

Carlyn Iverson

RENAL MODULE
2ND YEAR
STUDY GUIDE

KGMC

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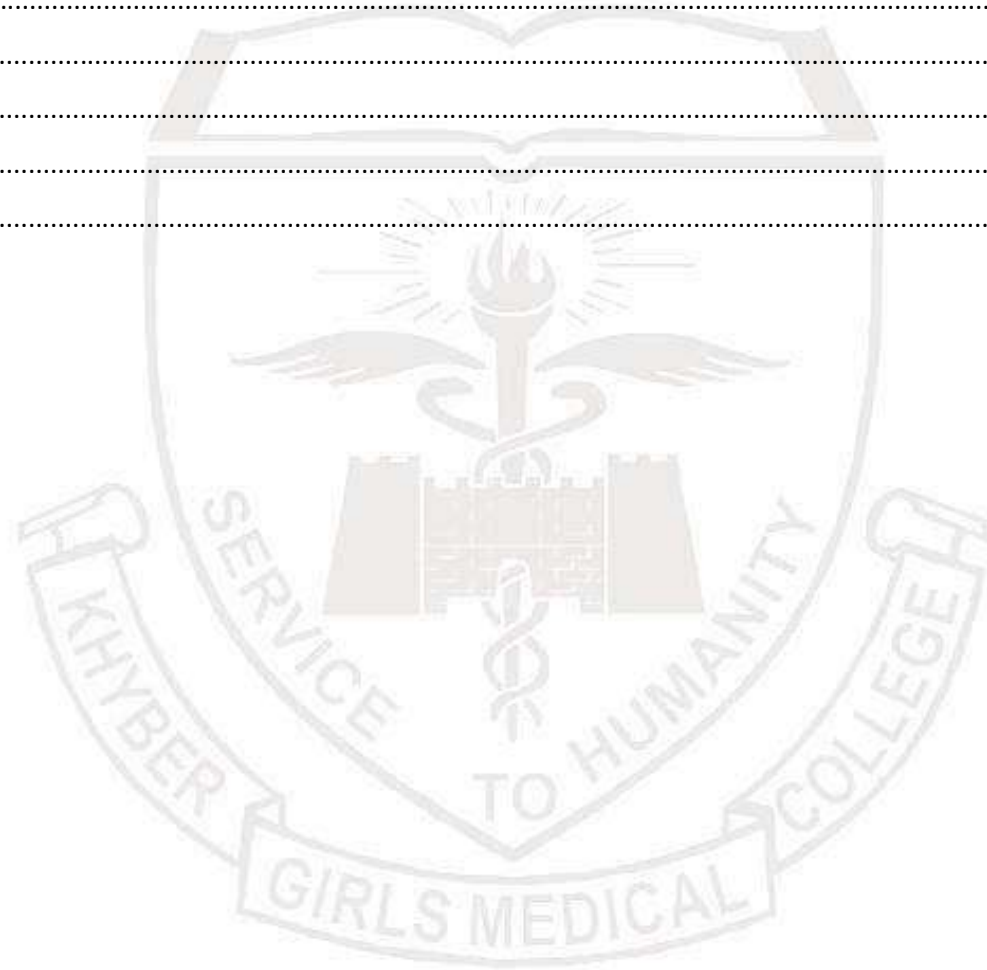
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Vision and Mission of KGMC

Khyber Medical University: Vision



Khyber Medical University will be the global leader in health sciences academics and research for efficient and compassionate health care.

Khyber Girls Medical College: Vision



“Excellence in health care, research ,teaching and training in the service of Humanity”

Khyber Girls Medical College: Mission

The mission of KGMC is to promote compassionate and professional health care leaders Who are knowledgeable, skillful, and community oriented lifelong learners serving humanity through evidence based practice

Curriculum Committee KGMC

Chair:

Professor Dr.Zahid Aman , Dean KGMC.

Co-Chair:

Dr. Sabina Aziz, Associate Dean KGMC.

Clinical Sciences:

- ✓ Dr. Tariq Mehr Department of Medicine
- ✓ Dr. Yousaf Jan Department of Surgical B

Behavioral Sciences:

- ✓ Dr. Wajid Ali Department of Behavioral Sciences

Medical Education

- ✓ Dr. Naheed Mahsood, Department of Medical Education, KGMC.
- ✓ Dr. Naveed Afzal Khan, Department of Medical Education, KGMC.
- ✓ Dr Onaiza Nasim , Department of Medical Education, KGMC.

Basic Sciences:

- ✓ Dr. Farida Ahmad Department of Physiology
- ✓ Dr. Shabnam Gul Admin
- ✓ Dr. Riffat Sultana Department of Physiology
- ✓ Dr. Shakeela Asif Department of Community Medicine
- ✓ Dr. Ayesha Jamil Professor of Pharmacology
- ✓ Dr. Munir Hussain Department of Pathology
- ✓ Dr. Gull Muhammad Department of Physiology
- ✓ Dr. Gulnaz begun Department of Biochemistry
- ✓ Dr. Farida Mujahid Department of Biochemistry
- ✓ Dr. Noreen Shah Department of Community Medicine

- ✓ Dr. Gul-e-lala Department of Anatomy
- ✓ Dr. Khush Bakht Department of Anatomy
- ✓ Dr. Hira Khursheed Department of Forensic Medicine



Module committee

1. Dr. Farida Ahmad Senior Lecturer Department of **Physiology**..... **Module Coordinator**
2. Dr. Naheed Mehsood Assistant Professor **DME****Module Secretary:**
3. Dr. Naveed Afzal Khan Coordinator **DME****Module Secretary**
4. Dr. Shabnam Gul Senior Lecturer **Admin**.....**Member:**
5. Dr. Wajid Ali Professor Department of **Behavioral Sciences**...**Member**
6. Dr. Riffat Sultana Professor Department of **Physiology**...**Member**
7. Dr. Shakeela Asif Associate Professor Department of **Community Medicine**...**Member**
8. Dr. Tariq Mehr Associate Professor Department of **Medicine**.....**Member**
9. Dr. Ayesha Jamil Associate Professor Department of **Pharmacology**.....**Member**
10. Dr. Munir Hussain Assistant Professor Department of **Pathology**..... **Member**
11. Dr. Yousaf Jan Assistant Professor Department of **Surgical B****Member**
12. Dr. Gull Muhammad Senior Lecturer Department of **Physiology**.....**Member**
13. Dr. Gulnaz begun Senior Lecturer Department of **Biochemistry**..... **Member**
14. Dr. Farida Mujahid Senior Lecturer Department of **Biochemistry**..... **Member**
15. Dr. Noreen Shah Senior Lecturer Department of **Community Medicine**.....**Member**
16. Dr. Gul-e-lala Lecturer Department of **Anatomy**..... **Member**
17. Dr. Khush Bakht Lecturer Department of **Anatomy**..... **Member**
18. Dr. Hira Khursheed Lecturer Department of **Forensic Medicine**.....**Member**
19. Dr. Onaiza Nasim , Department of **Medical Education****Member**

