup>th</sup> edition

**Course objectives:**

- To introduce the students with basic concepts in bacteriology and mycology.
- To introduce the students with common bacterial and fungal infections.
- To introduce the students with diagnosis of common bacterial and fungal infections.

**Course contents:**

Historical review and scope of microbiology, sterilization, disinfection and antisepsis, structure and function of prokaryotic cell, difference between prokaryotic and eukaryotic cell, bacterial growth and metabolism, bacterial classification, normal microbial flora of human body, mechanism of bacterial pathogenesis, host parasite interaction, Immune response to infection, common bacterial pathogen prevailing in Pakistan, introduction to fungi, fungal characteristic, morphology, structure, replication and classification, mechanism of fungal pathogenesis, common fungal pathogen prevailing in Pakistan.

**Practical:**

1. Introduction and demonstration of Laboratory Equipments used in Microbiology.
2. Inoculation and isolation of pure bacterial culture and its antibiotic susceptibility testing.
3. Demonstration of different types of physical and chemical methods of sterilization, and disinfection.
4. Students should be thorough to work with compound microscope.
5. Detection of motility: Hanging drop examinations with motile bacteria, non-motile bacteria.
6. Simple staining methods of pure culture and mixed culture.
7. Gram's staining of pure culture and mixed culture.
8. AFB staining of Normal smear, AFB positive smear.
9. KOH preparation for fungal hyphae.
10. Germ tube test for yeast identification and Gram stain for candida.

**Recommended books:**

- Sherris Medical Microbiology: An Introduction to Infectious Diseases. Ryan, K. J., Ray, C. G., 4<sup>th</sup> ed. McGraw-Hill, 2003.
- Clinical Microbiology Made Ridiculously Simple. Gladwin, M., & Trattler, B., 3<sup>rd</sup> ed. MedMaster, 2004.



**Course Objectives**

By the end of the course students will be able to:

- Communicate effectively both verbally and non-verbally
- Apply the requisite academic communication skills in their essay writing and other forms of academic writing
- Use various computer-mediated communication platforms in their academic and professional work
- Relate to the interpersonal and organizational dynamics that affect effective communication in organizations.

**Course contents:**

Introduction to Communication , Meaning and definition of Communication, The process of communication, Models of communication, Effective Communications in Business, Importance and Benefits of effective communication, Components of Communication, Communication barriers, Non verbal communication, Principles of effective communication, Seven Cs, Communication for academic purposes, Introduction to academic writing, Summarizing, paraphrasing and argumentation skills, Textual cohesion, Communication in Organizations, Formal communication networks in organizations, Informal communication networks, Computer- mediated communication (videoconferencing, internet, e-mail, skype, groupware, etc), Business Writing , Memos, Letters, Reports, Proposals, Circulars, Public Speaking and Presentation skills, Effective public presentation skills, Audience analysis, Effective argumentation skills, Interview skills.

**Recommended Books:**

- Practical English Grammar by A.J. Thomson and A.V. Martinet. Exercises 2. Third edition. Oxford University Press 1986. ISBN 0 19 431350 6.
- Practical English Grammar by A.J. Thomson and A.V. Martinet. Exercises 1. Third edition. Oxford University Press. 1997. ISBN 0194313492.
- Practical English Grammar by A.J. Thomson and A.V. Martinet. Exercises 2. Third edition. Oxford University Press. 1997. ISBN 0194313506
- Reading. Upper Intermediate. Brain Tomlinson and Rod Ellis. Oxford Supplementary Skills. Third Impression 1992. ISBN 0 19 453402 2.

**Course Objectives:**

- To discuss the roles and responsibilities of the various members of the health care team in maintaining patient safety during drug therapy.
- To define common terms related to pharmacology and drug therapy.
- To discuss relevant historical, legal, and ethical issues related to pharmacology and drug therapy.

**Course Contents:**

Definitions of a drug pharmacology, clinical pharmacology, therapeutics, pharmacogenetics, therapeutic index, Pharmacokinetics: Drug passage across cell membrane, Plasma half-life, Steady state concentration, biological half life, Absorption: sites, enterohepatic circulation, bioavailability, factors affecting systemic availability, pre-systemic elimination, effect of food on drug kinetics, Distribution: protein binding, Metabolism: results of metabolism of drugs, sites of metabolism, phases of metabolism, enzyme induction, enzyme inhibition, Elimination: Excretion, Mechanism of drug action: Different mechanisms of drug action. Receptors: Drug binding to receptors, second messenger, receptor regulation. Dose-response relationship: agonist, antagonist, affinity, potency, efficacy, factors modifying drug response. Drug interactions: Definitions. Types of interaction: harmful and useful. Pharmacological basis of drug interaction: pharmacokinetic interactions; pharmacodynamics interactions; antagonism, synergism. An overview of Drugs acting on parasympathetic system, Antihypertensive drugs, An overview of Analgesics: Narcotics and Non-narcotics, An overview of Drugs acting in gastrointestinal tract, Drugs acting on respiratory tract, An overview of Drugs acting on endocrine system.

**Practicals:**

1. Routes of drug administration and Dose-Response Curves
2. Affect of adrenaline on pulse rate
3. Affect of beta blockers on heart rate after exercise
4. Source of drug and identification of some raw materials that are source of drug
5. Weight conversions, measurement and prescription writing
6. Preparation Sulfur ointment and Preparation of pilocarpine drop

**Recommended Books:**

- Lippincott's pharmacology (text book) by Mycek 2ndEdition published by Lippincott Raven 2000.

