



Jinnah Medical & Dental College

Urinary System Module 1 & 2

Study Guide



**MBBS
2022-23**

**“Health is a state of body. Wellness is a
state of being”**

-J. Stanford

VISION

To set local and global standards for quality patient outcomes – creating a culture of excellence to promote a transformative experience for the 21st century clinicians, educators, and researchers to benefit all humanity.

MISSION

To develop well-rounded academicians, thinkers, clinicians, and researchers by strengthening a global view, broadening intellectual foundations and teach effective communication. It is our aspiration to cultivate creative and critical thinking skills for problem solving, sensitive to cultural and ethical values and responsibilities. Our graduates will be role models and society leaders.

Team Members of Urinary System Module I &II 2022-23

Name	Committee	Department
Professor Dr. Muhammad Baqir Soomro	Member	Anatomy
Professor Dr. Shahid Ahsen	Member	Biochemistry
Professor Dr. Sadaf Fatima	Member	Physiology
Professor Dr. Sanower Ali	Member	Community Medicine
Professor Dr. Bushra Rafique	Member	Pediatrics
Professor Dr. Mahdev Harani	Member	Pathology & Microbiology
Professor Dr. Ishaq Ghauri	Member	Medicine
Professor Dr. Samia Perwaiz Khan	Member	Pharmacology
Professor Dr. Farooq Umer	Member	Surgery
Dr. Zeelaf Shahid Associate Director	Member	Medical Education

Introduction

Greetings and a very warm welcome to medical students in the Urinary system modules. This module has been developed to impart integrated teaching as a part of modular curriculum in Jinnah Medical & Dental College, Karachi. Urinary System module I (2nd year) is covered in 4 weeks and Urinary System module II (4th year) covered in 4 weeks.

Rationale

It is designed to provide students with not only knowledge about basics of Urinary System but also develop their ability to apply information to solve problems.



JMDC CURRICULUM SEQUENCE: MBBS 1-5 YEARS

Year	Module 1		Module 2		Module 3		Module 4		Module 5			EOM* Exam of Module				
1	Foundation-1 8 weeks		Blood-1 4 weeks		Locomotor-1 8 weeks		Respiratory-1 4 weeks		CVS-1 4 weeks							
PAKISTAN STUDIES & ISLAMIAT																
2	Module 6		Module 7		Module 8		Module 9		Module 10		Module 11	Module 12	EOM			
	GIT-1 4 weeks		Head & Neck-1 5 weeks		Neurosciences-1 7 weeks		Special Senses 3 weeks		Endocrine-1 5 weeks		Reproductive-1 4 weeks	Urinary-1 5 weeks				
Communication Skills Patient Safety & Infection Control Professionalism & Ethics																
3	Module 13		Module 14		Module 15		Module 16		Module 17		Module 18	EOM	EOM			
	Foundation 2 10 weeks		Blood-2 5 weeks		Locomotor-2 4 weeks		Respiratory-2 4 weeks		CVS-2 5 weeks		GIT-2 7 weeks					
Clinical Rotations (Each Batch) WT* = Ward test																
Communication Skills Patient Safety & Infection Control Professionalism & Ethics																
R1	Medicine 2 weeks		Psychiatry 2 weeks		Surgery 2 weeks		Orthopedics 2 weeks		OBS/ GYN 2 weeks		Pediatrics 2 weeks		Eye 2 weeks	Ent 3 weeks	WT	
R2	Medicine 2 weeks		Psychiatry 2 weeks		Surgery 2 weeks		Orthopedics 2 weeks		OBS/ GYN 2 weeks		Pediatrics 2 weeks		Eye 2 weeks		Ent 3 weeks	WT
4	Module 19		Module 20		Module 21		Module 22		Module 23		Module 24	Module 25	Module 26		Module 27	EOM
	Nervous Sys & Psychiatry 2 weeks		H & N & SP Senses 2 (Eye) 4 weeks		H & N & SP Senses 3 (ENT) 4 weeks		Endocrinology 4 weeks		Repro 6 weeks		Urinary 4 weeks	Derma 2 weeks	Orthopedics 2 weeks		Rehab 2 weeks	
Lectures Eye/ENT																
Clinical Rotations (Each Batch)																
Communication Skills Patient Safety & Infection Control Professionalism & Ethics																
R1	Medicine 3 weeks		Psychiatry 3 weeks		Surgery 3 weeks		Orthopedics 3 weeks		OBS/ GYN 3 weeks		Pediatrics 3 weeks		Eye 3 weeks	Ent 3 weeks	WT	
R2	Medicine 3 weeks		Surgery 3 weeks		Eye 3 weeks		Ent 3 weeks		WT		WT		WT		WT	
LECTURES R***= Rotation																
5	Medicine				Surgery				OBS/Gynae				Pediatrics			
Clinical Rotations																
Communication Skills Patient Safety & Infection Control																
R1	Medicine 4 weeks				Surgery 4 weeks				OBS/ GYN 4 weeks				Pediatrics 4 weeks			
R2	Medicine 5 weeks				Surgery 5 weeks				OBS/ GYN 5 weeks				Pediatrics 5 weeks			

Students Assessment

There will be an end of module/rotation test after completion of module/clinical posting which will comprise the following components: -

i. Written Assessment

The theory paper will have components of one – best type multiple – choice questions (MCQs).

ii. Practical / lab examination:

This will comprise Objective Structured Clinical Examination (OSCE) The OSCE will have both observed and non-observed stations. The end of clinical posting will be of 2 hours duration. This will comprise the following components:

The OSPE/ OSCE will be conducted in batches. The students will be having different patterns of OSPE/OSCE in the subject of both Basic & Clinical Sciences.

