Ministry of Science and Higher Education of the Russian Federation
Federal State Autonomous Institution of Higher Education
“National Research Nuclear University “MEPhI”

INSTITUTE OF ENGINEERING PHYSICS FOR BIOMEDICINE

APPROVED НТС ИФИБ

Protocol No. 3.1

dated 30.08.2024

ACADEMIC COURSE OUTLINE

УРОЛОГИЯ / URINOLOGY

Educational program track (speciality) [1] 31.05.01 General Medicine

Semester	**Labour input, credits**	**Total course academic, hours**	**Lectures, hrs.**	**Practical sessions, hrs.**	**Laboratory sessions, hrs.**	**In the form of practical studies, hrs.**	**Independent studies, hrs.**	**Independent studies monitoring, hrs.**	**Course progress, Exam/Pass-fail exam/Term**
12	3	108	16	40	0		52	0	PFE
Total	3	108	16	40	0	40	52	0	

ABSTRACT

The program is designed based on the requirements for completion of the specialist program. Graduates (general practitioners) must be prepared to address the challenges of diagnosis, treatment, and prevention of diseases. During the course, students acquire knowledge, skills, and abilities in diagnosing the most common diseases and injuries of the urinary system, managing urological patients, and selecting the optimal treatment and prevention method for urinary tract diseases. Urology is a branch of surgical diseases.

1. ACADEMIC COURSE GOALS AND OBJECTIVES

The goal of this course is to develop competencies in the diagnosis, treatment, and prevention of the most common urological diseases.

Objectives of this course

- to develop a system of knowledge about the etiology, epidemiology, pathogenesis, and clinical manifestations of urinary tract diseases, as well as methods of diagnosis, treatment, and prevention of the most common urological diseases;
- to develop a readiness to identify the main pathological conditions, symptoms, and syndromes, as well as nosological forms of diseases and injuries of the urinary tract, and formulate a preliminary diagnosis;
- to develop the skills and abilities to develop an examination and treatment plan for urological patients, and to interpret the results of additional studies in accordance with clinical guidelines for the purpose of establishing a diagnosis;
- to develop the skills and abilities to provide medical care in the event of emergency conditions in urology, and to determine indications for hospitalization of urological patients;
- develop skills and abilities in selecting rational drug, non-drug, and other treatments for urinary tract diseases, taking into account the severity of the disease and in accordance with clinical guidelines; ability to evaluate the effectiveness and safety of prescribed treatment;
- develop skills and abilities in implementing preventive measures aimed at preventing the development of diseases and injuries of the urinary tract, complications, and relapses;
- develop communication skills with patients, taking into account ethics and deontology, and interaction skills with colleagues;
- develop clinical thinking, the ability to work with scientific literature and apply regulatory documents in the field of urology in professional activities, and the ability to maintain medical records.

2. PLACE OF THE ACADEMIC COURSE IN THE MAIN HIGHER EDUCATION CURRICULUM

Successful mastery of this course requires knowledge, skills, and abilities developed through the study of such disciplines as: Medical Microbiology and Virology, Immunology, Pathological Anatomy, Pathophysiology, Pharmacology, General Surgery, Surgical Diseases (Faculty and Hospital Course), Radiology, and others.

The knowledge, skills, and abilities acquired through studying this course are necessary for solving professional problems in the diagnosis, treatment, and prevention of diseases.

3. DEVELOPED COMPETENCIES AND INTENDED LEARNING OUTCOMES

Universal and/or general professional competencies:

Competency code and title	Code and title of competency-based rubrics
ОПК-4 [1] – Capable of using medical devices stipulated by the medical care procedures, as well as conducting patient examination for diagnosis establishment.	З-ОПК-4 [1] – Know: - modern diagnostic instrumental examination methods for patients, including functional, radiological, ultrasound, radionuclide diagnostics, and endoscopy; - diagnostic capabilities of instrumental examination methods; - medical devices stipulated by the procedure for providing medical care to the adult population in the "Therapy" specialty, and the equipment standard for a therapeutic room; - main medical devices stipulated by the procedures for providing medical care to the adult population in major surgical specialties, obstetrics, and gynecology; - indications for referring patients for instrumental examinations and functional diagnostics; - techniques for physical examination of patients using medical devices stipulated by procedures and considering medical care standards У-ОПК-4 [1] – Be able to: - use medical devices stipulated by the medical care procedure; - determine the required volume and content of instrumental and functional diagnostics to establish a diagnosis; - interpret results of the most common functional and instrumental diagnostic methods В-ОПК-4 [1] – Possess skills in: - using basic medical devices (stethoscope, blood pressure monitor, sphygmomanometer, pulse oximeter, height-weight scale, measuring tape, neurological hammer, scalpel, forceps, and other devices); - operating electrocardiographs and devices for measuring external respiratory function; - interpreting results of the most common functional and instrumental diagnostic methods
ОПК-6 [1] – Capable of organizing general nursing, providing primary medical care, ensuring the organization of work and making professional decisions in emergencies at the pre-hospital stage, in emergency situations, epidemics and in areas of mass destruction	З-ОПК-6 [1] – Know: - a set of measures for general nursing with diseases of various organs and systems; Signs of clinical and biological death; - indications for patient hospitalization for the most common diseases with typical progression. У-ОПК-6 [1] – Be able to: - organize care for patient when providing medical care in an outpatient setting; - determine the need for patient hospitalization; - ensure the organization of work in emergency situations, epidemics, and in mass casualty zones. В-ОПК-6 [1] – Possess skills in: - general care of a patient (general nursing); - providing first aid; - making medical decisions in emergencies at the prehospital stage, including in emergency situations, epidemics, and in mass casualty zones.
ОПК-7 [1] – Capable of prescribing treatment and monitoring its effectiveness and safety.	З-ОПК-7 [1] – Know: - pharmacological groups of medicinal drugs and their intended purposes; - mechanisms of action of pharmacological and non-pharmacological treatments, indications and contraindications for their use, side effects, and complications caused by their application; - methods for monitoring the effectiveness and safety of various treatment