**Course Objective:**

At the end of this of course student will be able

- To Identify different function of kidney
- To Describe mechanism of urine formation
- To Analyze regulation of blood chemistry through kidney

**Course Contents:**

Introduction, anatomy of urinary system, function of kidney, endocrine function of kidney, regulation of blood pressure, Different layers of kidney, Renal corpuscle, tubular portion of nephron, passage of urine, structure of juxtaglomerular apparatus, function of juxtaglomerular apparatus, Regulation of Glomerular blood flow and glomerular filtration, Renal blood vessels, measurement of renal blood flow, regulation of renal blood flow, special feature of renal circulation, urine formation, glomerular filtration rate, filtration fraction, tubular reabsorption, mechanism of reabsorption, route of reabsorption, site of reabsorption, tubular secretion, concentration medullary gradient, countercurrent mechanism multiplier, countercurrent mechanism exchanger, role of ADH, acidification of urine and role of kidney in acid base balance, Properties and composition of normal urine, Renal Function tests, Examination of blood and urine renal function tests.

**Practical:**

1. Identification of various parts of kidney structure
2. Microscopic and Structural examination of human kidney
3. Ultra sound examination of kidney
4. Laboratory analysis of blood and urine specimen of nephrology patient

**Recommended Books:**

- Essentials of Medical Physiology K Sembulingam, Prema Sembulingam Sixth Edition 2013
- Guyton And Hall Textbook Of Medical Physiology John E. Hall, Arthur C. Guyton Professor and Chair 2006

## 4<sup>th</sup> Semester Courses

- Haematology-II
- General Pharmacology-II
- Medical Microbiology-II
- General Pathology-II
- Behavioral Sciences
- Special Pathology of Kidney

**Course Objectives:**

- To introduce the students about the basic concepts in Hematology and acquire skill in practical work to produce a team of Medical Technologists steeped in knowledge of Pathology.
- To equip Medical Technologists with latest advancements in the field of hematology.

**Course Outlines:**

Iron metabolism, introduction to iron deficiency anemia, different stages and diagnosis, introduction to thalassemia, classification, pathophysiology and its diagnosis, introduction to Sideroblastic anemia, etiology and diagnosis, folate and vitamin B<sub>12</sub> metabolism, introduction to megaloblastic anemia, etiology and diagnosis, introduction to G6PD deficiency anemia, pathophysiology and diagnosis, introduction to sickle cell anemia, pathophysiology and diagnosis, introduction to hereditary spherocytosis, pathophysiology and diagnosis, introduction to hemolytic anemia, Immune hemolytic anemia, non immune hemolytic anemia, aplastic anemia, etiology and diagnosis, ABO and Rh D group system, Kell blood group system, Kidd blood group system, Duffy blood group system, donor selection criteria, phlebotomy of donor, blood products, preparation and its importance, hemovigilance in blood bank, cross match, types of cross match, procedure and its importance, blood grouping and its importance, Coombs test, types and importance, introduction to hemolytic disease of newborn, types, pathophysiology, diagnosis and management, hemolytic transfusion reactions and management.

**Practical:**

1. ABO blood grouping (Forward and Reverse grouping)
2. Rh Blood grouping
3. Antibodies screening
4. Cross matching (Major and Minor)
5. Coombs tests (Direct and Indirect)
6. Separation of different blood components
7. Du Test

**Recommended books**

- a. Essential of Hematology, A.V Hoff Brand, 6<sup>th</sup> edition 2006
- a. Clinical Hematology, G.C Degrunchi, 5<sup>th</sup> edition 2002
- b. Practical Hematology, Dacie J.V. 10<sup>th</sup> edition 2012

**COURSE OBJECTIVES:**

- To provide quality patient care in routine as well as advanced procedures.
- To understand the mechanism of drug action at molecular as well as cellular level, both desirable and adverse.
- To understand the principles of pharmacokinetics i.e. drug absorption, distribution, metabolism and excretion and be able to apply these principles in therapeutic practice.

**Course contents:**

Drugs acting on cardiovascular system; Drugs for heart failure, anti hypertensive drugs, anti arrhythmic drugs, antianginal drugs, Anti Hyperlipidemic drugs, Blood drugs, Diuretics, Insulin and glucose lowering drugs, Chemotherapeutic drugs, Antibiotics, Drugs acting on Respiratory system, Anesthetics.

**Practical:**

1. Routes of drug administration
2. Dose-Response Curves
3. Affect of adrenaline on pulse rate
4. Affect of beta blockers on heart rate after exercise
5. Source of drug and identification of some raw materials that are source of drug
6. Weight conversions and measurements
7. Preparation Sulfur ointment
8. Preparation of pilocarpine drops
9. Prescription writing

**Recommended Books:**

- Lippincott's pharmacology (text book) by Mycek 2nd Edition published by Lippincott Raven 2000.
- Katzung textbook of pharmacology (Reference Book) by Bertram Katzung 8<sup>th</sup> Edition, Published by Appleton.dec 2007.

**Course objectives:**

- To introduce the students with basic concepts in virology and parasitology.
- To introduce the students with common viral and parasitic infections.
- To introduce the students with diagnosis of common viral and parasitic infections.

**Course contents:**

Biosafety levels, control of hospital infection, biomedical waste management, introduction to virology, Viral morphology, structure, replication and classification, general properties of virus, pathogenesis and control of virus, common viral pathogen prevailing in Pakistan, introduction to parasitology, Parasite (protozoan and helminthes) morphology and classification, general principal of pathogenesis, immunology and diagnosis of parasitic infection, common parasitic pathogen prevailing in Pakistan.