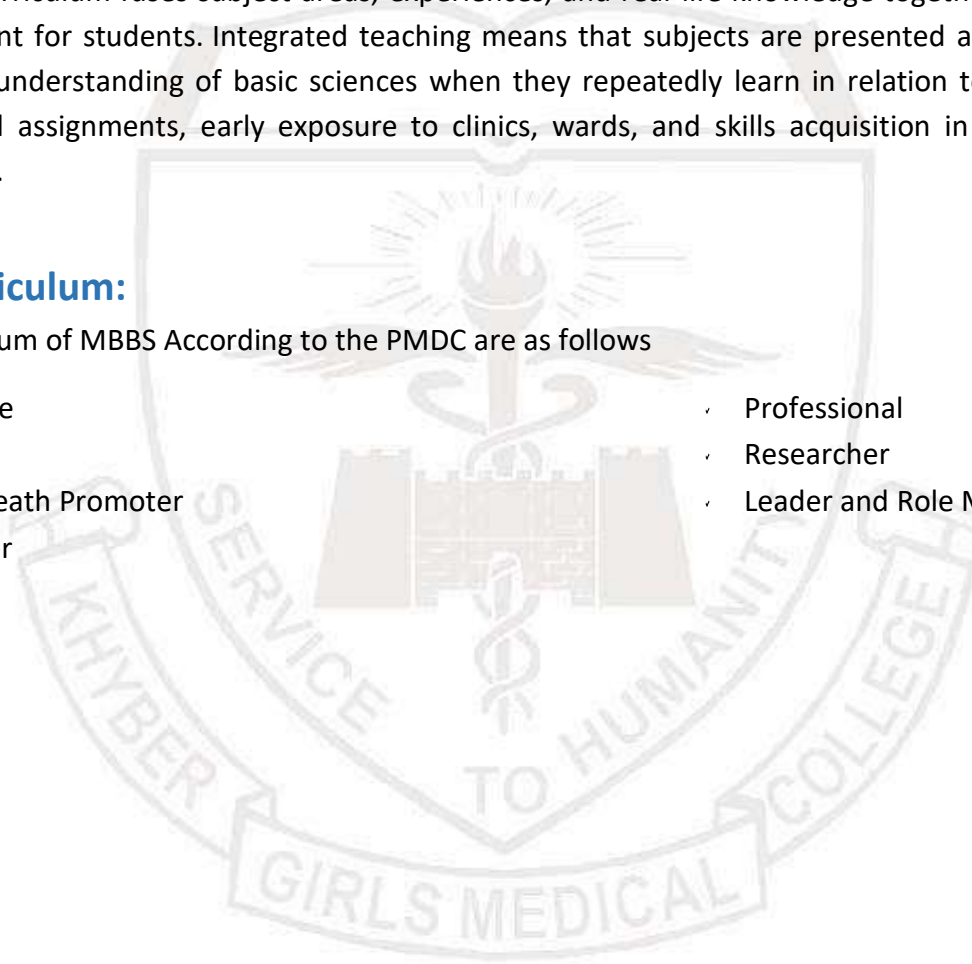
Integrated curriculum:

An integrated curriculum is all about making connections, whether to real life or across the disciplines, about skills or about knowledge. An integrated curriculum fuses subject areas, experiences, and real-life knowledge together to make a more fulfilling and tangible learning environment for students. Integrated teaching means that subjects are presented as a meaningful whole. Students will be able to have better understanding of basic sciences when they repeatedly learn in relation to clinical examples. Case based discussions, computer-based assignments, early exposure to clinics, wards, and skills acquisition in skills lab are characteristics of integrated teaching program.

Outcomes of the curriculum:

The outcomes of the curriculum of MBBS According to the PMDC are as follows

- ✓ Knowledgeable
- ✓ Skilful
- ✓ Community Health Promoter
- ✓ Problem-solver
- ✓ Professional
- ✓ Researcher
- ✓ Leader and Role Model



KNOWLEDGE

By the end of five year MBBS program the KGMC student should be able to;

1. Acquire a high level of clinical proficiency in history taking, physical examination, differential diagnosis, and the effective use of medicine's evolving diagnostic and procedural capabilities including therapeutic and palliative modalities
2. Manage the common prevalent diseases in community
3. Identify the common medical emergencies
4. Develop plan for prevention of common community diseases
5. Formulate a referral plan
6. Compose a prescription plan

PSYCH OMOTOR

By the end of five year MBBS program the KGMC student should be able to;

1. Demonstrate the ability to perform the disease specific relevant examination
2. Respond to common medical emergencies
3. Master the skill of first aid
4. Perform BLS
5. Apply the best evidenced practices for local health problems

AFFECTIVE

By the end of five year MBBS program the KGMC student should be able to

1. Relate to patient and caregivers vulnerability
2. Demonstrate ethical self-management
3. Counsel and educate patients and their families to empower them to participate in their care and enable shared decision-making.
4. Display compassion with patient and colleagues
5. Demonstrate in clinical care an understanding of the impact of psychological, social, and economic factors on human health and disease

Introduction to the Course/Module

Renal Module

Year-2 (MBBS)

Total Weeks-3

- ✓ Flank Pain /Loin Pain 1 week
- ✓ Scanty Urine /Urinary retention and Edema 1 week
- ✓ Urinary Incontinence. 1 week

The urinary system, also known as the renal system or urinary tract, consists of the kidneys, ureters, bladder, and the urethra. The purpose of the urinary system is to eliminate waste from the body, regulate blood volume and blood pressure, control levels of electrolytes and metabolites, and regulate blood pH.

General Learning Outcomes of the Module/Course

By the end of this module the students should be able to;

Knowledge

Describe the structure of main components of the urinary system

Describe the functions of renal system

Discuss the common urinary tract problems

Skills

Identify the gross anatomic features the kidneys, renal pelvis, ureter, urinary bladder and urethra

Maintain Intake output chart maintenance in bed ridden patients

Perform insertion of catheter on dummy

Identification of the various structures forming the perineum on models

Identify the radiographic landmarks of the perineum

Estimation of creatinine in 24 hour urine sample

Arterial blood sampling and analysis and interpretation of arterial blood gases.

Attitude

Demonstrate compassion and care for patients while performing the renal system examination

Demonstrate the team work while working in the hospital environment.

Show good communication skills while performing tasks.

Theme 1

Loin pain/ flank pain

Flank pain refers to discomfort in your upper abdomen or back and sides. It develops in the area below the ribs and above the pelvis. Usually, the pain is worse on one side of your body.

Most people experience flank pain at least once in their life, and the discomfort is usually temporary. However, constant or severe flank pain may indicate a serious medical condition, such as dehydration or a urinary tract infection. Kidney stones or another kidney problem may also cause persistent flank pain.

Though flank pain is often a symptom of a kidney problem, it can also be the result of other medical conditions if it occurs along with additional symptoms. It's important to see your doctor if you have chronic or severe flank pain, especially if you're also experiencing other symptoms.