	approaches. У-ОПК-7 [1] – Be able to: - make rational choices for pharmacological and non-pharmacological treatments based on clinical guidelines and in accordance with medical care standards; - develop a treatment plan for a disease or condition considering the diagnosis, age, disease course characteristics, and comorbidities, based on clinical guidelines and medical care standards; - prescribe medications, medical devices, and therapeutic nutrition considering the diagnosis, age, disease course characteristics, and comorbidities, based on clinical guidelines and medical care standards; - justify prescribed pharmacological and non-pharmacological treatments; - evaluate the effectiveness and safety of medications, medical devices, therapeutic nutrition, and other treatment methods. В-ОПК-7 [1] – Possess skills in: - administering medications through various routes of administration; - developing treatment plans for diseases or conditions considering diagnosis, age, disease course characteristics, and comorbidities; - assessing the effectiveness and safety of prescribed treatments.

Professional competencies in compliance with the goals and professional knowledge areas:

Professional activity goal	**Professional activity knowledge area**	**Professional competency code and title; Based on the professional standard, experience analysis**	**Code and title of competency-based rubrics**
medical			
Diagnostics of diseases and pathological conditions of the patients.	Individuals (patients); the population; the set of means and technologies aimed at creating conditions for preserving and strengthening the health of the adult population	ПК-3.2 [1] - Capable of conducting patient examinations to establish a diagnosis *The base:* Professional standard: 02.009	З-ПК-3.2[1] - Know: - clinical diagnosis establishment algorithm; - patient history-taking and physical examination methodology; - laboratory and instrumental research methods for health assessment to establish a diagnosis; - semiotics of diseases of different organs and systems; - structure, principles of the current International Statistical Classification of Diseases and Related Health Problems (hereinafter - ICD).; У-ПК-3.2[1] - Be able to: - conduct patient history-taking and physical examination; - interpret

			history, physical examination data, laboratory and instrumental results to recognize a condition or establish the presence/absence of a disease, establish a diagnosis; - distinguish and recognize in each specific case tissue damage, the reaction to it, and the form of adaptability; - develop a patient examination plan, justify the necessity and scope of laboratory and instrumental examination; - identify main pathological conditions, symptoms and syndromes, nosological forms in the patient according to the current ICD.; В-ПК-3.2[1] - Possess skills in: - patient history-taking and physical examination; Formulating a preliminary diagnosis; - developing a patient examination plan; Interpreting laboratory and instrumental results; - establishing a diagnosis considering the current ICD
Providing primary medical care in outpatient settings and day hospital settings.	Individuals (patients); the population; the set of means and technologies aimed at creating conditions for preserving and strengthening the health of the adult population	ПК-3.3 [1] - Able to provide primary medical care in an outpatient setting *The base:* Professional standard: 02.009	З-ПК-3.3[1] - Know: - general issues of organizing medical care for the population and organizing medical care for the adult population in outpatient settings, including at home; - features of medical care using telemedicine technologies; - Clinical picture, differential diagnosis, features of the course of the disease, complications and outcomes of internal diseases; - diagnostic criteria for the most

			common diseases of internal organs and systems; - indications for referring patients for specialist consultations according to clinical guidelines and considering relevant medical care standards; - indications for referring patients for specialized medical care in inpatient settings and day hospitals according to clinical guidelines and considering relevant medical care standards; - features of managing and treating elderly patients in outpatient settings. ; У-ПК-3.3[1] - Be able to: - perform differential diagnosis of internal diseases; - monitor the course of physiological pregnancy; - justify the need for referring patients to specialist consultations; - recognize the main and concomitant diseases; - assess disease or condition severity - the degree of organ and/or system damage or functional impairment due to the disease/condition or its complications; - determine management, examination and treatment tactics for patients with specific diseases (nosological units) depending on disease severity and condition, according to clinical guidelines and considering relevant medical care standards.; В-ПК-3.3[1] - Possess skills in: - conducting differential diagnosis with other diseases/conditions, including emergencies; - interpreting data obtained

			from patient consultations with specialists; - prescribing additional tests to clarify the diagnosis; - formulating a clinical diagnosis; - prescribing treatment according to clinical guidelines and considering relevant medical care standards.