Summary of marks of each module exam

Theory (BCQs) = 100 marks

OSPE (10 stations) = 100 marks

Total = 200 marks

Internal Assessment:

- Continuous monitoring of attendance and practical assessment in short groups By Mini CEX, DOPS and logbooks.
- It may be in the form of MCQs (BCQs), Ward tests, and OSCE.
- Internal assessment carries 20% weightage

Course Evaluation:

Course evaluation will be obtained through a feedback form which will be posted on the JMC website

Mandatory Policy:**Eligibility for sitting in Professional Examinations is as follows:**

- 75% overall Class Attendance
- 75% Attendance all Clinical Wards with passing marks in all Clinical Ward Tests.
- Minimum 40% aggregate marks on all Internal Examinations (Module Tests, Midterm, Pre-Professional Examinations)
- MBBS 1stYear: Complete all Professional Communication assignments with passing marks
- MBBS 1st& 2ndYear: Obtain passing marks in Behavioral Sciences & Research Module assessments
- MBBS 2ndYear: Presentation in Journal club at least twice in a year
- MBBS 4th& Final Year: CPC Presentation at least once in a year
- Skills Labs: Must be completed with passing marks
- Research Paper must be completed before MBBS 4 Professional Examination

Failure to Meet the Eligibility Requirements:

- A Student failing to meet the above listed eligibility for sitting in the professional examination will not be allowed to sit in 1st attempt of the Professional Examination. The college has the right to withhold all students who however, not met the eligibility requirements from sitting in the 1st attempt.
- Such students who have been withheld from sitting in the 1st attempt of the Professional exam because of failure to meet the eligibility requirements will be allowed only to sit in the retake of that examination.

It is expected that deficiency in requirements of Professional communication assignments, Behavioral Sciences & Research Module assessments, journal Club presentations, CPC, Skills Labs must be made up and fulfilled before a student will allowed to sit in the retake exam.

Details of Attendance policy

The CR is responsible to bring attendance sheets from Student Affairs Office to each class. At the end of class, the attendance sheet must be signed and returned by the faculty member to the Student Affairs Office. No attendance sheets from students will be accepted. These attendances will be compiled together as follows:

LECTURE ATTENDANCE = # Lectures Attended / Total # of Lectures

PRACTICAL ATTENDANCE = # Practical's Attended / Total # of Practical's

TUTORIAL ATTENDANCE = # Tutorials Attended / Total # of Tutorials

NOTE: All tutorials will be conducted by a Senior Faculty Member (AP or above), assisted by a Junior Faculty Member (Lecturer)

FINAL CLASS ATTENDANCE =

%Lecture Attendance + %Tutorial Attendance + %Practical Attendance

Teaching / Learning Methods

The teaching learning sessions of this module will be of diverse types:

- a. Large group interactive sessions (LGIS)
- b. Small group teaching will include tutorials and, case – based learning session.
- c. Problem – based learning sessions.
- d. Practical session will comprise sessions on early exposure to clinical methods and practical laboratory demonstrations.
- e. Seminars: on different topics, in which students will make oral presentations on different aspects of the allocated topic.
- f. Self-directed learning sessions: This is the time during which students are expected to revise what they have learnt in the class, clear their concepts by consulting different textbooks, reference material and prepare their assignments and projects.

Main Content Areas

Anatomy

- Gross anatomy of kidneys
- Blood supply, nerve supply and lymphatic drainage of kidneys
- Gross anatomical features of ureter and urinary bladder & urethra
- Surface anatomy of Urinary system
- Histological features of kidney
- Histological features of ureter, urinary bladder, and urethra
- Development of kidney, ureter & urinary bladder
- Anomalies of kidney, ureter & urinary bladder

Biochemistry

- Water distribution, regulation & disturbances
- Nucleotide metabolism

Physiology

- General functions of kidneys and excretory system
- Glomerular filtration rate (GFR) and its regulating factors
- Auto-regulation of GFR and renal blood flow
- Tubular reabsorption and secretion
- Concentration and dilution of urine
- Acidification of urine
- Process of micturition and micturition reflex
- Plasma clearance and estimation of renal function
- Renal Hormones

Community medicine

- Renal diseases and prevention

Pediatrics

- Nephrotic syndrome
- AGN nephritis
- Acute renal failure

Pathology

- Cysts: Congenital and acquired cystic conditions of kidney
- Obstructive Uropathy1: Urinary outflow Obstruction (Urolithiasis, Hydronephrosis)
- ObstructiveUropathy2: Urinary outflow Obstruction (Prostate)
- Obstructive Uropathy 3: Carcinoma of Prostate

- Urinary Tract Infections (Microbiology)
- Pathogenesis of glomerular disorders
- Nephritic syndrome
- Nephrotic syndrome
- Acute tubular necrosis
- Renal Vascular Diseases

Medicine

- Acute kidney injury
- Chronic kidney disease
- Nephrotic syndrome
- Nephritic syndrome
- Urinary tract infections
- Renal tubular acidosis
- Introduction to dialysis & renal transplant
- Polycystic kidneys Polycystic kidneys

Pharmacology

- Diuretics I&II

Surgery

- Urinary Symptoms and Investigations
- Kidneys and ureters
- Urinary Bladder

GENERAL LEARNING OBJECTIVES:

By the end of this module, the students will be able to:

Anatomy

- Explain Gross anatomy of kidneys
- Describe Blood supply, nerve supply and lymphatic drainage of kidneys
- Explain Gross anatomical features of ureter and urinary bladder & urethra
- Discuss Surface anatomy of Urinary system
- Portray Histological features of kidney
- Portray Histological features of ureter, urinary bladder, and urethra
- Describe Development of kidney, ureter & urinary bladder
- Discuss Anomalies of kidney, ureter & urinary bladder