Specific learning objectives of the theme 1

Topic	Learning objectives	MIT	Assessment strategy
Gross Anatomy			
Overview of the urinary system	List and describe the main components of the urinary system	DISSECTION/DEMO/SGD	MCQ,OSPE
Kidneys	<p>Discuss the location, anatomical structure, and relations of right and left kidneys to other abdominal organs</p> <p>Discuss the gross morphological composition of kidneys</p> <ul style="list-style-type: none"> · Capsule · Pericapsular adipose tissue · Cortex · Medulla · Pelvis · Hilum · Vascular system within kidneys · Arterial supply · Venous drainage · Lymphatic's · Innervation <p>Enumerate the various coverings of the kidney</p> <p>Explain the clinical significance of coverings of the kidneys</p> <p>Describe the structures entering and leaving the hilum of kidney and their relations</p>	DISSECTION/DEMO/SGD	MCQ,OSPE

Posterior abdominal wall	Describe the general features of lumbar vertebrae	DISSECTION/DEMO/SGD	MCQ,OSPE
	Describe the special features of lumbar vertebrae	DISSECTION/DEMO/SGD	MCQ,OSPE
	Enlist the muscles of posterior abdominal wall. Describe their origin, insertion, nerve supply and actions	DISSECTION/DEMO/SGD	MCQ,OSPE
	Explain the course and relations of Abdominal Aorta	DISSECTION/DEMO/SGD	MCQ,OSPE
	Enumerate and elaborate the paired branches of abdominal aorta Enumerate and elaborate the paired branches of abdominal aorta Discuss the formation of inferior vena cava Discuss the formation of inferior vena cava	DISSECTION/DEMO/SGD	MCQ,OSPE
Embryology			
Development of the urinary system	Trace the embryological origins and development of the urinary system	LGF	MCQ,OSPE
Congenital anomalies of the urinary system	List and describe the common congenital anomalies of kidney and ureter.	LGF	MCQ,OSPE
Histology			
Kidney	Describe the parenchyma of kidney Enlist different components of uriniferous tubules Describe Histological features of the various components of Nephron Describe the histological features of renal corpuscle Describe filtration barrier Describe the parts of collecting tubules Describe the microscopic anatomy of collecting duct Enlist the components of juxtaglomerular apparatus	LGF	MCQ,OSPE

Physiology

Physiological Anatomy Of the kidneys and Overview of its Functions	States major functions of the kidneys & brief physiological anatomy of kidney.	LGF	MCQ
	Define the components of the nephron and their interrelationships: renal corpuscle, glomerulus, nephron, and collecting-duct system.	LGF	MCQ
	Draw the relationship between glomerulus, Bowman's capsule, and the proximal tubule.	LGF	MCQ
	Describe the 3 layers separating the lumen of the glomerular capillaries and Bowman's space; defines podocytes, foot processes, and slit diaphragms.	LGF	MCQ
	Define glomerular mesangial cells and states their functions and location within the glomerulus. Detail of renal vessels & Pressure within them. Describe, in general terms, the differences among superficial cortical, midcortical, and juxtamedullary nephrons.	LGF	MCQ
	List the individual tubular segments in order; states the segments that comprise the proximal tubule, Henle's loop, and the collecting-duct system; defines principal cells and intercalated cells.	LGF	MCQ
	Define juxtaglomerular apparatus and describes its 3 cell types; states the function of the granular cells.	LGF	MCQ
	Define the basic renal processes: glomerular filtration, tubular reabsorption, and tubular secretion	LGF	MCQ

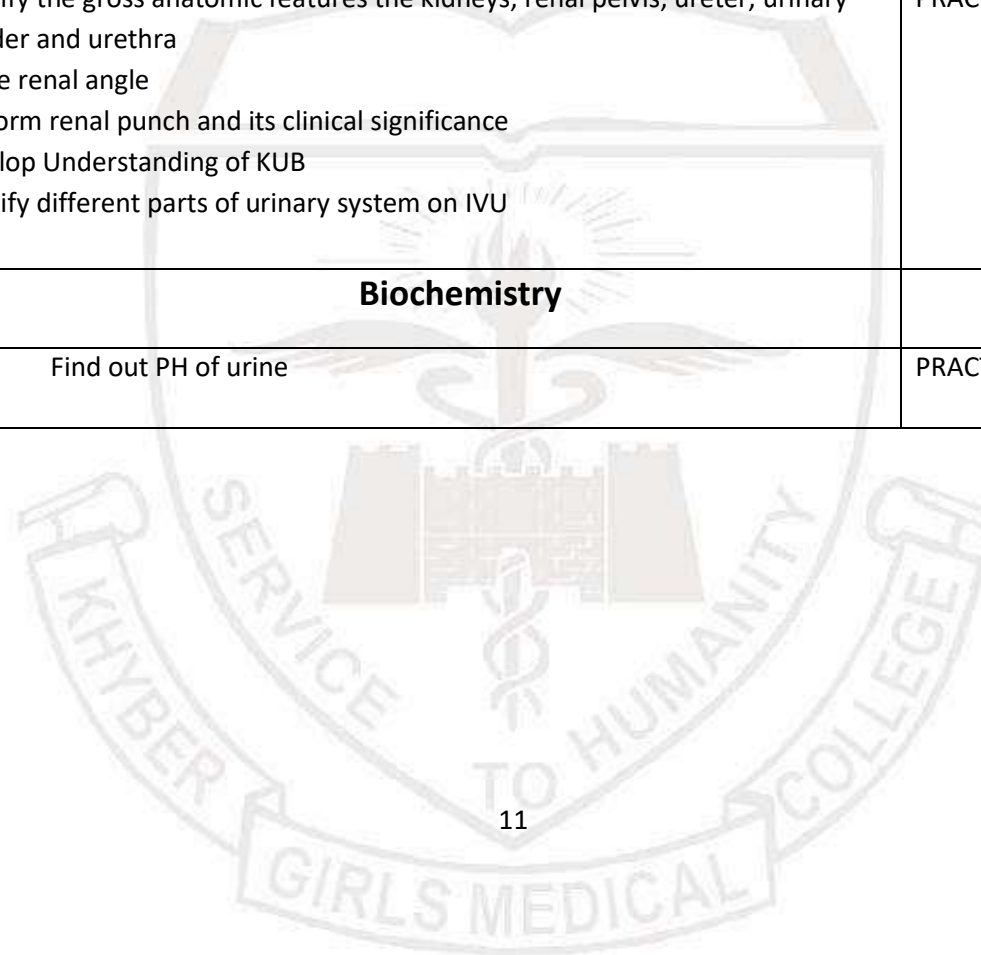
Glomerular Filtration: Determinants and Equation	Describe how molecular size and electrical charge determine filterability of plasma solutes; states how protein binding of a low-molecular-weight substance influences its filterability.	LGF	MCQ
	State the formula for the determinants of glomerular filtration rate, and states, in qualitative terms why the net filtration pressure is positive.	LGF	MCQ
	Define filtration coefficient and states how mesangial cells might alter the filtration coefficient; states the reason glomerular filtration rate is so large relative to filtration across other capillaries in the body	LGF	MCQ
	Describe how arterial pressure, afferent arteriolar resistance, and efferent arteriolar resistance influence glomerular capillary pressure	LGF	MCQ
	Describe how changes in renal plasma flow influence average glomerular capillary oncotic pressure.	LGF	MCQ
	State the Starling forces involved in capillary filtration.	LGF	MCQ
	State how changes in each Starling force affect glomerular filtration rate	LGF	MCQ
Nervous & Hormonal Control of Renal Circulation	Define renal blood flow, renal plasma flow, glomerular filtration rate, and filtration fraction, and gives normal values. Define renal blood flow, renal plasma flow, glomerular filtration rate, and filtration fraction, and gives normal values.	LGF	MCQ
	State the formula relating flow, pressure, and resistance in an organ	LGF	MCQ
	Describe sympathetic nerve supply of renal vessels & hormones affecting renal vessels	LGF	MCQ