4. PEDAGOGIC POTENTIAL OF THE COURSE

Pedagogic tracks/objectives	**Pedagogic goals (code)**
Professional education	Establishing conditions for: formation of responsibility for professional choice, professional development and professional decisions (B18)
Professional education	Establishing conditions for: formation of motivation to improve the quality of medical care to the population and the desire to follow the rules and norms of interaction between the doctor, colleagues and the patient, contributing to the creation of the most favorable environment for the patient's recovery (B34)

5. ACADEMIC COURSE STRUCTURE AND CONTENT

Academic course sections, their scope, terms of study and assessment:

No.	**Academic course section name**	**Weeks**	**Lectures/ Practical (seminars)/ Laboratory sessions, hrs.**	**Compulsory current assessment (form*, week)**	**Maximum grade per section****	**Section assessment (form*, week)**	**Competency-based rubrics**
	12 Semester						
1	Non-neoplastic pathology of the urinary tract, prostate, testicle	1-8	8/20/0	Т-4 (10),Т-5 (15)	25	Т-8	З-ОПК-4, У-ОПК-4, В-ОПК-4, З-ОПК-6, У-ОПК-6, В-ОПК-6, З-ОПК-7, У-ОПК-7, В-ОПК-7, З-ПК-3.2, У-ПК-3.2, В-ПК-3.2, З-ПК-3.3,

							У-ПК-3.3, В-ПК-3.3
2	Tumor pathology of the urinary tract, prostate, testicle	9-15	8/20/0	Т-10 (15),Т-12 (10)	25	Т-15	З-ОПК-4, У-ОПК-4, В-ОПК-4, З-ОПК-6, У-ОПК-6, В-ОПК-6, З-ОПК-7, У-ОПК-7, В-ОПК-7, З-ПК-3.2, У-ПК-3.2, В-ПК-3.2, З-ПК-3.3, У-ПК-3.3, В-ПК-3.3
	Totals for 12 Semester		16/40/0		50		
	Assessment events for 12 Semester				50	PFE	З-ОПК-4, У-ОПК-4, В-ОПК-4, З-ОПК-6, У-ОПК-6, В-ОПК-6, З-ОПК-7, У-ОПК-7, В-ОПК-7, З-ПК-3.2, У-ПК-3.2, В-ПК-3.2, З-ПК-3.3, У-ПК-3.3, В-ПК-3.3

* – abbreviated name of assessment

** – 100 maximum points per semester including a pass/fail exam and (or) an exam

Abbreviated current assessment forms and section assessment

Abbreviation	**Full name**
T	Testing
PFE	Pass/fail examination

SYLLABUS

Weeks	**Topics / Content**	**Lect., hrs.**	**Pr./sem., hrs.**	**Lab., hrs.**
	12 Semester	16	40	0
1-8	**Non-neoplastic pathology of the urinary tract, prostate, testicle**	8	20	0
1 - 2	**Introduction to the subject.**	All		