Biochemistry

- Explain Water distribution, regulation & disturbances
- Discuss Nucleotide metabolism

Physiology

- Explain General functions of kidneys and excretory system
- Discuss Glomerular filtration rate (GFR) and its regulating factors
- Discuss Auto-regulation of GFR and renal blood flow
- Explain Tubular reabsorption and secretion
- Discuss Concentration and dilution of urine
- Describe Acidification of urine
- Discuss Process of micturition and micturition reflex
- Explain Plasma clearance and estimation of renal function
- Discuss Renal Hormones

Community medicine

- Explain Renal diseases and prevention

Pediatrics

- Discuss Nephrotic syndrome
- Describe AGN nephritis
- Explain Acute renal failure

Pathology

- Discuss Cysts: Congenital and acquired cystic conditions of kidney
- Explain Obstructive Uropathy1: Urinary outflow Obstruction (Urolithiasis, Hydronephrosis)

- Discuss Obstructive Uropathy 2: Urinary outflow Obstruction (Prostate)
- Explain Obstructive Uropathy 3: Carcinoma of Prostate
- Describe Urinary Tract Infections (Microbiology)
- Discuss Pathogenesis of glomerular disorders
- Explain Nephritic syndrome
- Discuss Nephrotic syndrome
- Discuss Acute tubular necrosis
- Explain Renal Vascular Diseases

Medicine

- Discuss Acute kidney injury
- Explain Chronic kidney disease
- Discuss Nephrotic syndrome
- Discuss Nephritic syndrome
- Describe Urinary tract infections
- Explain Renal tubular acidosis
- Discuss dialysis & renal transplant
- Explain Polycystic kidneys Polycystic kidneys

Pharmacology

- Discuss Diuretics I&II

Surgery

- Explain Urinary Symptoms and Investigations
- Discuss Kidneys and ureters
- Discuss Urinary Bladder

Recommended Reading Material

Anatomy

A. GROSSANATOMY

1. K.L. Moore, Clinically Oriented Anatomy
2. Richard L. Drake, Gray's anatomy for students

B. HISTOLOGY

1. B. Young J. W. Health Wheather's Functional Histology
2. di Fiore's Atlas of histology and functional correlations

C. EMBRYOLOGY

1. Keith L. Moore. The Developing Human
2. Langman's Medical Embryology

Biochemistry

TEXT BOOKS

1. Harper's Illustrated Biochemistry
2. Lippincott's Illustrated reviews of Biochemistry
3. Lehninger's Principles of Biochemistry
4. Biochemistry by Devlin

Physiology

A. TEXTBOOKS

1. Textbook of Medical Physiology by Guyton And Hall
 2. Human Physiology by Lauralee Sherwood
 3. Berne & Levy Physiology
 4. Best & Taylor Physiological Basis of Medical Practice

B. REFERENCEBOOKS

1. Ganong's Review of Medical Physiology

Community Medicine

- Public Health and Community Medicine by Shah Ilyas Ansari, 8th Edition
- Park's Textbook of Preventive and Social Medicine by K Park 24th Edition Epidemiology and Biostatistics:
- Epidemiology by Leon Gordis, Fifth Edition
- Basic Statistics for the Health Sciences by Jan W. Kuzma, Fifth Edition.

Pediatrics

- Illustrated textbook of Pediatrics (Tom Lissauer)
- Textbook of Pediatrics (PPA)
- The Harriet Lane Handbook of Pediatrics
- Drug doses by Frank Shann (2021)

Pathology

- Basis of Pathology by Robbins & Cotran
- Review of Microbiology by Livingston

Pharmacology

- Katzung. Basic & Clinical Pharmacology. 14th Edition.
- Katzung & Trevor's. Pharmacology. 12th Edition.
- Rang & Dales. Pharmacology.

Medicine

- Davidson's Principles and Practice of Medicine
- MacLeod's clinical examination 13th edition
- Bedside techniques of clinical examination edition 4
- Additional learning resources
<https://www.medscape.com>
<https://www.uptodate.com/login>

Surgery

- Clinical Examination of Surgery by Norman Browse
- Short Practice of Surgery by Baily's and Love
- Washington manual of Surgery
- Surgery on call

Urinary System Module 1

Organization

Time requirements:

- | | |
|----------------|-------|
| • Anatomy | Hours |
| • Physiology | Hours |
| • Biochemistry | Hours |

Hours

Urinary System Module II

Organization

Time requirements:

- | | |
|----------------------------|-------|
| • Anatomy | Hours |
| • Community Medicine | Hours |
| • Pathology & Microbiology | Hours |
| • Pharmacology | Hours |
| • OBS & Gynecology | Hours |
| • Urology | Hours |
| • Behavioral sciences | Hours |