	Describe the effects of changes in afferent and efferent arteriolar resistances on renal blood flow	LGF	MCQ
Auto regulation of GFR and renal blood flow	Define auto regulation of renal blood flow and glomerular filtration rate	LGF	MCQ
	Describe the myogenic and tubuloglomerular feedback mechanisms of auto regulation.	LGF	MCQ
Review of Transport Mechanisms across the Cell Membrane(Active and Passive transport)	Define and state the major characteristics of diffusion, facilitated diffusion, primary active transport, secondary active transport (including symport and antiport) and endocytosis.	LGF	MCQ
	Define osmolality and osmolarity, and states why osmolarity is commonly used to approximate osmolality.	LGF	MCQ
	Describe what is meant by the expression "water follows the osmoles."	LGF	MCQ
	Describe qualitatively the forces that determine movement of reabsorbed fluid from the interstitium into peritubular capillaries.	LGF	MCQ
	Compare the Starling forces governing glomerular filtration with those governing peritubular capillary absorption.	LGF	MCQ
	Compare and contrasts the concepts of T_m and gradient-limited transport.	LGF	MCQ
	Describe 3 processes that can produce bidirectional transport of a substance in a single tubular segment; states the consequences of pump-leak systems.	LGF	MCQ
	Contrast "tight" and "leaky" epithelia	LGF	MCQ

Biochemistry			
Acid-base balance & imbalance	Study the sources of Hydrogen Ion, pH & Anion Gap	LGF	MCQ
	Describe Buffer Systems operating in the Body 5Carbonic acid,protein,and phosphate buffer Transporting acid and mitigating pH changes	LGF	MCQ
	Describe Respiratory Regulation of Acid Base Balance	LGF	MCQ
	Describe Renal Regulation of Acid Base Balance	LGF	MCQ
	Describe Disorders of Acid Base Balance: their causes, mechanisms and compensations of Respiratory Acidosis & Alkalosis and Metabolic Acidosis & Alkalosis	LGF	MCQ
Pathology			
Smoky urine	List the common kidney symptoms Discuss the pathophysiology of renal infections Describe Symptoms associated with renal pathology Classify renal diseases Explain Pathophysiology of renal infections Describe Treatment of chronic pyelonephritis	LGF	MCQ
Renal disorders	Define the terms Nephrotic syndrome, nephritic syndrome, Azotemia. Enlist the Causes types of renal stones. Enlist the causes and describe the pathogenesis of urinary tract	LGF	MCQ
Systemic disease affecting kidneys	Explain how systemic diseases can affect renal function Systemic diseases affecting renal function Diabetes Cardiovascular disorders (hypertension, CHF) Immunological disorders (SLE, glomerulonephritis) Cancers (myeloma) Hematological disorders (sickle cell anemia, HUS)	LGF	MCQ



Practical			
Gross Anatomy			
surface anatomy of the urinary system and radiology	Identify the gross anatomic features the kidneys, renal pelvis, ureter, urinary bladder and urethra locate renal angle Perform renal punch and its clinical significance Develop Understanding of KUB Identify different parts of urinary system on IVU	PRACTICAL/DEMO	MCQ,OSPE
	Biochemistry		
Titration acidity of urine	Find out PH of urine	PRACTICAL/DEMO	MCQ,OSPE



Theme 2

Edema and urinary retention/scanty urine

Urinary retention is defined as the inability to completely or partially empty the bladder. Suffering from urinary retention means you may be unable to start urination, or if you are able to start, you can't fully empty your bladder. Scanty urine means the urine output is less than normal.

Symptoms of urinary retention may include:

Difficulty starting to urinate

Inability to feel when bladder is full

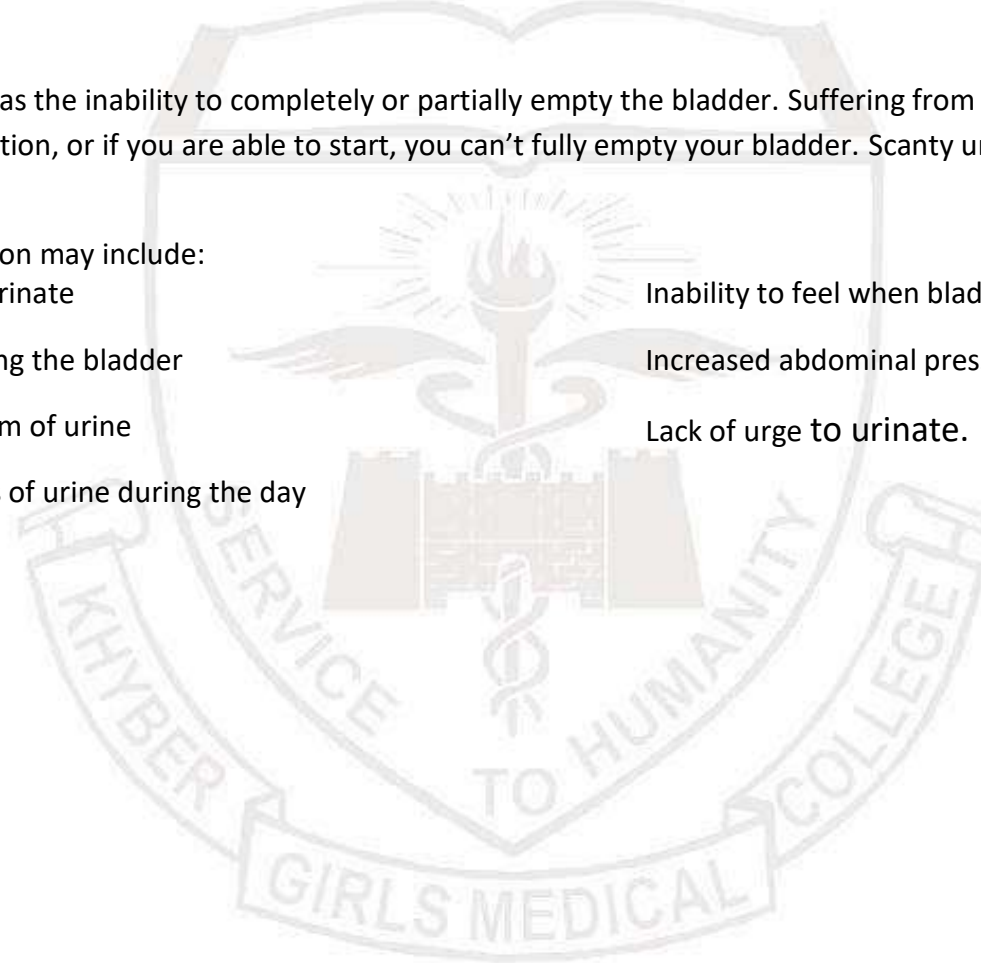
Difficulty fully emptying the bladder

Increased abdominal pressure

Weak dribble or stream of urine

Lack of urge to urinate.