	The concept of urology: urology as a branch of medicine in which surgery is the primary treatment method; the main types of urological pathology; a brief history of urology. The contribution of Russian scientists to the development of urology; the current state of urology. Ethics and deontology in urology. Organization and provision of urological services. Achievements of modern surgical urology.	2	5	0
		Online		
		0	0	0
3 - 4	**Urolithiasis.** Etiology and pathogenesis of urolithiasis. Clinical presentation, modern clinical, laboratory, and instrumental examination methods. Surgical and endoscopic treatment methods. Lithotripsy. Conservative treatment and prevention.	All		
		2	5	0
		Online		
		0	0	0
5 - 6	**Kidney and urinary tract anomalies.** The etiology and pathogenesis of kidney and urinary tract anomalies. The clinical presentation of the disease, modern clinical, laboratory, and instrumental examination methods, treatment options, and indications for their use. Tactics principles at various stages of treatment.	All		
		2	5	0
		Online		
		0	0	0
7 - 8	**Prostate diseases. BPH.** The main stages of prostate hyperplasia (adenoma) pathogenesis, clinical manifestations of the disease, stages of prostate hyperplasia (adenoma), diagnosis of prostate hyperplasia (adenoma) and its complications, conservative, instrumental, and surgical treatment. Acute urinary retention, treatment tactics	All		
		2	5	0
		Online		
		0	0	0
9-15	**Tumor pathology of the urinary tract, prostate, testicle**	8	20	0
9 - 10	**Prostate cancer.** Etiology, pathogenesis, clinical picture, course, and outcomes of prostate cancer. Diagnosis of various forms of prostate cancer using modern diagnostic methods; Conservative treatment methods and indications for surgical treatment of prostate cancer. Survival prognosis. Prostate-specific antigen and its significance.	All		
		2	5	0
		Online		
		0	0	0
11 - 12	**Tumors of the kidney, renal pelvis, and ureter.** TNM Classification. Symptoms of kidney cancer and renal pelvis cancer, principles of diagnosis and treatment of these diseases; a sense of oncological alertness. Survival prognosis; patient follow-up.	All		
		2	5	0
		Online		
		0	0	0
13 - 14	**Bladder tumors.** Etiology and pathogenesis of bladder tumors. Clinical presentation, modern clinical, laboratory, and instrumental examination methods, treatment options, and indications for their use. Tactics at various stages of treatment	All		
		2	5	0
		Online		
		0	0	0
15	**Tumors of the testicles and penis.** Etiology and pathogenesis of testicular tumors. Clinical symptoms of testicular tumors. Modern diagnostic methods for testicular tumors and treatment principles at different stages. Etiology and pathogenesis of penile cancer. Clinical symptoms of penile cancer. Modern diagnostic methods for penile cancer and treatment principles at different stages.	All		
		2	5	0
		Online		
		0	0	0

Abbreviated names of online options:

Abbreviation	Full name
EC	E-course
FtM	Full-text material
FtL	Full-text lectures
VM	Video materials
AM	Audio materials
Prs	Presentations
T	Tests
ERM	E-reference materials
IS	Interactive site

PRACTICAL SESSIONS TOPICS

Weeks	Topics / Content
	12 Semester
1	**Semiotics of urological diseases.** Three groups of symptoms of pathological processes of the urinary system: pain, urination disorders, and qualitative and quantitative changes in urine. To study the characteristic sequence of symptoms of an objective urological examination of diseases, the patient, the methodology and qualitative and quantitative changes in urine in diseases, functional studies of the kidneys and urinary tract, instrumental, radiological, and isotopic examination methods.
2	**Instrumental examination methods for urological patients.** Instrumental and endoscopic examination methods in urology. Catheters: soft rubber – Nelaton and Timan, elastic – Mercier, Foley, and curved metal for men and women, ureteral catheters No. 3-4-6-8-12, external and internal stents. Curved, metal, elastic, and combined urethral bougies and their purposes. Cystoscopes: viewing or irrigation and flushing. Single- and double-ended catheterization, surgical, cystolithotriptor, resectoscope. Instrument sets according to the Charrière scale, basic design. Sterilization, insertion technique. Cystoscopy, its diagnostic capabilities, normal cystoscopic appearance of the bladder, purposes of other cystoscopes. Ultrasound and radiation diagnostic methods in urology. Urodynamics. Uroflowmetry. The use of radiographic examination methods in the diagnosis of urological diseases and the interpretation of radiographic images obtained using various methods. A description of examination techniques and a list of the most common contrast agents used for radiographic and radioisotope examinations. Complications arising from excretory urography.
3	**Benign prostatic hyperplasia.** Etiology and pathogenesis: hormonal theory, impaired dihydrotestosterone metabolism in prostate cells, the role of various 5-alpha-reductase isoenzymes and growth factors in the pathogenesis of prostatic hyperplasia. Disease classification: disease stages. Clinical course of prostatic hyperplasia. Choice of therapy for patients with prostatic hyperplasia. Drug treatment with 5-alpha-reductase inhibitors, selective alpha-1-adrenergic blockers, and their combination. Minimally invasive treatments for prostatic hyperplasia: transurethral microwave thermotherapy, the use of various types of laser energy, and others. Surgical treatment: indications for transurethral, transvesical, and retropubic adenomectomy, cystostomy. Transurethral adenomectomy. Retropubic adenomectomy. Transvesical adenomectomy. Cystostomy. Acute urinary retention. Treatment for acute urinary retention includes bladder catheterization, suprapubic bladder puncture, trocar and traditional cystostomy. Complications of benign prostatic hyperplasia include bladder stones, cystitis, pyelonephritis, and renal failure. Complication prevention. Follow-up care for patients with