**Practical:**

1. Cleaning of new and used glass wares for microbiological purposes.
2. Students should be familiar to use autoclave, hot air oven, water bath, steamer etc.
3. Macroscopic and microscopic examination of stool for adult worms, ova, cysts, larvae.
4. Visit to hospital for demonstration of biomedical waste management.
5. Demonstration of common serological tests used for the diagnosis of viral and parasitic infection.
6. Demonstration of malarial parasites in blood and bone marrow.
7. Demonstration of leishmania in blood film.
8. Concentration techniques for intestinal parasites in stool.

**Recommended books:**

Sherris Medical Microbiology: An Introduction to Infectious Diseases. Ryan, K. J., Ray, C. G., 4<sup>th</sup> ed. McGraw-Hill, 2003.

Clinical Microbiology Made Ridiculously Simple. Gladwin, M., & Trattler, B., 3<sup>rd</sup> ed. MedMaster, 2004.

Medical Microbiology and Infection at a Glance. Gillespie, S., H., Bamford, K., B., 4<sup>th</sup> ed. Wiley-Blackwell, 2012.

**Course Objectives:**

- To introduce students with different environmental hazards
- To gain knowledge of some basic systemic diseases

**Course Details:**

Health effects of climate change, toxicity of chemical and physical agents, environmental pollution, effect of tobacco, effect of alcohol, injury by therapeutic drugs and drugs of abuse, general principles of microbial pathogenesis, special techniques for identifying infectious agents, agents of bioterrorism, heart failure, congenital heart diseases, ischemic heart diseases, hypertensive heart diseases, arrhythmias, atelectasis, chronic obstructive pulmonary disease, asthma, bronchiectasis, pneumonias, pneumothorax, hemothorax, nephrotic syndrome, renal stone, hydronephrosis, aphthous ulcer, gastritis, peptic ulcer, hemorrhoid, jaundice, liver cirrhosis, viral hepatitis, cholecystitis, urinary tract infections, arthritis, facial palsy

**Practicals:**

1. Helicobacter pylori test
2. Diagnosis methods of UTI
3. Determination of renal function tests
4. Determination of liver function tests
5. Determination of cardiac profile

**Recommended Books:**

1. Robbins Basic Pathology by Kumar, Abbas and Aster; 9<sup>th</sup> edition



**Course objective:**

At the end of this course student will be able

- To categorize different renal disease
- To analyze clinical diagnosis of different renal disease.
- To describe Pathological causes of different renal disease.
- To explain pathological mechanism of different renal disease.

**Course content:**

Clinical Manifestation of renal disease, Imaging techniques for kidney, Polyuria, proteinuria, Hematuria, urinary retention, glomerular disease, the nephrotic syndrome, the nephritic syndrome, rapidly progressive glomerulonephritis, tubulointerstitial nephritis, Tubulo interstitial necrosis, acute tubular injury, cystic disease of the kidney, Urinary tract infection, urinary outflow obstruction, Prostatitis, renal stone, hydronephrosis, tumors of the kidney, renal cell carcinoma, Benign prostatic hypertrophy.

**Practical:**

1. Examination of microscopic section of kidney in laboratory
2. Ultrasound examination of kidney
3. Identification of kidney in abdomen X-ray
4. Examination of kidney disease specimen
5. Laboratory analysis of stool and urine specimen of nephrology patient
6. Visit of nephrology patients (Inpatients and outpatients)

**Recommended Books:**

- Robbins Basic Pathology by Kumar, Abbas and Aster; 9<sup>th</sup> edition
- Fundamental of Renal Pathology, Arthur H. Cohen, Robert B. Calvin, J. Charles, Jennette, Chartes E. Alpers, 2<sup>nd</sup> Edition
- Medical diagnosis and management, Inam Danish

**Course Objectives**

- Conducting diagnostic interviews
- Formulating and clarifying diagnostic findings and treatment recommendations
- Documenting evaluation and treatment procedures, involving duties such as recording results of diagnostic interviews, lab studies, and/or treatment plans in a timely way according to the medical records protocols of the rotation site

**Course Contents:**

Introduction to Behavioral Sciences and its importance in health: Bio-Psycho-Social Model of Health Care and the Systems Approach, Normality vs Abnormality, Importance of Behavioral sciences in health, Desirable Attitudes in Health Professionals Understanding Behavior: Sensation and sense organs, Perception, Attention and concentration, Memory, Thinking, Communication, Individual Differences: Personality, Intelligence, Emotions, Motivation, Learning, Stress and Stressors, Life Events, Stress, Management, Interviewing / Psychosocial History Taking, Allied Health Ethics-Hippocratic oath, Culture and Allied Health practice, Psychological reactions, Breaking Bad News, Pain, Sleep, Consciousness.

**Recommended Books:**

- Behavioral Sciences by M.H Rana 2007, edition 5<sup>th</sup>
- Sociology in a Changing World by William Kornblum 8<sup>th</sup> edition 2007
- Changing Behavior: Immediately Transform Your Relationships with Easy-to-Learn, Proven Communication Skills by Georgiana Donadio 2011, edition 5<sup>th</sup>

## 5<sup>TH</sup> SEMESTER COURSE

- Kidney Failure
- Principle of Dialysis
- Dialysis procedure
- Acute complication of Dialysis
- Dialysis in Special situation
- Chronic complication of dialysis

**Course Objectives:**

At the end of this course student will be able

- To describe different stages of kidney failure
- To describe Pathological causes of kidney failure
- To analyze variation of Blood composition due to renal failure

**Course Content:**

Definition and type of kidney injury, stages of acute kidney injury, acute kidney failure, pathology of acute kidney injury and acute kidney failure, clinical aspects of acute kidney injury and acute renal failure, management of acute kidney failure, definition of chronic kidney stages and chronic kidney failure, pathology of chronic kidney failure, kidney failure in hypertension, pathogenesis, clinical assessment of HTN, classification and treatment , kidney failure in diabetes, kidney failure in stone disease, kidney failure in Gastrointestinal problem like diarrhea ets, clinical aspects of chronic renal failure, management of chronic renal failure.