Hours

Total = Hours

Urinary System -1

Module

ANATOMY

LECTURES & DEMONSTRATIONS

S. NO.	LEARNING OBJECTIVES By the end, the students should be able to	Content	TEACHING Activity Duration	ASSESSMENT
1.	<ul style="list-style-type: none"> Describe the gross structure of kidney, its location and shape □ Discuss the coverings and cortex and medulla, relations, and functions of kidneys □ Discuss the clinical conditions related to kidneys□ <p>(K)</p>	Gross anatomy of kidneys	LGIS 50 Mins + Demonstrations (90 mins)	MCQs + OSPE
2.	<ul style="list-style-type: none"> Describe in sequence the structures passing through the hilum of kidneys Discuss the blood supply of kidney in detail, with clinical segmentation of kidney according to its blood supply Discuss the nerve supply and lymphatic drainage of kidney Discuss the clinical conditions related to blood supply of kidney <p>(K)</p>	Blood supply, nerve supply and lymphatic drainage of kidneys	LGIS 50 Mins + Demonstrations (90 mins)	MCQs + OSPE
3.	<ul style="list-style-type: none"> Enumerate the parts of urinary system (Ureter, urinary bladder and urethra) Describe, course, anatomical constrictions, and relations of ureter • Explain the location, apex, base, surfaces, and relations of urinary bladder Describe the trigone of the urinary bladder Explain the support to the urinary bladder Describe the blood supply, nerve supply and lymphatic drainage of ureter, urinary bladder and urethra <p>(K)</p>	Gross anatomical features of ureter and urinary bladder & urethra	LGIS 50 Mins + Demonstrations (90 mins)	MCQs + OSPE
4.	<ul style="list-style-type: none"> Mark the following structures on the surface of a human body/mannequin: <ol style="list-style-type: none"> Kidney Ureter Urinary bladder <p>(K)</p>	Surface anatomy of Urinary system	LGIS 50 Mins + Demonstrations (90 mins)	MCQs + OSPE
5.	<ul style="list-style-type: none"> Describe the histological features of kidney (cortex & medulla) □ Discuss the histological features of a nephron and its types □ Describe the filtration barrier and its significance □ Explain the juxtaglomerular apparatus, its • location and significance <p>(K)</p>	Histological features of kidney	LGIS 50 Mins + Demonstrations (90 mins)	MCQs + OSPE
6.	<ul style="list-style-type: none"> Discuss the lining epithelium of Ureter, Urinary Bladder & Urethra Describe the arrangement of layers in ureter, urinary bladder and urethra & their microscopic appearance 	Histological features of ureter, urinary bladder, and urethra	LGIS 50 Mins + Demonstrations (90 mins)	MCQs + OSPE

	(K)			
7.	<ul style="list-style-type: none"> Describe the role of intermediate mesoderm in the formation of kidney Describe the development and the fate of the three progenitors of urinary system: pronephros, mesonephros and metanephros Discuss the development of the following: <ul style="list-style-type: none"> i. Nephron ii. Collecting system of kidney iii. Ureter iv. Urinary bladder □ <p>(K)</p>	Development of kidney, ureter & urinary bladder	LGIS 50 Mins + Demonstrations (90 mins)	MCQ's + OSPE
8.	<ul style="list-style-type: none"> Describe the congenital anomalies of kidney (polycystic kidney, pelvic kidney, horseshoe kidney), ureter (Bifid ureter) and urinary bladder <p>(K)</p>	Anomalies of kidney, ureter & urinary bladder	LGIS 50 Mins + Demonstrations (90 mins)	MCQs + OSPE

Histology

PRACTICALS

S. N O.	LEARNING OBJECTIVES	Content	TEACHING Activities (Duration)	ASSESSMENT
1.	<ul style="list-style-type: none"> □ Identify renal corpuscle • Differentiate proximal and distal convoluted tubules □ • Identify medullary rays, collecting tubules and collecting ducts □ <p>(S)</p>	Histological features of kidneys	Demonstrations 90 mins	OSPE
2.	<ul style="list-style-type: none"> • Identify the microscopic appearance and structure of the ureter & urinary bladder • Discuss the microscopic features of ureter and urinary bladder <p>(S)</p>	Histological features of Ureter & Urinary Bladder	Demonstrations 90 mins	OSPE

BIOCHEMISTRY

LECTURES & DEMONSTRATIONS

S.N O.	LEARNING OBJECTIVES By the end of module, the students should be able to	Content	TEACHING Activities (Duration)	ASSESSMENT
1.	<p>WATER DISTRIBUTION, REGULATION & DISTURBANCES</p> <ul style="list-style-type: none"> • Describe the distribution of water in the body • Discuss the hormonal regulations of water homeostasis and their exchanges • Explain the regulatory mechanism by which the water balance is maintained • Discuss the biochemical consequences of dehydration and overhydration • Discuss the clinical disorders associated with water balance abnormalities and their management <p>(K)</p>	Water distribution, regulation & disturbances	<p>LGIS 50 Mins + Demonstrations (90 mins)</p>	<p>MCQ's + OSPE</p>
2.	<ul style="list-style-type: none"> • Describe the maintenance of normal pH • Discuss the renal mechanism of pH regulation • Discuss the biochemical consequences of respiratory and metabolic acidosis and alkalosis • Explain the compensatory mechanism in metabolic pH disturbances • Discuss the Arterial blood gases (ABGs) in metabolic pH disturbances • Discuss the ABGs in compensated metabolic pH disturbances <p>(K)</p>	PH Disturbances	<p>LGIS 50 Mins + Demonstrations (90 mins)</p>	<p>MCQ's + OSPE</p>
3.	<ul style="list-style-type: none"> • List the sources of dietary sodium and chloride • Discuss the normal daily requirement of Sodium and chloride • Explain the distribution of sodium in extracellular and intracellular compartments • Describe the biochemical role and metabolism of Sodium and chloride • Discuss the clinical disorders associated with sodium and chloride disturbances (e.g Hypertension) • Discuss the laboratory investigations related with the disturbances of these electrolytes (e.g dehydration and over-hydration) <p>(K)</p>	Sodium and chloride disturbances	<p>LGIS 50 Mins + Demonstrations (90 mins)</p>	<p>MCQ's + OSPE</p>
4	<ul style="list-style-type: none"> • List the sources of dietary potassium and phosphate • Discuss the normal daily requirement of potassium and phosphate • Explain the distribution of potassium and phosphate in extracellular and intracellular compartments • Describe the biochemical role and the metabolism of potassium and phosphate • Discuss the clinical disorders associated with potassium and phosphate disturbances (e.g. 	Potassium and phosphate disturbances	<p>LGIS 50 Mins + Demonstrations (90 mins)</p>	<p>MCQ's + OSPE</p>