Loss of small amounts of urine during the day



Specific learning objectives of the theme 2

Topic	Learning objectives	MIT	Assessment strategy
Gross Anatomy			
Ureters	Describe the gross anatomy of ureters	DISSECTION/DEMO/SGD	MCQ,OSPE
	Describe the relations of right ureter in males and females	DISSECTION/DEMO/SGD	MCQ,OSPE
	Describe the relations of left ureter in males and females	DISSECTION/DEMO/SGD	MCQ,OSPE
	Highlight the clinical significance of relations of right and left ureters in both sexes	DISSECTION/DEMO/SGD	MCQ,OSPE
	Discuss constrictions in ureter and their clinical relevance.	DISSECTION/DEMO/SGD	MCQ,OSPE
Urinary bladder	Describe the gross structure of urinary bladder Discuss the Ligaments/supports.	DISSECTION/DEMO/SGD	MCQ,OSPE
	Discuss the blood supply and nerve supply of urinary bladder	DISSECTION/DEMO/SGD	MCQ,OSPE
	Discuss the relations of urinary bladder in males	DISSECTION/DEMO/SGD	MCQ,OSPE
	Discuss the relations of urinary bladder in females	DISSECTION/DEMO/SGD	MCQ,OSPE
Prostate gland	Describe the structure of prostate gland Describe Lobes, capsule, relations and structures within prostate.	DISSECTION/DEMO/SGD	MCQ,OSPE
	Discuss the common problems resulting from abnormal growth of	DISSECTION/DEMO/SGD	MCQ,OSPE
	the prostate. Relate the symptoms to structures		
Urethra	Describe the gross anatomy of urethra	DISSECTION/DEMO/SGD	MCQ,OSPE
	Enlist the differences between male and female urethra	DISSECTION/DEMO/SGD	MCQ,OSPE

Embryology

Development of the urinary system (Kidney and Ureter)	Enlist the stages of development of kidneys	LGF	MCQ,OSPE
	Describe the formation of pronephric, mesonephric and metanephric kidneys	LGF	MCQ,OSPE
	Enumerate the derivatives of metanephric blastema and describe their development	LGF	MCQ,OSPE
	Enumerate the derivatives of metanephric diverticulum/ureteric bud	LGF	MCQ,OSPE
	Describe the changes in position and blood supply of kidneys during development	LGF	MCQ,OSPE
	Enlist the various types of developmental anomalies of kidneys along with their embryological causes	LGF	MCQ,OSPE
	Enlist the various types of developmental anomalies of ureters along with their embryological causes	LGF	MCQ,OSPE
(Bladder and urethra)	Describe the development of bladder	LGF	MCQ,OSPE
	Discuss the developmental anomalies of bladder	LGF	MCQ,OSPE
	Describe the development of male urethra	LGF	MCQ,OSPE
	Describe the development of prostate and bulbourethral glands	LGF	MCQ,OSPE
	Describe the development of female urethra	LGF	MCQ,OSPE
	Discuss the developmental anomalies of male and female urethra	LGF	MCQ,OSPE
Prostate gland	Describe Embryological development of prostate gland	LGF	MCQ,OSPE
Congenital anomalies of the urinary system	List and describe the common congenital anomalies of bladder and urethra.	LGF	MCQ,OSPE

Histology			
Ureter	Describe the microscopic anatomy of ureter	LGF	MCQ,OSPE
Bladder	Describe the histological features of urinary bladder	LGF	MCQ,OSPE
Prostate	Describe the microscopic structure of prostate	LGF	MCQ,OSPE
Urethra	Discuss the microscopic structure of male and female urethra	LGF	MCQ,OSPE
Physiology			
Body fluid compartments	<p>List the body fluid compartments</p> <ul style="list-style-type: none"> -Recall the volumes of body fluid compartments -Discuss the interplay in fluid volumes between different fluid compartments -Describes principles of osmosis and osmotic pressure -Discuss the interplay between various pressures -Discuss principles of edema <ul style="list-style-type: none"> ✓ Intracellular fluid compartment 	LGF	MCQ
	<ul style="list-style-type: none"> ✓ Extracellular fluid compartment ✓ Intravascular fluids ✓ Blood ✓ Plasma ✓ Interstitial fluid ✓ Constituents of intra- and extracellular fluid compartments ✓ Calculating fluid volumes ✓ Osmosis and osmotic fluid regulation 		
Reabsorption /Secretion along Different Parts of the Nephron	List approximate percentages of sodium reabsorbed in major tubular segments.	LGF	MCQ
	List approximate percentages of water reabsorbed in major tubular segments.	LGF	MCQ

	Define the term <i>iso-osmotic volume</i> reabsorption.	LGF	MCQ
	Describe proximal tubule sodium reabsorption, including the functions of the apical membrane sodium entry mechanisms and the basolateral sodium-potassium-adenosine triphosphatase.	LGF	MCQ
	Explain why chloride reabsorption is coupled with sodium reabsorption, and lists the major pathways of proximal tubule chloride reabsorption.	LGF	MCQ
	State the maximum and minimum values of urine osmolality.	LGF	MCQ
	Define osmotic diuresis and water diuresis.	LGF	MCQ
	Explain why there is an obligatory water loss.	LGF	MCQ
	Describe the handling of sodium by the descending and ascending limbs, distal tubule, and collecting-duct system.	LGF	MCQ
	Describe the role of sodium-potassium-2 chloride symporters in the thick ascending limb.	LGF	MCQ
	Describe the handling of water by descending and ascending limbs, distal tubule, and collecting-duct system	LGF	MCQ
mechanisms of regulation of tubular reabsorption	<p>Discuss the mechanisms of regulation of tubular reabsorption</p> <ul style="list-style-type: none"> •Reabsorption and secretion by the renal tubules •Active and passive transport mechanisms •Mechanism of reabsorption of specific substances (eg. Water, electrolytes) •Reabsorption and secretion in different parts of the tubules •Glomerular balance •Peritubular and renal interstitial fluid physical forces •Effect of arterial pressure on urine output •Hormonal control of tubular reabsorption •Aldosterone •Angiotensin-II •ADH •Parathyroid hormone •Nervous regulation of tubular reabsorption 	LGF	MCQ

Concept Of Renal Clearance	Define the terms clearance and metabolic clearance rate, and differentiates between general clearance and renal clearance.	LGF	MCQ
	List the information required for clearance calculation	LGF	MCQ
	State the criteria that must be met for a substance so that its clearance can be used as a measure of glomerular filtration rate; states which substances are used to measure glomerular filtration rate and effective renal plasma flow.	LGF	MCQ
	Predict whether a substance undergoes net reabsorption or net secretion by comparing its clearance with that of inulin or by comparing its rate of filtration with its rate of excretion.	LGF	MCQ
	Calculate net rate of reabsorption or secretion for any substance.	LGF	MCQ
	Calculate fractional excretion of any substance.	LGF	MCQ
	Describe how to estimate glomerular filtration rate from C_{Cr} and describes the limitations.	LGF	MCQ
	Describe how to use plasma concentrations of urea and creatinine as indicators of changes in glomerular filtration rate.	LGF	MCQ
Mechanism of diluted urine formation	Describe the process of "separating salt from water" and how this permits excretion of either concentrated or dilute urine.	LGF	MCQ
	Describe how antidiuretic hormone affects water reabsorption.	LGF	MCQ
	Describe the characteristics of the medullary osmotic gradient.	LGF	MCQ
	Explain the role of the thick ascending limb, urea recycling, and medullary blood flow in generating the medullary osmotic gradient.	LGF	MCQ
	State why the medullary osmotic gradient is partially "washed out" during a water diuresis	LGF	MCQ
	Describe the origin of antidiuretic hormone and the 2 major reflex controls of its secretion; define diabetes insipidus; state the effect of antidiuretic hormone on arterioles.	LGF	MCQ