**Practical's:**

1. Ultra sound examination of kidney
2. Clinical examination of renal failure patient
3. Priming of blood tube lining, dialyzer and dialysis machine
4. Laboratory analysis of renal failure patient
5. Dialyzing patient with acute renal failure

**Recommended Book:**

- Oxford Handbook of dialysis, Jeremy Levy, Edwina Brown, Christin Daley and Anastasia Lawrence, 4th Edition
- The Essentials Renal Pathophysiology, Helmut G. Rennke, Bradley M. Denker, 3rd Edition
- Fundamental of Renal Pathology, Arthur H. Cohen, Robert B. Calvin, J. Charles, Jennette, Charles E. Alpers, 2nd edition
- Oxford Desk Reference Nephrology, Jonatan Barratt, Kevin Harris, Peter Topham

**Course objectives:**

At the end of this course student will be able

- To describe principle of dialysis
- To categorize different procedure of dialysis
- To demonstrate mechanism of ultrafiltration
- To recognize machine key feature
- To describe water composition

**Course Content:**

History and theory of Dialysis, Principles of Hemodialysis in Practice, Diffusion and Osmosis Process during Hemodialysis, Factor Affecting Solute Clearance on Hemodialysis, Ultrafiltration Process during Hemodialysis, Methode of Ultrafiltration during Hemodialysis, High efficiency and High Flux Hemodialysis, Heamofiltration and Heamodiafiltration, Dialyzer Technical Specification, Dialyzer membrane and Dialyzer types, Solute And Water Transport in Dialyzer, Biocompatibility of membrane, Dialysis Machine key Feature, Dialysis Machine additional Facilities, Dialysis Machine Monitor, Dialysis Machine Patient Monitor, Product of Water and Hemodialysis Solution, Contaminants in water, Method of Purifying water for Dialysis, Standard and Monitoring of Dialysis solution.

**Practical:**

1. Identification of parts of dialysis machine
2. Setup blood line and dialyzer on machine
3. Pre and post assessment of dialysis patient
4. Visit to water treatment plant of dialysis unit

**Recommended Book:**

- Handbook of dialysis, John T. Daulrdas, Peter G. Black, Todd, 5th edition
- Oxford Handbook of dialysis, Jeremy Levy, Edwina Brown, Christin Daley and Anastasia Lawrence,
- Fluid, Electrolyte and acid base Physiology, Halperin, Goldstain and Kamal, 4th Edition

**Course Objective:**

At the end of this course student will be able

- To analyze composition and preparation of dialysate solution
- To demonstrate preparation of permanent of vascular access
- To demonstrate insertion of temporary vascular access

**Course Contents:**

Dialysate, types and composition of dialysis concentrate, dialysate delivery and safety issues, sodium and other electrolytes, glucose dialysate., vascular access, vascular access overview, temporary vascular access, advantages and disadvantages of temporary vascular access, permanent vascular access, formation of vascular access, advantages and disadvantages of permanent vascular access, catheter use for temporary vascular access, complication during temporary vascular access, differences between fistula and graft, complication of fistula and graft, stenosis, thrombosis, ischemia, pseudoaneurysm, infection, access recirculation, Hemodialysis procedure, hemodialysis order, pre and post dialysis assessment, needle placement and dialysis access, patient monitoring drugs, rinsing and priming the dialyzer, the first dialysis session in chronic and acute renal failure, the first dialysis specification, the first dialysis session dialysis, arteries and venous pressure during dialysis, anticoagulation, definition of anticoagulant, different types of anticoagulants, clotting test for anticoagulant, anticoagulant techniques, heparin free dialysis, regional anticoagulation for hemodialysis, other methods of anticoagulant.

**Practical's:**

1. Assessment of A.V fistula
2. Cannulation technique for A.V fistula
3. Pre and post assessment of dialysis patient
4. Intra dialytic assessment and monitoring
5. Different trouble shooting

**Recommended Book:**

- Handbook of dialysis, John T. Daulrdas, Peter G. Black, Todd, 5th edition
- Oxford Handbook of dialysis, Jeremy Levy, Edwina Brown, Christin Daley and Anastasia Lawrence,
- Fluid, Electrolyte and acid base Physiology, Halperin, Goldstain and Kamal, 4th Edition

**Course Objectives:**

At the end of this course student will be able

- To interpret assessment and management of different complication during dialysis
- To describe how prevent of different complication during dialysis

**Course Content:**

Acute complication of dialysis, hypotension, ( Intradialytic), Management of hypotension, Prevention of hypotension, Prevention of Hypotension Blood volume monitoring, Muscle Cramp, Causes of Muscle Cramp, Management of Muscle Cramp, Prevention of Muscle Cramps, Nausea and Vomiting, causes of Nausea and Vomiting, management of Nausea and Vomiting , Prevention, Headache, Causes, Management, prevention, Chest pain and Back pain, causes, management, prevention , Disequilibrium Syndrome, causes, management, prevention, Dialyzer Reaction , causes, types, management prevention Seizures, causes, management , prevention, Hemolysis, causes, management, prevention , Fever and Chills, causes, management, Air Embolism, causes, management, prevention, Arrhythmia, causes, management, prevention.