	benign prostatic hyperplasia.
4	**Urogenital tract infection. Pyelonephritis. Urinary tract tuberculosis.** Non-obstructive (primary) and obstructive (secondary) pyelonephritis. Gestational pyelonephritis. Cystitis: acute and chronic. Epididymitis. Prostatitis. Prostate abscess. Vesiculitis. Urethritis. Balanitis, balanoposthitis. Collection of complaints and anamnesis, physical examination of the patient with a UTI. Laboratory and instrumental examination and evaluation of results. Indications for conservative and surgical treatment. Disease prevention and follow-up. Palpation of the kidneys, examination of the male reproductive organs. Tuberculosis of the kidneys and urinary tract (secondary tuberculosis). Etiology. Routes of entry and spread of infection, pathogenesis. Pathological anatomy. Symptoms of tuberculosis of the kidneys and urinary tract. Diagnosis: clinical, laboratory. Tuberculin diagnostics - indications and contraindications, evaluation. Ultrasound and radiological diagnostics (clinical and radiological forms of renal tuberculosis), endoscopic diagnostics with bladder biopsy, morphological diagnostics. Complications of tuberculosis of the kidneys and urinary tract. Differential diagnostics. Treatment: chemotherapy and surgery, indications and contraindications. Tuberculosis of the reproductive system: tuberculosis of the epididymis, prostate, seminal vesicles. Routes of penetration and spread of infection. Pathological anatomy. Clinical picture. Diagnostics: laboratory and morphological. Treatment: conservative and surgical.
5	**Urolithiasis.** Collection of complaints and anamnesis, physical examination of a patient with urolithiasis. Laboratory and instrumental examination, interpretation of results. Morphology and chemical composition of stones. Modern mineralogical classification. Renal colic and its differential diagnosis. Indications and contraindications for conservative treatment of kidney and ureteral stones. Medication and physiotherapy aimed at spontaneous passage of stones. Urate nephrolithiasis and its treatment. Shock wave lithotripsy. Indications and contraindications. Indications and contraindications for surgical treatment. Diet therapy and drug prevention of recurrent stone formation. Bladder stones. The role of stasis and infection in the genesis of bladder stones. Symptoms, ultrasound, endoscopic, and radiographic diagnostics. Prevention of bladder stones.
6	**Hydronephrosis and anomalies of the kidneys and urinary tract.** Etiology and pathogenesis of hydronephrosis. Stenosis of the ureteropelvic junction as a primary cause of hydronephrosis. The role of accessory renal vessels in the development of the disease. Primary and secondary hydronephrosis. Symptoms and complications of the disease: pain, palpable mass, hematuria, pyelonephritis, nephrolithiasis. Diagnosis. Radiographic examinations: excretory urography, retrograde ureteropyelography, angiography. Renal ultrasound. Radioisotope methods for renal examination. Differential diagnosis with renal tumor, nephroptosis and polycystic kidney disease, and tumors of the abdominal organs. Conservative and surgical treatment of patients with hydronephrosis: medication, dilation of the ureteropelvic junction, transcutaneous endoscopic and traditional plastic surgeries for hydronephrosis. Principles of diagnostic procedures for ureteropelvic junction stenosis. Disease prognosis. Renal anomalies: diagnostic methods include palpation, functional tests, excretory urography, angiography, ultrasound, and computed tomography. Types of kidney anomalies: anomalies of quantity - aplasia, hypoplasia, third accessory kidney, duplication of the kidney with a split and double ureter, anomalies of position - homolateral dystopia (pelvic, iliac, lumbar, thoracic), heterolateral dystopia (with fusion, without fusion), anomalies of the relationship of fused kidneys - symmetrical (horseshoe kidneys, gall-shaped kidneys), asymmetrical (L-shaped kidneys, S-shaped kidneys), anomalies of structure - polycystic kidneys, solitary cysts (serous, dermoid, blood), multicystic kidneys, anomalies of the structure of the medulla - tubular dilation, spongy kidney, megacalyx, megacalycosis,