	<p>hypokalemia & hyperkalemia)</p> <ul style="list-style-type: none"> Discuss the laboratory investigations related with the disturbances of these electrolytes <p>(K)</p>			
5.	<ul style="list-style-type: none"> Discuss the clinical importance of renal disorders Discuss the importance of renal function tests for the diagnosis of renal disorders □ List the renal function tests □ Explain the renal function tests □ Interpret clinical conditions correlated with their laboratory investigations 	Renal Function tests	LGIS 50 Mins + Demonstrations (90 mins)	MCQ's + OSPE
6.	<p>NUCLEOTIDE METABOLISM □</p> <ul style="list-style-type: none"> Discuss the structure and biochemical functions of nucleotides □ Name the different types of purines Describe the sources of carbon and nitrogen atoms in the purine ring □ Discuss the process of purine synthesis (Denovo and salvage pathways) □ Discuss the biochemical abnormalities related to purine synthesis (e.g Lesch–Nyhan Syndrome & Von Gierke's Diseases) <p>(K)</p>	Purine Synthesis	LGIS 50 Mins + Demonstrations (90 mins)	MCQ's + OSPE
7.	<ul style="list-style-type: none"> Describe the fate of dietary nucleoproteins Discuss the degradation of tissue purine nucleotides □ Explain the formation of uric acid Discuss the clinical significance of purine degradation abnormalities (e.g. Gout, Severe combined immunodeficiency diseases, purine nucleoside phosphorylase deficiency and hypouricemia) <p>(K)</p>	Purine Degradation	LGIS 50 Mins + Demonstrations (90 mins)	MCQ's + OSPE
8.	<ul style="list-style-type: none"> Discuss the structure and biochemical functions of pyrimidine nucleotides □ Name the different types of pyrimidine □ Discuss the process of pyrimidine synthesis and degradation Discuss the biochemical abnormalities related to pyrimidine synthesis (e.g. Orotic aciduria) <p>(K)</p>	Pyrimidine Metabolism	LGIS 50 Mins + Demonstrations (90 mins)	MCQ's + OSPE

BIOCHEMISTRY**TUTORIALS**

S. NO.	LEARNING OBJECTIVES	Content	TEACHING Activities (Duration)	ASSESSMENT
1.	<ul style="list-style-type: none"> Discuss the clinical importance of water, electrolytes, and pH disturbances Correlate the interpretation of laboratory investigations with relevant clinical conditions □ <p>(K)</p>	Water, electrolytes and pH disturbances	SGD 90 mins	MCQ's
2	<ul style="list-style-type: none"> Discuss the clinical importance of Nucleotide metabolism (e.g., Gout) Correlate the interpretation of laboratory investigations with relevant clinical conditions <p>(K)</p>	Nucleotide Metabolism	SGD 90 mins	MCQ's

BIOCHEMISTRY**PRACTICALS**

S. N O.	LEARNING OBJECTIVES	Content	TEACHING Activities (Duration)	ASSESSMENT
1.	<ul style="list-style-type: none"> List the normal and abnormal urine constituents and its biochemical significance □ Outline the method for detection of normal and abnormal urine constituents by chemical tests and urine dipstick □ Detect the normal and abnormal constituents of urine by chemical tests and urine dipstick □ Correlate the interpretation of laboratory investigations with relevant clinical conditions 	Detection of normal and abnormal urine constituents	Demonstration 90 mins	OSPE
2	<ul style="list-style-type: none"> Explain the bio-techniques to estimate Urea and Creatinine in a sample Explain the principle of detection of Urea and Creatinine by Spectrophotometry Estimate Urea and Creatinine levels by spectrophotometry Correlate the interpretation of laboratory investigations with relevant clinical conditions 	Urea & Creatinine estimation	Demonstration 90 mins	OSPE
3.	<ul style="list-style-type: none"> Explain the bio-techniques to estimate Uric acid in a sample Explain the principle of detection of Uric acid by Spectrophotometry Estimate Uric acid level by spectrophotometry Correlate the interpretation of laboratory investigations with relevant clinical conditions 	Uric Acid estimation	Demonstration 90 mins	OSPE