**Practicals:**

1. Pre and post assessment of dialysis patient
2. Connecting via central line or A.V fistula
3. Intra dialytic assessment and monitoring
4. Changing setting during dialysis
5. Terminating dialysis
6. Response to emergency situation during dialysis

**Recommended Book:**

- Handbook of dialysis, John T. Daulrdas, Peter G. Black, Todd, 5th edition
- Oxford Handbook of dialysis, Jeremy Levy, Edwina Brown, Christin Daley and Anastasia Lawrence,
- Fluid, Electrolyte and acid base Physiology, Halperin, Goldstain and Kamal, 4th Edition

**Course Objectives:**

At the end of this course student will be able

- To demonstrate how to manage with special complication of Dialysis Patient
- To illustrate techniques and principle of plasmapheresis

**Course Content:**

Dialysis in the elderly, Dialysis in the peads, complication of acute and chronic Dialysis in children, Managing Diabetic Patients on Dialysis, Problem for Diabetic Patients on Dialysis, Surgery in Dialysis Patient, Surgery in Dialysis Patient (HD and PD), Myeloma Renal Failure, Myeloma Renal failure Treatment , Pain management in ESRF, Difficulty of pain management in Renal patient, Analgesic drugs, Pregnancy in Dialysis patient, managing Pregnancy in dialysis patient, Dialysis with patient HIV, Plasmapheresis, Techniques of Plasmapheresis, Ancillary measure, Complication of Plasmapheresis, specific indication for Plasmapheresis, Immune Adsorption Techniques, Indication for Immune Adsorption, Complication during plasma exchange,

**Practical:**

1. Pre and post patient assessment
2. Verifying safety parameters of hemodialysis machine
3. Setting limits on Hemodialysis machine
4. Changing setting during dialysis
5. Response to emergency situation during dialysis

**Recommended Book:**

- Handbook of dialysis, John T. Daulrdas, Peter G. Black, Todd, 5th edition
- Oxford Handbook of dialysis, Jeremy Levy, Edwina Brown, Christin Daley and Anastasia Lawrence,
- Complication of dialysis, Norbort lameire, Ravinda L. Metha
- Oxford Desk Reference Nephrology, Jonatan Barratt, Kevin Harris, Peter Topham



**Course Objectives:**

At the of this the student will be able

- To describe chronic complication of hemodialysis
- To demonstrate therapy of chronic complication of dialysis patient
- To describe how prevention of communicable disease

**Course Content:**

Psychosocial Issue in End Stage renal disease, Hypertension, Pathophysiology of Hypertension, Hematological Abnormalities, Definition of Anemia, Consequence of Anemia, Treatment, ESA Therapy, Blood and blood product transfusion, Infection, Bacterial Infection in Dialysis Patients, Viral infection, Hepatitis, Vaccination, Endocrine Disturbance, Bone Disorder in ESRD, Cardiovascular Disease in ESRD, Common Gastrointestinal Disorder in dialysis patient, Respiratory disorder in dialysis patient.

**Practicals:**

1. Basic diagnostic method in hematology
2. Clinical management of different complication during dialysis
3. Method of prevention to communicable disease
4. Visit of nephrology ward

**Recommended Book:**

- Fundamental of Renal Pathology, Arthur H. Cohen, Robert B. Calvin, J. Charles, Jennette, Chartes E. Alpers, 2nd edition
- Oxford Handbook of Nephrology and hypertension, Simon Steddon, Neil Ashman, Alistair Chesser, John Cunnigham, 2nd edition
- Oxford Handbook of Nephrology and hypertension, Simon Steddon, Neil Ashman, Alistair Chesser, John Cunnigham, 2nd edition

## 6<sup>th</sup> Semester course

- Specialized Dialysis
- Peritoneal Dialysis
- Complication of Peritoneal Dialysis
- Dialysis Adequacy
- Research Methodology
- Bio-Statistic

**Course objectives:**

At the of this course student will be able

- To interpret hemodialysis and CRRT
- To operate CRRT Machine
- To identify different type of CRRT

**Course Content:**

Continuous Hemodialysis, continuous hemofiltration, continuous heamodifiltration, slow continuous ultrafiltration, sustained low efficiency dialysis, clinical indication, difference among C-HD, C-HF and C-HDF in clearance of small and large molecule weight solute. Vascular access for Specialized dialysis, CRRT filter, dialysis and replacement solution, prescribing and delivering of CRRT, equipment, setting the ultrafiltration rate, anticoagulation, hemodiafiltration versus hemofiltration, indication for plasmapheresis, plasmapheresis, principle of treatment, Pharmacokinetics of immnuoglobuline, technical consideration, vascular access, anticoagulation, replacement of solution, Use of dialysis and hemoperfusion in treatment of poisoning, dialysis and hemoperfusion, indication, choice of therapy, importance of volume distribution, technical point.