	Distinguish between the reflex changes that occur when an individual has suffered iso-osmotic fluid loss because of diarrhea as opposed to a pure water loss (ie, solute-water loss as opposed to pure-water loss).	LGF	MCQ
	Describe the control of thirst.	LGF	MCQ
	Describe the pathways by which sodium and water excretion is altered in response to sweating, diarrhea, hemorrhage, high-salt diet, and low-salt diet.	LGF	MCQ
Mechanism of concentrated urine formation	Discuss the mechanism of concentrated urine formation.	LGF	MCQ
Renal regulation of Potassium	State the normal balance and distribution of potassium within different body compartments, including cells and extracellular fluid.	LGF	MCQ
	Describe how potassium moves between cells and the extracellular fluid, and how, on a short-term basis, the movement protects the extracellular fluid from large changes in potassium concentration.	LGF	MCQ
	Describe how plasma levels of potassium do not always reflect the status of total-body potassium.	LGF	MCQ
	State generalizations about renal potassium handling for persons on high- or low-potassium diets.	LGF	MCQ
	State the relative amounts of potassium reabsorbed by the proximal tubule and thick ascending limb of Henle's loop regardless of the state of potassium intake.	LGF	MCQ
	Describe how the cortical collecting duct can manifest net secretion or reabsorption; describes the role of principal cells and intercalated cells in these processes.	LGF	MCQ
	List the 3 inputs that control the rate of potassium secretion by the cortical collecting duct.	LGF	MCQ
	Describe the mechanism by which changes in potassium balance influence aldosterone secretion.	LGF	MCQ
	State the effects of most diuretic drugs and osmotic diuretics on potassium excretion.	LGF	MCQ

	Describe the association between perturbations in acid-base status and the plasma potassium level	LGF	MCQ
The prostate	Discuss the physiological functions of the prostate	LGF	MCQ
physiochemical aspects	Discuss the physiochemical aspects (Diffusion, Adsorption, Viscosity, Colloid Osmotic pressure and role of Albumin in regulation of Osmotic pressure)	LGF	MCQ
Regulation of extracellular fluid osmolality and sodium concentration	<p>Discuss the homeostatic function of the kidneys</p> <ul style="list-style-type: none"> -Explain the mechanism by which kidneys are able to form diluted or concentrated urine Mechanism of formation of dilute urine - Mechanism of formation of concentrated urine -Requirements for excreting a concentrated urine -The counter-current mechanism -Role of distal tubules and collecting ducts -Quantifying urine concentration and dilution -Disorders of urine concentration ability 	LGF	MCQ
Regulation of extracellular fluid osmolarity and sodium concentration-2	<p>Discuss the homeostatic function of the kidneys</p> <ul style="list-style-type: none"> -Discuss the principles of osmoregulation by the kidneys Explain how the body regulated the osmolarity of fluid comparts -Control of extracellular fluid osmolarity and sodium concentration -Osmoreceptor-ADH feedback system -Role of thirst in controlling extracellular fluid osmolarity and concentration -Salt-appetite mechanism -Integrated response to sodium intake 	LGF	MCQ

Regulation of concentration of potassium, calcium, phosphate and magnesium	Discuss the mechanisms of regulation of concentrations of various ions in the body Describe the processes occurring at cellular level to maintain/excrete various ions in the kidneys -Regulation of potassium --Regulation of calcium -Regulation of phosphate -Regulation of magnesium	LGF	MCQ
Short and Long term control of Blood pressure by Kidneys	Describe the 3 temporal domains of blood pressure control and the major mechanisms associated with them.	LGF	MCQ
	Describe the relationship between renin and angiotensin II.	LGF	MCQ
	Describe the 3 detectors that can alter renin secretion.	LGF	MCQ
	Define pressure natriuresis and diuresis.	LGF	MCQ
	Define tubuloglomerular feedback and describe the mechanism for tubuloglomerular feedback and autoregulation of glomerular filtration rate	LGF	MCQ
Biochemistry			
Renal control of Calcium & Phosphorus	State the normal total plasma calcium concentration and the fraction that is free.	LGF	MCQ
	Describe the distribution of calcium between bone and extracellular fluid and the role of bone in regulating extracellular calcium.	LGF	MCQ
	Describe and compare osteocytic osteolysis and bone remodeling.	LGF	MCQ

	Describe renal handling of phosphate.	LGF	MCQ
	Describe how parathyroid hormone changes renal phosphate excretion.	LGF	MCQ
constituents of urine	Describe the normal and abnormal constituents of urine	LGF	MCQ
General surgery /urology			
Urinary retention	Describe the etiology, and management of urinary retention	LGF	MCQ
	Describe the etiology, clinical features and treatment of Benign prostatic hyperplasia	LGF	MCQ
Pathology			
Renal failure	<p>Enlist the causes of Renal failure/ uraemia and abnormalities related to micturition including incontinence</p> <p>Discuss the causes and pathophysiology of Chronic Renal failure</p>	LGF	MCQ
Urinary stones	Describe the pathophysiology of Urinary stones	LGF	MCQ
Glomerular diseases	Describe the etiology and pathogenesis of glomerulonephritis	LGF	MCQ
Classification of kidney disorders	<p>Classify kidney disorders according to etiology, site of dysfunction and type of dysfunction</p> <ul style="list-style-type: none"> - Acute/ chronic -Infectious -Immunological 	LGF	MCQ

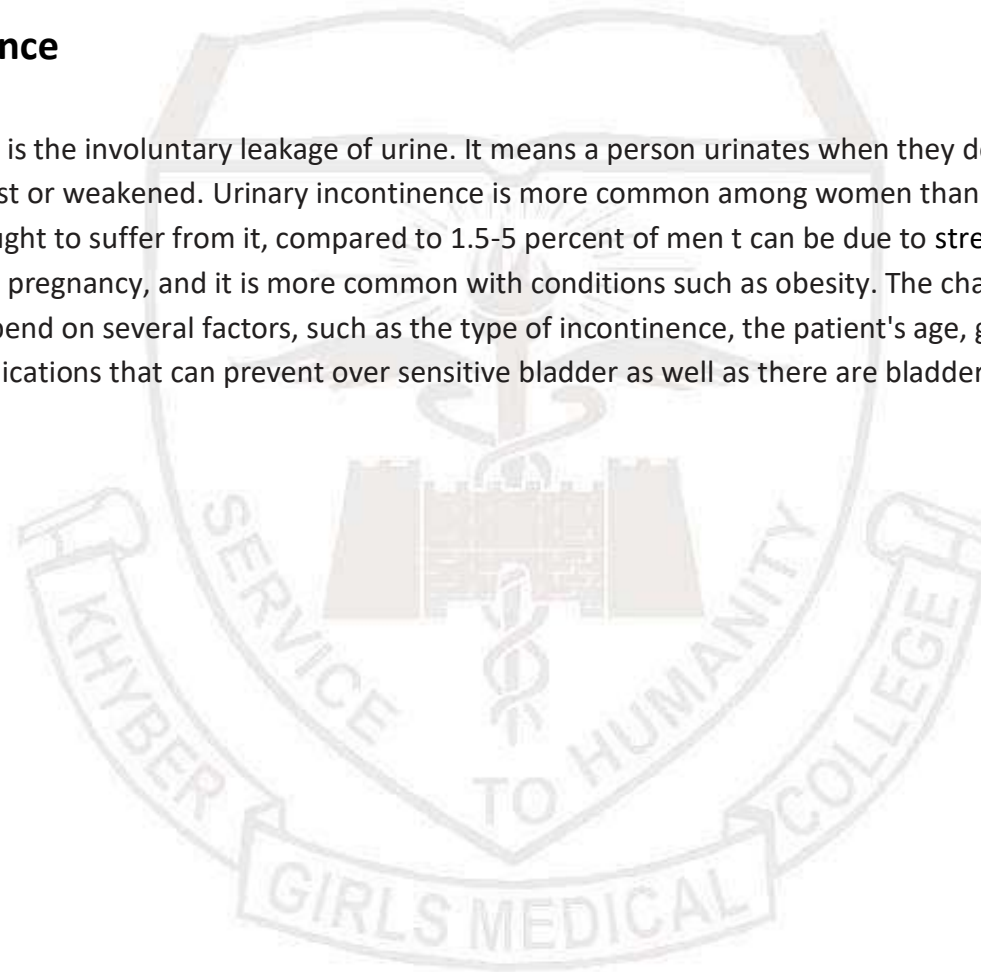
	-Neoplastic -Vascular/interstitial /parenchymal - Primary/systemic		
Nephrotic syndrome	Describe Nephrotic syndrome and its etiology	LGF	MCQ
Pharmacology			
Nephrotoxic drugs	Describe the mechanism of drug excretion	LGF	MCQ
	Enlist nephrotoxic drugs	LGF	MCQ
	Describe the mechanism of action of diuretic drugs	LGF	MCQ
Drugs acting on the renal system (in NW module it's in theme of Scanty Urine)	Classify diuretics	LGF	MCQ
Clinical			
Quality of life in problems of prostate	Discuss quality of life issues in patients with prostate problems Overview of the concept of quality of life (QoL) Discuss the significance of quality of life in disease and treatment settings Discuss quality of life issues in geriatric population	LGF	MCQ
Practical			