	ectopia calyx. Ureteral anomalies: achalasia, ureterocele, ectopia. Bladder anomalies. Diagnostic methods: cystography, cystoscopy, examination. Types of bladder anomalies: exstrophy, diverticula, double bladder, urachus fistula. Male urethral anomalies. Diagnostic methods: urethrography, urethroscopy, examination. Types of urethral anomalies: urethral atresia, urethral diverticulum, urethral duplication, paraurethral tracts, hypospadias (glans penis, scrotal, perineal, total), epispadias. Penile anomalies. Scrotal anomalies. Diagnostic methods: palpation, examination, hormonal profiling. Types of anomalies of the scrotum organs: monorchism, anorchism, cryptorchidism, ectopia testis
7	**Urology emergency. Renal colic. Acute urinary retention. Hematuria. Anuria. Acute renal failure.** Renal colic. Etiology and pathogenesis of renal colic. Symptomatology. Urinalysis in colic. The role of renal ultrasound in the diagnosis of renal colic. The diagnostic value of chromocystoscopy. The role of radiographic examination of the kidneys in the diagnosis of colic. Possible complications (pyelonephritis, hydronephrotic transformation, etc.). Differential diagnosis with acute abdominal diseases. Treatment measures for renal colic: heat, antispasmodics, analgesics, Lorin-Epstein block, ureteral catheterization. Acute urinary retention. Etiology and pathogenesis of acute urinary retention. Causes of ischuria. Clinical symptomatology. Differential diagnosis with anuria. First aid depending on the cause of acute urinary retention: bladder catheterization, bladder puncture, epicystostomy, surgery to eliminate the cause of ischuria - urethrolithotomy, adenomectomy, etc. Hematuria. Types of hematuria: macrohematuria, microhematuria, initial, terminal, and total. Determining the source of hematuria depending on its type. Physician's approach to hematuria. The role of cystoscopy in total macrohematuria. Research methods for determining the cause of hematuria: three-glass test, urine analysis before and after physical activity, ultrasound of the kidneys and bladder, computed tomography, renal angiography, etc. Anuria. Its types: arenal, prerenal, renal, and subrenal. The role of renal ultrasound in recognizing the type of anuria. The role of purine metabolism disorders in the development of subrenal anuria. Differential diagnosis between ischuria and anuria. The use of instrumental and radiographic examination methods in recognizing the type of anuria: plain imaging of the urinary tract, ureteral catheterization, retrograde ureteropyelography. Indications for conservative and surgical treatment. Acute renal failure. Causes (poisoning, septic abortion, eclampsia, transfusion of incompatible blood, TUR syndrome, crush syndrome, acute blood loss, acute nephritis). Stages of acute renal failure (shock, oliguria, polyuria, recovery) and their characteristics. Therapy, principles of body detoxification. Conservative therapy. Types of dialysis, indications for hemodialysis and peritoneal dialysis. Outcome criteria for acute renal failure.
8	**Urogenital injuries. Injuries to the kidneys, ureters, bladder, and urethra. Injuries to the penis and scrotal organs.** Kidney injuries. Closed and open kidney injuries. Pathogenesis. The role of the hydraulic effect in kidney injury. Classification: contusions, ruptures, and avulsion of the kidney from its pedicle. Symptomatology. Determining the functional state of the contralateral kidney. Ultrasound and excretory urography in kidney injury. Indications for renal angiography: significant hematuria, the presence of a retroperitoneal hematoma, concomitant injuries to other organs and systems, and the absence of R-contrast excretion by the injured kidney. Treatment. Indications for surgical treatment of kidney injury: profuse bleeding, a large retroperitoneal hematoma, or its expansion. Types of surgical treatment: renal parenchyma suturing, partial nephrectomy, and nephrectomy. Complications of kidney injury: arterial hypertension, hydronephrotic transformation, pyelonephritis.

	Ureteral injuries. Closed injuries. Ureteral injuries in obstetrics and gynecology. Symptomatology. Diagnosis. Prevention of injuries during gynecological surgery: preoperative knowledge of the upper urinary tract, ureteral catheterization before major surgeries, intravenous indigo carmine solution if injury is suspected during surgery. Treatment. Complications Bladder injury. Types of injuries. Pathogenesis of extraperitoneal and intraperitoneal bladder ruptures. Combined trauma. Symptomatology of extraperitoneal and intraperitoneal ruptures. Diagnostic value of retrograde cystography and "delayed" cystography. Treatment of intraperitoneal ruptures: laparotomy, bladder wound suturing, abdominal drainage, epicystostomy in men, and bladder drainage using a urethral catheter in women. Pathogenesis of extraperitoneal bladder ruptures. They are often associated with pelvic bone trauma. Treatment of patients with extraperitoneal rupture: cystotomy, rupture suturing, epicystostomy. Urethral trauma. Pathogenesis. Mechanism of injury. Role of pelvic bone damage. Symptomatology. Diagnosis. Importance of urethrography and treatment. Indications for primary urethral suturing. Importance of bladder drainage and urohematoma. Consequences of urethral trauma. Surgical treatment of urethral stricture. Injuries to the scrotum and its organs. Open and closed scrotal injuries. Symptomatology. The role of ultrasound in diagnosing testicular injury. Organ-preserving surgical treatment and scrotal drainage. Indications for testicular removal. Scrotal reconstruction after complete rupture ("scalping"). Penile injury. Types of lesions. Clinical presentation. Symptomatology. Treatment. Organ-preserving surgery
9 - 10	**Prostate Cancer.** Etiology and pathogenesis. Pathological anatomy. Clinical course. Disease stages. Prostate cancer metastasis, types of metastases. Prostate cancer diagnosis (clinical, laboratory, X-ray, radiological). Prostate biopsy (transrectal and perineal). Differential diagnosis (benign prostatic hyperplasia, prostate stones, chronic prostatitis, prostate tuberculosis, bladder cancer). Indications for surgical treatment: prostatectomy, transurethral and intravesical electroresection, prostate cryosurgery. Castration, testicular enucleation. Conservative treatment methods. Estrogen therapy: general principles, possible complications. Primary and secondary tumor resistance to estrogens. Treatment with antiandrogens. Determining hormonal saturation for therapy. Short-term and long-term treatment results. The role of preventive health examinations.
11 - 12	**Tumors of the kidney, renal pelvis, and ureter.** Prevalence, etiology, and pathogenesis. Pathological anatomy of kidney tumors. Tumors of the renal parenchyma, renal pelvis, and ureter. Renal parenchymal tumors - malignant and benign. Wilms tumor. International classification according to the TNM system. Clinical symptoms of kidney cancer. Renal (hematuria, pain, palpable mass) and extrarenal (hyperthermia, arterial hypertension, varicocele, erythrocytosis, amyloidosis, enteropathy) symptoms. Paraneoplastic syndromes (nephrotic, osteoarticular, myopathic, Stauffer syndrome). Hematogenous and lymphogenous metastasis in kidney cancer. Diagnosis of kidney tumors. The role of ultrasound as a screening test in recognizing space-occupying kidney diseases and as a method of routine population examination. Diagnostic capabilities of survey and excretory urography. The role of computed tomography in establishing the diagnosis and prevalence of the process. Comprehensive vasographic examination of kidney tumor and the significance of the information obtained for choosing a surgical approach and planning the operation. Angio-nephroscintigraphy as a method for assessing the functional state of the cancerous and contralateral kidney. Magnetic resonance imaging in the diagnosis of kidney tumor. Differential diagnosis with solitary cyst, multilocunar cystic renal cell tumor, cystic nephroma, xanthogranulomatous pyelonephritis, echinococcosis. Features of ultrasound, computed tomography, magnetic resonance imaging, and angiography data in