PHYSIOLOGY

LECTURES & DEMONSTRATIONS

S. NO.	LEARNING OBJECTIVES	Content	TEACHING Activities (Duration)	ASSESSMENT
1.	<ul style="list-style-type: none"> List the general functions of kidneys Describe the structure, functions and types of typical nephron and its blood supply <p>(K)</p>	General functions of kidneys and excretory system	LGIS 50 Mins + Demonstrations (90 mins)	MCQ's + OSPE
2.	<ul style="list-style-type: none"> Define glomerular filtration rate Explain the composition of glomerular filtrate Discuss the major factors that regulate the GFR (Net filtration pressure, hydrostatic, and colloid osmotic pressures) <p>(K)</p>	Glomerular filtration rate (GFR) and its regulating factors	LGIS 50 Mins + Demonstrations (90 mins)	MCQ's + OSPE
3.	<ul style="list-style-type: none"> Define tubule glomerular feedback Explain the functions of juxtaglomerular apparatus and Macula densa Discuss myogenic autoregulation <p>(K)</p>	Auto-regulation of GFR and renal blood flow	LGIS 50 Mins + Demonstrations (90 mins)	MCQ's + OSPE
4.	<ul style="list-style-type: none"> Discuss the transport mechanisms among different segments of renal tubule Explain the regulation of tubular reabsorption and secretion □ Discuss the hormonal control of tubular reabsorption secretion <p>(K)</p>	Tubular reabsorption and secretion	LGIS 50 Mins + Demonstrations (90 mins)	MCQ's + OSPE
5.	<ul style="list-style-type: none"> Explain counter current multiplier, and counter current exchange method □ Discuss the role of urea in urine formation Define obligatory urine volume □ □ <p>(K)</p>	Concentration and dilution of urine	LGIS 50 Mins + Demonstrations (90 mins)	MCQ's + OSPE
6.	<ul style="list-style-type: none"> Discuss different buffer systems in the body (bicarbonate, phosphate, ammonia) Explain the role of kidneys in acid base balance Discuss the changes in the level of urine PH (maximum/minimum level; 4.5-8) <p>(K)</p>	Acidification of urine	LGIS 50 Min+ Demonstrations (90 mins) s	MCQ's + OSPE
7.	<ul style="list-style-type: none"> Explain physiology and innervation of bladder Explain micturition reflex <p>(K)</p>	Process of micturition and micturition reflex	LGIS 50 Mins + Demonstrations (90 mins)	MCQ's + OSPE

8.	<ul style="list-style-type: none"> • Determine renal plasma flow, renal blood, GFR • List the substances that are used to estimate renal function (PAH, inulin) • Calculate clearance of PAH and inulin <p>(K)</p>	Plasma clearance and estimation of renal function	LGIS 50 Mins + Demonstrations (90 mins)	MCQ's + OSPE
9.	<p>Explain the effects of different hormones on kidney function (erythropoietin, ADH, Angiotensin, aldosterone)</p> <p>(K)</p>	Renal Hormones	LGIS 50 Mins + Demonstrations (90 mins)	MCQ's + OSPE

Week 4

End of Module

Urinary system Module 1 Test Theory

Urinary system Module 1 Test OSCE

Urinary system -2

Module

Community Medicine

Lectures

S No	Learning Objectives By the end of the session, students will be able to:		Learning Activity (Duration)	Assessment
1.	<ul style="list-style-type: none"> Describe common renal diseases □ Discuss epidemiology of renal diseases Identify environmental risk factors of renal diseases □ Explain preventive measures of renal diseases <p>(K)</p>	Renal diseases and prevention	LGIS 50mins	MCQs

Pathology

Lectures

S No	Learning Objectives By the end of the session, students will be able to:	Content Areas	Learning Activity (Duration)	Assessment
1.	<input type="checkbox"/> <ul style="list-style-type: none"> Classify cystic diseases of the kidneys □ Discuss genetics, pathogenesis, morphology and clinical features of autosomal dominant, autosomal recessive polycystic kidney disease. Discuss cystic diseases of renal medulla and acquired (Dialysis associated) cystic disease <p>(K)</p>	Cysts: Congenital and acquired cystic conditions of kidney	LGIS 50mins	MCQs
2.	<ul style="list-style-type: none"> Discuss the causes, pathogenesis, morphology and clinical features of Hydronephrosis Explain the types, pathogenesis and clinical presentation of renal stones Explain the major causes of Ureteral obstruction <p>(K)</p>	Obstructive Uropathy1: Urinary outflow Obstruction (Urolithiasis, Hydronephrosis)	LGIS 50min	MCQs
3.	<ul style="list-style-type: none"> Discuss acute and chronic Prostatitis Explain the etiology, pathogenesis, morphological and clinical features of Benign Prostatic Hyperplasia <p>(K)</p>	ObstructiveUropathy2: Urinary outflow Obstruction (Prostate)	LGIS 50min	MCQs
4.	<ul style="list-style-type: none"> Discuss the etiology, genetic alterations, pathogenesis, morphology, and clinical features of Prostatic Adenocarcinoma □ Explain the grading, staging and laboratory diagnostics of carcinoma of Prostate <p>(K)</p>	Obstructive Uropathy 3: Carcinoma of Prostate	LGIS 50min	MCQs
5.	<ul style="list-style-type: none"> Describe the etiologies and pathophysiology of upper and lower urinary infections <p>(K)</p>	Urinary Tract Infections (Microbiology)	LGIS 50min	MCQs