**Practical:**

1. Setup of extra corporeal circuit of CRRT
2. Priming of CRRT circuit
3. Operating of CRRT machine
4. Assessment of patient in intensive care unite

**Recommended Book:**

- Oxford Handbook of dialysis, Jeremy Levy, Edwina Brown, Christin Daley and Anastasia Lawrence
- Handbook of dialysis, John T. Daulrdas, Peter G. Black, Todd, 5th edition
- Oxford Handbook of Nephrology and hypertension, Simon Steddon, Neil Ashman, Alistair Chesser, John Cunnigham, 2nd edition

**Course Objectives:**

At the end of this course student will be able

- To describe principle of peritoneal dialysis
- To demonstrate insertion and conformation of peritoneal catheter
- To describe peritoneal membrane complication

**Course Content:**

Peritoneal Dialysis, anatomy of peritoneal membrane, function of peritoneal membrane, physiology of peritoneal transport, clinical assessment and implication of peritoneal transport, principle of peritoneal dialysis, factor effecting efficiency of peritoneal dialysis, effect of dwell time of solute and fluid transfer, Apparatus for peritoneal dialysis, CAPD, automated peritoneal dialysis, hybrid regimens, peritoneal access device, acute versus chronic catheter, types of chronic catheter, placement procedure, catheter break in procedure, complication of peritoneal catheter, care of peritoneal catheter, acute peritoneal dialysis prescription, introduction, peritoneal catheter, use of automated cyclers, prescribing acute peritoneal dialysis, monitoring clearance, complication, Adequacy of peritoneal dialysis and chronic peritoneal dialysis prescription, choice of PD treatment modality, choice of prescription, nutritional issues in peritoneal dialysis, volume status and fluid overload in peritoneal. Peritoneal dialysate: assessment of fluid status, mechanism of fluid overload, diagnosis of ultrafiltration, management of fluid overload, glucose sparing strategies, hypertension and hypotension in peritoneal dialysis.

**Practical:**

1. Tubing of peritoneal dialysis on dialysis
2. Operating of peritoneal dialysis
3. Laboratory analysis of peritoneal dialysis patient
4. Adequacy of peritoneal dialysis

**Recommended Book:**

- Oxford Handbook of dialysis, Jeremy Levy, Edwina Brown, Christin Daley and Anastasia Lawrence
- Textbook of Peritoneal Dialysis, Nolph and Gokal's, 3rd Edition
- Peritoneal Dialysis: A Clinical Update, Claudio Ronco, Roberto Dell'Aquila, Maria Pia Rodighiero

**Course Objectives:**

At the of this course student will be able

- To analyze Laboratory analysis of blood and urine with dialysis patient
- To describe how to manage blood chemistry regulation through PD

**Course Content:**

Introduction, malfunctioning of catheters, investigation and management of malfunctioning catheters, constipation of peritoneal dialysis patient, repositioning peritoneal dialysis catheters, peritoneal dialysate problem with lactate/ dextrose, Peritonitis, incidence of peritonitis, pathogenesis, etiology, diagnosis, and treatment of initial management of peritonitis, exit site infection, mechanical complication of peritoneal dialysis, hernia formation, pathogenesis of hernia, etiology of hernia, investigation and treatment of hernia, abdominal wall and pericatheter leak, genital edema, respiratory complication, back pain, Metabolic complication of peritoneal dialysis, glucose absorption, lipid abnormalities, protein loss, hypernatremia and hyponatremia, hypokalemia and hyperkalemia, hypocalcemia and hypercalcemia, magnesium and vascular calcification, acidosis and alkalosis.

**Practical:**

1. Insertion of Peritoneal catheter
2. Management of peritoneal catheter
3. Preparation of peritoneal solution and operating different type of peritoneal dialysis

**Recommended Book:**

- Textbook of Peritoneal Dialysis, Nolph and Gokal's, 3rd Edition
- Peritoneal Dialysis: A Clinical Update, Claudio Ronco, Roberto Dell'Aquila, Maria Pia Rodighiero
- Oxford Handbook of dialysis, Jeremy Levy, Edwina Brown, Christin Daley and Anastasia Lawrence
- Handbook of dialysis, John T. Daulrdas, Peter G. Black, Todd, 5th edition

**Course Objectives:**

At the end of this course student will be able

- To interpret different method to calculate adequacy of dialysis
- To describe how to control dry weight of dialysis patient

**Course Content:**

Dialysis adequacy overview, dialysis adequacy solute clearance, urea kinetic modeling, calculation of  $Kt/V$ , other measures of solute clearance and online measure of clearance, residual renal function, other markers of adequacy, target for adequate dialysis  $kt/V$  and urea reduction ratio, increasing dialysis dose delivered, dialysis adequacy in acute renal failure, prescribing acute haemodialysis urea clearance, prescribing chronic haemodialysis dialyzer factor, laboratory test for patient on regular haemodialysis, dry weight, novel measure of dry weight, re-use of dialysers, re-use of dialyser technique, re-use of dialyser potential problems.

**Practical:**

1. Blood analysis to use for adequacy of dialysis
2. Measurement of residual renal function method
3. Dry weight
4. Labelizing of dialyzer
5. Re-use of dialyzer technique

**Recommended Book:**

- Oxford Handbook of dialysis, Jeremy Levy, Edwina Brown, Christin Daley and Anastasia Lawrence
- Handbook of dialysis, John T. Daulrdas, Peter G. Black, Todd, 5th edition

**Course Objectives:**

To introduce the student with the significance of bio-statistics, statistics means basic concept, describing and exploring data, normal distribution, sampling distribution and hypothesis testing, basic concept of probability and application of statistics and social research.