Physiology			
Intake output chart maintenance in bed ridden patients	Maintain Intake output chart maintenance in bed ridden patients	PRACTICAL/DEMO	MCQ,OSPE
Catheter insertion	Preform insertion of catheter on dummy	PRACTICAL/DEMO	
Biochemistry			
Urine analysis	Determine the normal/abnormal constituents in the urine -Urine sugar -Amino acids -Proteins -Hemoglobin -Uric acid -Urea -Creatinine and chloride -Calcium and phosphate -Ammonia -Ketone bodies -Benzidine test for blood in urine	PRACTICAL/DEMO	MCQ,OSPE

Theme 3

Urinary incontinence

Urinary incontinence is the involuntary leakage of urine. It means a person urinates when they do not want to. Control over the urinary sphincter is either lost or weakened. Urinary incontinence is more common among women than men. An estimated 30% of females aged 30-60 are thought to suffer from it, compared to 1.5-5 percent of men. It can be due to stress factors, such as coughing, it can happen during and after pregnancy, and it is more common with conditions such as obesity. The chances of it happening increase with age. Treatment will depend on several factors, such as the type of incontinence, the patient's age, general health, and their mental state. There are medications that can prevent over sensitive bladder as well as there are bladder control exercises.



Specific learning objectives of the theme 3

Topic	Learning objectives	MIT	Assessment Strategy
Anatomy			
The Perineum	Define the pelvis and the perineum Discuss the openings in the pelvis and what passes through them List and describe the contents of the urogenital triangle -Contents of the male urogenital triangle -Urethral injuries -Injury to the perineum in childhood	DISSECTION/DEMO/SGD	MCQ,OSPE
Physiology			
Urinary bladder and micturition	Describe the functional anatomy of urinary bladder Explain the mechanism of micturition Explain the micturition reflex and relate structures of the bladder with function Explain basal cystometrogram Describe the nervous control of bladder functions	LGF	MCQ
Urinary incontinence	Discuss the causes, symptoms and management of patients with urinary incontinence, urgency, frequency, burning micturition etc Causes of urinary incontinence, urgency, frequency, burning micturition Terms related to urinary obstruction and incontinence	LGF	MCQ,OSPE

	<p>Clinical presentation of continence disorders</p> <p>General management of incontinence</p>		
Radiology			
Radiological diagnosis of urinary pathologies	<p>Identify and describe the various anatomic landmarks of the renal system on radiographs</p> <p>Discuss special radiological tests to determine renal function and pathologies</p> <p>Normal radiographs of abdomen and pelvis</p> <p>Special radiological tests to show renal pathology and function</p> <p>Abdominal ultrasound</p>	LGF	MCQ, OSPE
Clinical			
Dialysis	<p>Describe the types, indications and the process of dialysis for kidney disease</p> <p>Types of dialysis</p> <ul style="list-style-type: none"> -Peritoneal dialysis -Hemodialysis -Hemofiltration -Haemodiafiltration -Intestinal dialysis -indications for dialysis -Disorders of acid-base balance, electrolyte abnormalities uremia or fluid overload resulting from acute 	LGF	MCQ

	<p>and chronic renal failure, and intoxication</p> <ul style="list-style-type: none"> -The process of hemodialysis and peritoneal dialysis -Dialyzable substances 		
<p>A young woman with excessive urination</p>	<p>Discuss the disorders associated with urine concentrating ability</p> <p>Plan a line of investigation and management in renal disorders</p> <ul style="list-style-type: none"> - Disorders of renal concentration ability -Comparison of excessive urine volume with increased frequency of micturition - Mechanism of secretion and action of ADH -Urine concentrating ability of the various parts of the nephron <p>Proximal convoluted tubule Descending limb of loop of Henle Ascending limb of loop of Henle Collecting system</p>	LGF	MCQ
<p>A girl with continuous dribbling of urine</p>	<p>Discuss the causes of urinary incontinence</p> <p>Discuss the significance of radiological investigations in cases of urinary incontinence in children</p> <p>Define and describe enuresis</p> <ul style="list-style-type: none"> -Causes of urinary incontinence -The micturition reflex -Tests for investigating urinary incontinence -Enuresis definition, types, causes and treatment 	LGF	MCQ

Pathology			
	List and define the common pathologies of the perineal region - Urethral infection.	LGF	MCQ
Practical			
Anatomy			
surface anatomy of the perineum and radiology	Identification of the various structures forming the perineum on models Identify the radiographic landmarks of the perineum	PRACTICAL/DEMO	MCQ, OSPE
Histologic examination urinary system	Identify the characteristic microscopic features of the urinary system -Kidney -Ureter -Urinary bladder -Urethra	PRACTICAL/DEMO	MCQ, OSPE
Biochemistry			
Creatinine in urine	Estimation of creatinine in 24 hour urine sample	PRACTICAL/DEMO	MCQ, OSPE
Physiology			
Arterial blood-gas analysis	-Arterial blood sampling - Analysis and interpretation of arterial blood gases.	PRACTICAL/DEMO	MCQ, OSPE

Teaching and learning strategies:

The following teaching / learning methods are used to promote better understanding:

- ✓ Interactive Lectures
- ✓ Hospital / Clinic visits
- ✓ Small Group Discussion
- ✓ Skills session
- ✓ Self-Directed Study

Interactive lectures:

An interactive lecture is an easy way for instructors to intellectually engage and involve students as active participants in a lecture- based class of any size. Interactive lectures are classes in which the instructor breaks the lecture at least once per class to have students

participate in an activity that lets them work directly with the material.

- ✓ The instructor might begin the interactive segment with an engagement trigger that captures and maintains student attention.
- ✓ Then the instructor incorporates an activity that allows students to apply what they have learned or give them a context for upcoming lecture material.
- ✓ As the instructor feels more comfortable using interactive techniques he or she might begin to call upon a blend of various interactive techniques all in one class period.