6.	<ul style="list-style-type: none"> Classify Glomerular Diseases Name the Glomerular syndromes Explain various pathological responses to glomerular injury Discuss pathogenesis of glomerular injury and mediators of glomerular injury Explain the underlying immune mechanism in development of various glomerular diseases <p>(K)</p>	Pathogenesis of glomerular disorders	LGIS 50min	MCQs
7.	<ul style="list-style-type: none"> Define nephritic syndrome □ Summarize major primary Glomerulo nephritides□ Discuss the etiology, pathogenesis, and clinical features of Acute proliferative (Poststreptococcal, Postinfectious) Glomerulo nephritis, & Rapidly Progressive (Crescentic)Glomerulonephritis. <p>(K)</p>	Nephritic syndrome	LGIS 50min	MCQs
8.	<ul style="list-style-type: none"> Define nephrotic syndrome List the common causes of Nephrotic syndrome Discuss etiology, pathogenesis, morphology [light microscopic, electron microscopic and immunofluorescent microscopic features) of Membranous Nephropathy, Minimal-Change Disease Focal Segmental Glomerulosclerosis (FSGS),HIV Associated Nephropathy, Membranoproliferative Glomerulonephritis(MPGN)] <p>(K)</p>	Nephrotic syndrome	LGIS 50min	MCQs
9.	<p>□</p> <ul style="list-style-type: none"> Define tubulointerstitial diseases Classify tubulointerstitial diseases Discuss etiology, pathogenesis, morphology and clinical features of Acute Tubular injury/Necrosis & Tubulointerstitial Nephritis <p>(K)</p>	Acute tubular necrosis	LGIS 50min	MCQs
10.	<ul style="list-style-type: none"> Discuss the pathophysiology, morphology and clinical features of glomerular conditions associated with systemic diseases (e.g .Diabetic Nephropathy, hypertension, Lupus Nephritis, Henoch-Schönlein Purpura Glomerulonephritis Associated with Bacterial Endocarditis and Other Systemic infections, Fibrillary Glomerulonephritis) Explain isolated glomerular abnormalities including IgA Nephropathy(Berger Disease),Hereditary <p>(K)</p>	Glomerular conditions associated with systemic disorders & Isolated Glomerular Abnormalities	LGIS 50min	MCQs
11.	<ul style="list-style-type: none"> Define Pyelonephritis □ List the causes and organisms of urinary tract infections □ Discuss the mechanism of ascending infection involving upper urinary tract and kidneys □ Discuss pathogenesis, morphologic & Chronic Pyelonephritis and Reflux Nephropathy □ Describe morphological features and complications of pyelonephritis <p>(K)</p>	Pyelonephritis	LGIS 50min	MCQs

12.	<ul style="list-style-type: none"> Classify renal neoplasms Discuss benign neoplasms of the kidney Explain the risk factors, malignant renal neoplasms <p>(K)</p>	Tumors of renal system	LGIS 50min	MCQs
13.	<ul style="list-style-type: none"> Classify Urothelial tumors Discuss the etiology, pathogenesis, morphology, clinical features, and diagnosis of urothelial tumors <p>(K)</p>	Tumors of renal system II	LGIS 50min	MCQs
14.	<ul style="list-style-type: none"> Classify renal vascular diseases Discuss the etiology, pathogenesis, morphology, and clinical features of Nephrosclerosis, Malignant Nephrosclerosis, Renal Artery stenosis, Thrombotic Microangiopathies and other vascular disorders <p>(K)</p>	Renal Vascular Diseases	LGIS 50min	MCQs

Pathology

Tutorials

S No	Learning Objectives By the end of the session, students will be able to:	Content Areas	Learning Activity (Duration)	Assessment
1.	<ul style="list-style-type: none"> Interpret urine detailed report <input type="checkbox"/> Discuss Lab/Dipsticks method of urine analysis Identify proteinuria in each sample of urine by Lab/Dipsticks method <p>(K)</p>	Urinary Analysis	SGDs 1hour	MCQs
2.	<ul style="list-style-type: none"> Discuss the procedure of performing urine C/S Identify the culture media and growth of different organism of UTI on culture plates <p>(K)</p>	Urine Culture and Sensitivity (C/S)	SGDs 1hour	MCQs
3.	<input type="checkbox"/> <ul style="list-style-type: none"> Discuss morphology (light microscopic, electron microscopic and immune fluorescent microscopic features) of important diseases related to Nephritic and nephrotic syndromes <p>(K)</p>	Histopathology of Glomerular Diseases	SGDs 1hour	MCQs

Pediatrics

Lectures

S No	Learning Objectives By the end of the session, students will be able to:	Content Areas	Learning Activity (Duration)	Assessment
1.	<ul style="list-style-type: none"> Define the nephrotic syndrome <input type="checkbox"/> Describe their etiology, risk factors, sign and symptoms, investigations, management, and complications of Nephrotic syndrome Interpret results of a urinalysis for Nephrotic Syndrome <p>(K)</p>	Nephrotic syndrome	LGIS 50min	MCQs
2.	<ul style="list-style-type: none"> Define AGN nephritis Describe their etiology, risk factors, sign and symptoms, investigations, management, and complications of AGN nephritis Interpret results of a urinalysis for AGN nephritis <p>(K)</p>	AGN nephritis	LGIS 50min	MCQs
3.	<ul style="list-style-type: none"> Define Acute Renal failure Describe their etiology, risk factors, sign and symptoms, investigations, management, and complications of Acute renal failure Interpret results of a urinalysis for Acute renal failure <p>(K)</p>	Acute renal failure	LGIS 50min	MCQs
4.	<ul style="list-style-type: none"> Define Urinary tract infections Describe their etiology, risk factors, sign and symptoms, investigations, management, and complications of Urinary tract infections Interpret results of a urinalysis for Urinary tract infections <p>(K)</p>	Urinary tract infections	LGIS 50min	MCQs

Surgery

Lectures

S No	Learning Objectives By the end of the session, students will be able to:	Content Areas	Learning Activity (Duration)	Assessment
1.	<ul style="list-style-type: none"> Identify the basis for diagnosing hematuria <input type="checkbox"/> List the pigments, mimicking hematuria <input type="checkbox"/> List the differential diagnosis for hematuria originating in the different anatomical parts of the urinary tract <input type="checkbox"/> Justify the significance of the information gathered from the palpation of the prostate rectally <input type="checkbox"/> List the radiological investigations available for the assessment of the urinary tract <input type="checkbox"/> Describe the management plan for the patient with hematuria <p>(K)</p>	Urinary Symptoms and Investigations	LGIS 1hour	MCQs