**Course Contents:**

Topics in univariate statistics: basic, Introduction, important terms, senses, method uses for taking census, information collection during census, method of estimating the population of any year, measurement scale, describing and exploring data, measures of central tendency and variability, health statistics, percentiles, quartiles and deciles, normal distribution, the standard normal distribution SND, using tables of SND, measures related to 'Z' scores, sampling distribution and hypothesis testing, basic concepts of probability, data collection (purpose and technique), categorical data and numerical data, application of statistics in social research, percentages, measure of central tendencies, means, Median, Mode, Quartile, decile and percentile

**Recommended Books:**

- Statistical methods for psychology by howell DC in 7<sup>th</sup> edition 2013.
- A guide to research methodology, biostatistics and medical writing by college of physicians and surgeons Pakistan by WHO collaboration center
- Reading understanding multivariate statistics giimm LG Yard AD PR, in 1995 publisher American Psychological association
- Ilyas Ansari's community medicine (Text Book) by Ilyas and Ansari 2003 published by Medical division Urdu Bazaar Karachi.

**Course Objectives:**

To introduce the significance of research methodology foundation, concept of measurement, design clinical research and health system research to the students.

**Course contents:**

Introduction to research (in simple term and a scientific term), concept of research, why do need research, advantage of research, identification of research need and its qualities, component of research, ethical and legal aspect of research and objective of research (definition, purpose, structure) Relevance, Avoidance of duplication, Feasibility, Political acceptability, Applicability, Cost efficiencies, work plan, budget required for research work, literature searching, statistical help, material, type of manuscript, printing of manuscript for submission and postage, Principles and reliability of measurement, errors and sources of measurement, types of measurement, measure of disease frequency and screening (introduction, validity and screening test) Studies design (introduction, selection of design), research questionnaire, validity and reliability of research finding, confounding factors, strategies to deal with threats to validity, hypothesis testing, sampling, collect data, data collection procedure, step and data collection survey questionnaire, starting questionnaire

**Recommended Books:**

1. Foundation of Clinical Research by Portney LG Walkais MP in 1993, Publisher by Appleton and lauge USA
2. A guide to Research Methodology, Biostatistics and Medical writing by college of physicians and surgeons Pakistan by WHO collaboration center
3. Health system research project by Corlien M Varkerisser, Indra Pathmanathan, Ann Brownlee in 1993 by International Development Research Center in New Dehli, Singapore.



## **7<sup>th</sup> SEMESTER COURSE**

- Fundamental of infection control
- Nutrition and Diet therapy
- Urological Procedure-I
- Epidemiology
- Renal Pharmacology

**Course Objectives:**

To introduce to the students the know-how of the subject of epidemiology in order to apply the knowledge of the subject regarding the community and community relate disease.

**Course Contents:**

Introduction to epidemiology, Determinants: Primary and Secondary, Clinical epidemiology, Occupational epidemiology, Importance of epidemiology, Definitions of common terms related to epidemiology, Health indication

**Recommended Books:**

Public Health by Ilyas Ansari

Public Health by J Park

**Course objectives:**

- To introduce the students with basic concepts in infection control.
- To introduce the students with infection control principles and practices.
- To introduce the students with importance of immunization and hand hygiene in infection control.
- To introduce the students with the role of clinical laboratory in infection control.

**Course contents:**

Introduction to infection control, principle of infection control, source and transmission of infection, infection in the hospital environment, immunization prophylaxes, exposure prophylaxes, sterilization, disinfection and antiseptics, practical disinfection, epidemiology of infectious disease, antimicrobial agents, antibiotic and their uses (prophylactic, empirical, and therapeutic), antibiotic resistance and policy, principles of laboratory diagnosis of infectious diseases, biomedical waste management, biosafety levels, hand hygiene, standard precautions and PPE.

**Practical:**

1. Demonstration of hand washing and hand rubbing technique.
2. Preparation of different disinfection and antiseptic solutions.
3. Demonstration of biomedical waste managements in hospitals.
4. Demonstration of cleaning and disinfection of working premises.
5. Demonstration of how to handle spills and aseptic handling.
6. Demonstration of standard precautions and PPE.

**Recommended Books:**

- Fundamentals of Infection Prevention and Control: Theory and Practice. Weston, D., Wiley-Blackwell, 2013.
- Sherris Medical Microbiology: An Introduction to Infectious Diseases. Ryan, K. J., Ray, C. G., 4<sup>th</sup> ed. McGraw-Hill, 2003.
- District Laboratory Practice in Tropical Countries, Part1 & Part 2. Cheesbrough, M., 2<sup>nd</sup> ed. Cambridge University Press, 2006.
- Medical Microbiology and Infection at a Glance. Gillespie, S., H., Bamford, K., B., 4<sup>th</sup> ed. Wiley-Blackwell, 2012.

**Course Objectives:**

At the end of this course student will be able

- To describe importance of diet for Renal dialysis patients
- To demonstrate which type of diet restricted for dialysis patient
- To discuss how to maintain body status of dialysis patient

**Course Content:**

Malnutrition in ESRD, nutritional requirement in chronic renal failure ( pre dialysis ), dietetic treatment plan for pre dialysis patient, assessment of nutritional status clinical 1, assessment of nutritional status clinical 2, assessment of nutritional status food intake, assessment of nutritional status biochemical, nutritional requirement in haemodialysis and peritoneal dialysis, strategies for achieving nutritional aims energy and protein, strategies for achieving nutritional aims phosphate, dietary problems specific to ethnic minority patients, supplemental vitamins and trace elements, use of nutritional supplements, intradialytic nutrition, carnitine and ESRD, fluid requirements in renal failure, Nutrition in acute renal failure energy, electrolyte and protein requirement, routes for nutritional support in acute renal failure.