	differential diagnosis. The role of renal puncture biopsy under ultrasound or computer monitoring. Treatment. Oncology requirements for kidney cancer. Types of surgeries: radical nephrectomy, organ-preserving surgeries (nephrectomy, tumor enucleation). Indications for organ-preserving surgeries (bilateral cancer, cancer of a solitary kidney, cancer of one kidney and disease of the other kidney in the presence of chronic renal failure). Radiation therapy for metastases to the retroperitoneal nodes, for bone metastases. Chemotherapy for lung metastases. The role of immunotherapy in kidney cancer. Renal artery embolization as a method for stopping bleeding in inoperable patients. Clinical follow-up of patients undergoing surgery for kidney cancer. Features of diagnosis and treatment of patients with renal pelvis cancer. The role of excretory urography, retrograde pyelography, ultrasound in the differential diagnosis of renal pelvis cancer and radiolucent calculi. The importance of urine sediment analysis in the differential diagnosis of renal pelvis cancer. The scope of the surgery (nephroureterectomy with bladder resection at the ureteral orifice, regional lymphadenectomy). Patient follow-up, need for regular cystoscopies.
13 - 14	**Bladder Tumors.** Prevalence. Etiology and Pathogenesis. Malignant and Benign Epithelial Neoplasms of the Bladder. Soft Tissue Tumors of the Bladder. Symptoms. International TNM Classification System. Bladder Tumor Diagnosis: Ultrasound (transabdominal, transrectal, endovesical). Cystoscopy as an initial and emergency examination for total painless hematuria, biopsy. Radiographic methods: plain and excretory urography, cystography, polycystography, pelvic arterio- and venography. The role of computed tomography in determining the extent of the disease. Treatment. TURBT for T1-2N0M0. The importance of a bladder wall biopsy from the transurethral resection area to determine the radicality of the operation and "step" biopsies to determine the risk of bladder cancer recurrence. Bladder resection with and without ureterocystostomy, endovesical resection. Cystectomy and its indications. Urine diversion techniques (creation of an artificial bladder, ureteral transplantation into continuous bowel, into an isolated bowel segment, onto the skin, transureteral anastomosis with unilateral nephrostomy, bilateral nephro- and pyelostomy). The role of intravesical chemotherapy and immunotherapy (BCG) in the treatment of bladder cancer and its recurrence prevention. Radiation therapy for bladder cancer. The role of control cystoscopies in the clinical follow-up of patients. Prognosis
15	**Tumors of the testicles and penis.** Testicular tumors. Pathological anatomy. Classification. International classification according to the TNM system. Modern methods for diagnosing testicular tumors and their metastases. Treatment: surgery, radiation therapy, chemotherapy. Tumors of the epididymis. Diagnosis and treatment. Penile tumors. Pathological anatomy. International classification according to the TNM system. Etiology, clinical course, diagnosis, and treatment methods.

6. EDUCATIONAL TECHNOLOGIES

The course is taught using methods based on modern advances in science and information technology in education. These methods are aimed at improving the quality of specialist training by developing students' creativity and independence. For this purpose, both traditional teaching methods (lectures, clinical practical classes) and interactive seminars and clinical case studies are used:

- training-based practical classes (clinical case studies, cases, role-playing in the form of clinical case studies or patient supervision);
- interactive clinical case studies with patient demonstrations;

- engaging students in preclinical and clinical research, preparing presentation materials, reports, essays, or papers.