Hospital / Clinic visits:

In small groups, students observe patients with signs and symptoms in hospital or clinical settings. This helps students to relate knowledge of basic and clinical sciences of the relevant module.

Small group discussion (SGD):

The shy and less articulate are more able to contribute. Students learn from each other. Everyone gets more practice at expressing their ideas. A two way discussion is almost always more creative than individual thoughts. Social skills are practiced

in a 'safe' environment e.g. tolerance, cooperation. This format helps students to clarify concepts acquire skills or attitudes. Students exchange opinions and apply knowledge gained from lectures, tutorials and self-study. The facilitator role is to ask probing questions, summarize, or rephrase to help clarify concepts.

Skills/Practical

session:

Skills relevant to respective module are observed and practiced where applicable in skills laboratory or Laboratories of various departments.

Self-Directed learning

(SDL):

Self-directed learning, which involves studying without direct supervision in a classroom/Library, is a valuable way to learn and is quickly growing in popularity among parents and students. Students' assume responsibilities of their own learning through individual study, sharing and discussing with peers, seeking information from Learning Resource Centre, teachers and resource persons within and outside the college. Students can utilize the time within the college scheduled hours of self-study

Time Tables:

The timetables for the module will be shared via Edmodo and the notice boards in advance.

Assessment tools:

Theoretical knowledge is tested by a written examination system constituted by multiple choice questions (MCQs). The assessment of practical knowledge involves oral, spot, or objective structured practical examinations (OSPE).

Multiple Choice Questions (MCQs):

- ✓ Multiple choice questions (MCQs) are a form of assessment for which students are asked to select the best choice from a list of answers.
- ✓ MCQ consists of a stem and a set of options. The stem is usually the first part of the assessment that presents the question as a problem to be solved; the question can be an incomplete statement which requires to be completed and can include a graph, a picture or any other relevant information. The options are the possible answers that the student can choose from, with the correct answer called the key and the incorrect answers called distractors.
- ✓ Correct answer carries one mark, and incorrect 'zero mark'. There is NO negative marking.
- ✓ Students mark their responses on specified computer-based sheet designed for the college.
- ✓ The block exam will comprise of 120 MCQs and will be compiled according to the shared blueprint.

Objective Structured Practical Examination (OSPE):

- ✓ The content may assess application of knowledge, or practical skills.
- ✓ Student will complete task in define time at one given station.
- ✓ All the students are assessed on the same content by the same examiner in the same allocated time.
- ✓ A structured examination will have observed, unobserved, interactive and rest stations.
- ✓ Observed and interactive stations will be assessed by internal or external examiners.
- ✓ Unobserved will be static stations in which students will have to answer the questions related to the given pictures, models or specimens the provided response sheet.
- ✓ Rest station is a station where there is no task given, and in this time student can organize his/her thoughts.
- ✓ The Block OSPE will be comprise of 18 examined station and 7 rest stations. The stations will be assigned according to the shred blueprint.

Internal Evaluation:

Internal evaluation is a process of quality review undertaken within an institution for its own ends. 10% marks of internal evaluation will be added to final marks. This 10% will be based on

Distribution of 13 Marks for paper	
Marks Obtained	Average of Percentage in Block exam (Renal module plus GIT module) and Pre professional exam.

Distribution of 10 Marks for Block A OSPE/OSCE	
Marks obtained	Average of percentage in Block OSPE Exam (Renal module plus GIT module) and Block Pre Prof OSPE
	Practical copies

Attendance Requirement:

More than 75% attendance is mandatory to sit for the modular examinations.



Learning resources:

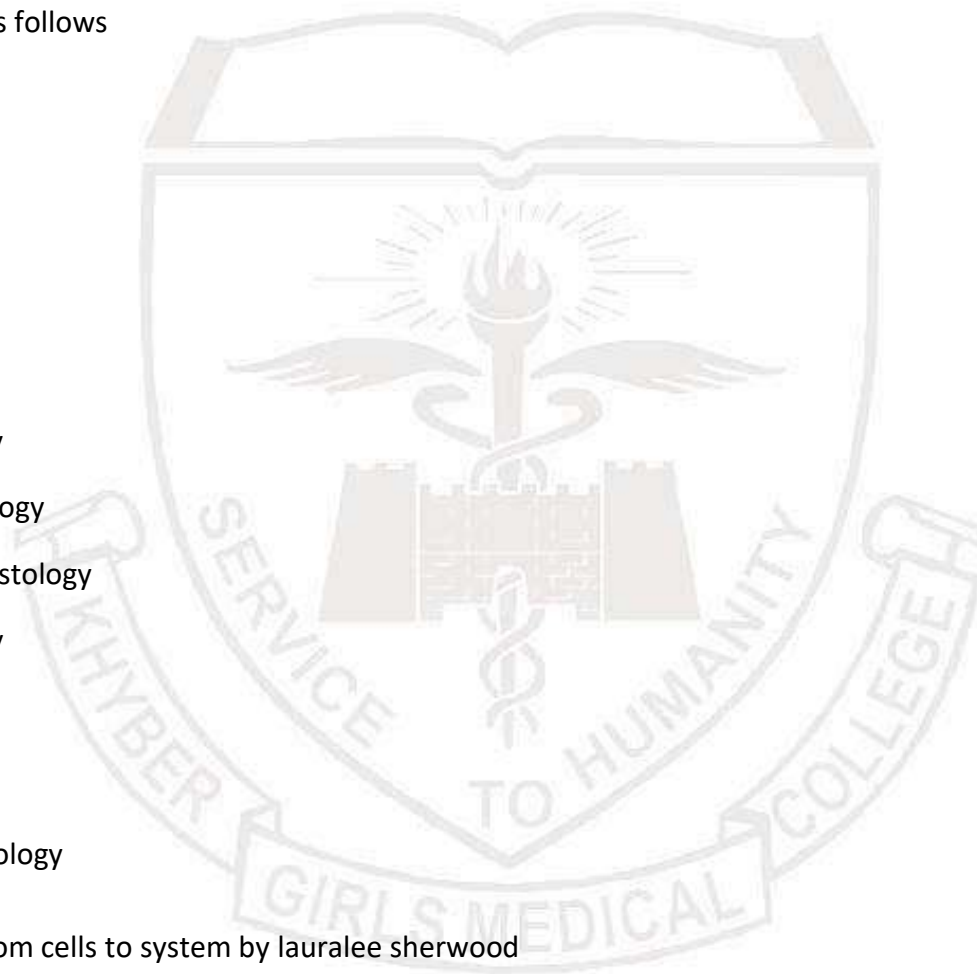
The learning resources are as follows

Anatomy

- Snell Neuroanatomy
- B.D Churasia
- Nelter Atlas
- Langman embryology
- Keithalmore embryology
- Laiq Hassain Basic Histology
- Difore Atlas Histology

Physiology

- ✓ Guyton nd Hall physiology
- ✓ Ganong physiology
- ✓ Human Physiology from cells to system by lauralee sherwood
- ✓ BRS Physiology
- ✓ Neuroscience by Dale Purves



Biochemistry

- Chatterjee text book of Biochemistry
- Harpers Biochemistry
- Lippincotts Biochemistry
- Satya Narayan biochemistry

Apart from these resources learning, students can consult books available in library or recommended by the specialty experts.