**Practicals:**

1. Route of administration for diet use
2. Assessment of nutritional assessment
3. Laboratory analysis for dialysis patients

**Recommended Books:**

- Nutrition in kidney disease, Laura D.Byham Gray, Jerrilynn D.Burrow 2<sup>nd</sup> edition
- Modern Nutrition in health and disease, Shils. FME & V R Young ,2<sup>nd</sup> Edition
- Nutrition and Diet therapy , Peggy S. Starfield , 3<sup>rd</sup> edition

**Course Code-430   UROLOGICAL PROCEUDRE-I                      Credit Hours: 3(2+1)**

**Course objective:**

- To provide knowledge and skills regarding urological procedures.
- To provide knowledge how to handle the kidney and ureter complication.
- To provide knowledge regarding kidney and upper urinary tract surgeries.

**COURSE CONTENT**

Anatomy and physiology of kidney and ureter , kidney calculus, ureter calculus, investigation of kidney and ureter calculus, Nephrectomy, Nephrolithotomy , pyelolithotomy, partial Nephrectomy, Ureterolithotomy , Pyeloplasty, Re-implantation of ureter, ESWL, Urodynamics, Renal Tx surgery.

**Practical's:**

- Visiting of urology ward
- Observation of urological procedure
- Assessment of urological procedure

**Recommended Book:**

- Nancy Marie Phillips, 11<sup>th</sup> edition. Berry Kohn's Operating Room Technique.
- Bailey and love's, 26<sup>th</sup> edition. Short practice of surgery.

**Course Objectives:**

At the end of this course student will be able

- To describe drugs uses for renal failure patient

**Course Content:**

Drug handling in renal failure, Dosing of commonly used drugs, Dosing of antimicrobial drugs, dosing of antifungal and antiviral drugs, dosing of antituberculous drugs, drugs that do not require dosage alteration in severe renal failure, heamodialysis and CAPD, drugs to be avoided in severe renal failure heamodialysis and PD, notes on specific cardiovascular drugs, notes on specific opioid analgesics drugs, notes on NSAIDs, notes on specific antibiotic, factors affecting drugs removal by continuous renal replacement therapy, dosing of drugs commonly used during continuous renal replacement therapy.

**Practical:**

1. Dialysis procedure in ICU and CCU
2. Uses of different group of drugs in dialysis patient
3. Method of hemofiltration

**Recommended Books:**

- Lippincott's pharmacology (text book) by Mycek 2ndEdition published by Lippincott Raven 2000.
- Katzung textbook of pharmacology (Reference Book) by Bertram Katzung 8<sup>th</sup> Edition, Published by Appleton.dec 2007.

## 8<sup>th</sup> Semester Course

- Research Project
- Seminar
- Renal Emergency
- Urological Procedure-II

**Course Code-406**

**RESEARCH PROJECT**

**Credit Hours: 6(0+6)**

During last year each student should select a topic of research report with consultation of his/her supervisor and shall prepare and submit research report to Khyber Medical University by the end of last year.



**Course Code-407**

**SEMINAR**

**Credit Hours:1(1+0)**

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During last year each student should select a topic of research work with consultation of his/her supervisor and shall present his/her research work through a seminar.

**Course Objectives:**

At the end of this course student will be able

- To describe causes of death during dialysis
- To demonstrate how to prevent of causes of death during dialysis
- To discuss how to manage dialysis patient in emergency
- To describe complication of dialysis

**Course Content:**

Pulmonary edema, Pneumothorax, hemo thorax, pericardial effusion, Hyperkalemia, metabolic and respiratory acidosis, Respiratory and metabolic alkalosis, Electrolyte disturbance in dialysis patient, blood transfusion reaction in dialysis patient, causes of AVF burst and management, hypertension during dialysis, Air embolism, arrhythmia, hemolysis, Causes of death in patient in dialysis, cardiac arrest during dialysis, management of cardiac arrest during dialysis, end of life issue, palliative care, palliative care management of symptoms, withdrawal of dialysis, withdrawal of dialysis case histories, withdrawal of dialysis discussion of cases, withdrawal of dialysis final case history.

**Practical:**

1. Visit of ICU and Critical care unit
2. Performing CPR
3. Operating of ventilator machine
4. Uses of defibrillator

**Recommended Books:**

- Oxford Handbook of dialysis, Jeremy Levy, Edwina Brown, Christin Daley and Anastasia Lawrence
- Handbook of dialysis, John T. Daulrdas, Peter G. Black, Todd, 5th edition

**Course objective:**

- To provide knowledge regarding lower urinary tract complication.
- To enable dialysis technologist to know about lower urinary tract problem and how it's diagnoses.
- To provide knowledge and skills regarding different lower urinary tract surgeries and procedures.

**Course outline:**

Anatomy and physiology of Bladder and Urethra, Obstruction in Bladder and Urethra, Circumcision, Excision of hydrocele, Orchidectomy, Vasectomy, Orchidopexy, Litholopaxy, Fulguration of Bladder tumor, Lithotripsy, Litholopexy, Suprapubic cystostomy, Prostatectomy, Total cystectomy, TURP, PCNL PCN, TURBT, Optical urethrotomy, Retrograde pyelography, Antigrade pyelography.

**Practical's:**

- Visiting of urology ward
- Observation of urological procedure
- Assessment of urological procedure

**Recommended Book:**

- Nancy Marie Phillips, 11<sup>th</sup> edition. Berry Kohn's Operating Room Technique.
- Bailey and love's, 26<sup>th</sup> edition. Short practice of surgery.