2.	<ul style="list-style-type: none"> Differentiate between obstruction at different levels of the urinary tract based on history, clinical features and diagnostic modalities <input type="checkbox"/> Discuss the presenting features, signs and symptoms of urological emergencies <input type="checkbox"/> Classify the urological emergencies based on etiology (excluding trauma) <input type="checkbox"/> Justify differential diagnosis based on given data <input type="checkbox"/> Discuss the appropriate investigations leading to a definite diagnosis <input type="checkbox"/> Devise a management plan according to clinical presentation <input type="checkbox"/> Interpret relevant investigations including kidney, ureter, and bladder (KUB) X-ray (KUB), Intravenous pyelogram (IVP) and CT Pyelography (calculi only) <p>(K)</p>	Kidneys and ureters	LGIS 1hour	MCQs
3.	<ul style="list-style-type: none"> Describe the etiology, presentation and management of benign and malignant conditions of urinary bladder List the treatment options for benign and malignant urinary bladder diseases <p>(K)</p>	Urinary Bladder	LGIS 1hour	MCQs

Medicine

Lectures

S No	Learning Objectives By the end of the session, students will be able to:	Content Areas	Learning Activity (Duration)	Assessment
1.	Describe etiology, pathophysiology, risk factors, clinical features, differential diagnosis, <input type="checkbox"/> radiological and laboratory investigations, management, and complications of Acute kidney injury (K)	Acute kidney injury	LGIS 50min	MCQs
2.	<input type="checkbox"/> Describe etiology, pathophysiology, risk factors, clinical features, differential diagnosis, radiological and laboratory investigations, management, and complications of Chronic kidney injury (K)	Chronic kidney disease	LGIS 50min	MCQs
3.	Describe etiology, pathophysiology, risk factors, clinical features, differential diagnosis, radiological and laboratory investigations, management, and complications of Nephrotic syndrome (K)	Nephrotic syndrome	LGIS 50min	MCQs

4.	Describe etiology, pathophysiology, risk factors, clinical features, differential diagnosis, radiological and laboratory investigations, management, and complications of Nephritic syndrome (K)	Nephritic syndrome	LGIS 50min	MCQs
5.	Describe etiology, pathophysiology, risk factors, clinical features, differential diagnosis, radiological and laboratory investigations, management, and complications of Urinary tract infections (K)	Urinary tract infections	LGIS 50min	MCQs
6.	Describe etiology, pathophysiology, risk factors, clinical features, differential diagnosis, radiological and laboratory investigations, management, and complications of Renal tubular acidosis (K)	Renal tubular acidosis	LGIS 50min	MCQs
7.	Describe etiology, pathophysiology, risk factors, clinical features, differential diagnosis, radiological and laboratory investigations, management, and complications of dialysis & renal transplant (K)	Introduction to dialysis & renal transplant	LGIS 50min	MCQs
8.	Describe etiology, pathophysiology, risk factors, clinical features, differential diagnosis, radiological and laboratory investigations, management, and complications of Polycystic kidneys (K)	Polycystic kidneys	LGIS 50min	MCQs

Medicine

Tutorials

S No	Learning Objectives By the end of the session, students will be able to:	Content Areas	Learning Activity (Duration)	Assessment
1.	Discuss the following clinical features related to kidney and urinary system: i. Pain & fever ii. Urinary obstructive symptoms (Urgency, hesitancy, pain, frequency, altered flow of urine) iii. Burning sensation on micturition iv. Altered color and appearance of urine (K)	Clinical features related to kidney and urinary system	LGIS 1hour	MCQs

Pharmacology

Lectures

S No	Learning Objectives By the end of the session, students will be able to:	Content Areas	Learning Activity (Duration)	Assessment
1.	Classify Diuretics □ Discuss basic & clinical pharmacology of those classes with their clinical uses, side effects & contraindications (K)	Diuretics I&II	LGIS 1hour	MCQs

Pharmacology

Tutorials

S No	Learning Objectives By the end of the session, students will be able to:	Content Areas	Learning Activity (Duration)	Assessment
1.	Justify management of clinical conditions With different classes pharmacokinetics and dynamics of those classes of drugs (K)	Role of Diuretics	LGIS 1hour	MCQs

Week 4

End of Module

Urinary System Module2 Test Theory

Urinary System Module 2 Test OSCE

Medical Education

Lectures/Workshop

S.NO	Learning Objectives (domain) At the end of session, student will be able to:	Content Areas	Teaching Activity (Duration)	Assessment
1.	Introduction to Medical Education <ul style="list-style-type: none"> Appreciate the journey of medical education from learning biomedical to clinical science. (K) 	<ul style="list-style-type: none"> Plan of medical education in college Organization of undergraduate medical curriculum Integrated Curriculum 	LGIS 50 mins	–
2.	Skills of Succeeding in a Medical College – 1 <ul style="list-style-type: none"> Describe the methods of learning knowledge in a medical college. (K) 	<ul style="list-style-type: none"> Difference in teaching and learning in school / college and a medical institution Learning knowledge Learning skills 	LGIS 50 mins	–
3.	Problem – based Learning <ul style="list-style-type: none"> Describe the basis of problem – based learning. (K) Follow the process / steps of problem – based learning session. (S) 	<ul style="list-style-type: none"> Basics of problem-based learning Process / steps of problem – based learning Practical demonstration of PBL session 	Workshop (2 hours)	–
4.	Medical Professionalism <ul style="list-style-type: none"> Describe the basics of medical professionalism and outline the behavioral descriptors of students. (K) 	<ul style="list-style-type: none"> History of medical professionalism Principals of medial professionalism Behaviors required from medical students 	LGIS 50 mins	–

Learning resource: How to succeed at medical school, Dason Evans & Jo Brown, 2009

TIME TABLES