7. ASSESSMENT TOOLKIT

The assessment toolkit ensures verification of the intended learning outcomes achievement (competency-based rubrics) using current, midterm and interim assessment of the course.

The link between developed competencies and their assessment is presented in the following table:

Competency	**Achievement rubrics**	**Assessment activity (Syl 1)**
ОПК-4	З-ОПК-4	PFE, T-8, T-15, T-5, T-4, T-10, T-12
	У-ОПК-4	PFE, T-8, T-15, T-5, T-4, T-10, T-12
	В-ОПК-4	PFE, T-8, T-15, T-5, T-10, T-12
ОПК-6	З-ОПК-6	PFE, T-8, T-15, T-5, T-4, T-10, T-12
	У-ОПК-6	PFE, T-8, T-15, T-5, T-4, T-10, T-12
	В-ОПК-6	PFE, T-8, T-15, T-5, T-4, T-10, T-12
ОПК-7	З-ОПК-7	PFE, T-8, T-15, T-5, T-4, T-10, T-12
	У-ОПК-7	PFE, T-8, T-15, T-5, T-4, T-10, T-12
	В-ОПК-7	PFE, T-8, T-15, T-5, T-10, T-12
ПК-3.2	З-ПК-3.2	PFE, T-8, T-15, T-5, T-4, T-10, T-12
	У-ПК-3.2	PFE, T-8, T-15, T-5, T-4, T-10, T-12
	В-ПК-3.2	PFE, T-8, T-15, T-5, T-4, T-10, T-12
ПК-3.3	З-ПК-3.3	PFE, T-8, T-15, T-5, T-4, T-10, T-12
	У-ПК-3.3	PFE, T-8, T-15, T-5, T-4, T-10, T-12
	В-ПК-3.3	PFE, T-8, T-15, T-5, T-4, T-10, T-12

Educational achievement rubrics scales

The scale of each assessment activity varies from 0 to the maximum established point, inclusive. The final assessment of the course is performed on a 100-point scale and represents the sum of the points earned by the student in the section assessments, framework of current and interim assessment.

Sections and interim assessments are considered passed when the student achieves a minimum score equal to 60% of the maximum. The final grade is assigned only upon passing all sections and the interim assessment.

The final grade is assigned in accordance with the following scale:

<table>
<tr><th>Total score</th><th>Rating on a 4-point scale</th><th>Pass/fail examination</th><th>ECTS assessment</th></tr>
<tr><td>90-100</td><td>5 – «excellent»</td><td rowspan="6">«pass»</td><td>A</td></tr>
<tr><td>85-89</td><td rowspan="3">4 – «good»</td><td>B</td></tr>
<tr><td>75-84</td><td>C</td></tr>
<tr><td>70-74</td><td rowspan="2">D</td></tr>
<tr><td>65-69</td><td rowspan="2">3 – «satisfactory»</td></tr>
<tr><td>60-64</td><td>E</td></tr>
<tr><td>below 60</td><td>2 – «fail»</td><td>«fail»</td><td>F</td></tr>
</table>

An “excellent” grade indicates a deep and solid mastery of the program material by a student who presents their answers consistently, clearly, and logically, is able to closely link theory with practice, and uses materials from monographic literature in their answers.

A “good” grade corresponds to a student’s solid knowledge of the material, who presents their answers competently and to the point, without any significant inaccuracies.

A “satisfactory” grade corresponds to the basic level of mastery of the material by the student, in which the main material has been mastered, but its details have not been assimilated, the answers contain inaccuracies, insufficiently correct wording and logical inconsistencies.

A grade “pass” corresponds to at least a basic level of mastery of the program material, in which the student possesses the necessary knowledge, skills, and abilities, and is able to apply theoretical principles to solve typical practical problems.

A grade “fail” is given to a student who lacks a significant understanding of the curriculum material, makes significant errors in their answers, or fails all required assignments. These students are generally unable to continue their studies without additional classes.

8. ACADEMIC COURSE EDUCATIONAL, METHODOLOGICAL AND INFORMATIONAL SUPPORT

CORE READING:

1. ЭИ К63 Урология : учебник, Комяков Б.К., Москва: ГЭОТАР-Медиа, 2022

2. ЭИ Г 55 Урология. От симптомов к диагнозу и лечению. Иллюстрированное руководство : учебное пособие, Аляев Ю.Г., Газимиев М.А., Глыбочко П.В., Москва: ГЭОТАР-Медиа, 2021

3. ЭИ К 75 Факультетская хирургия : учебник для вузов, Мовчан К. Н. [и др.], Москва: Юрайт, 2024

4. ЭИ Х 50 Хирургические болезни : , , Москва: ГЭОТАР-Медиа, 2022

FURTHER READING:

1. ЭИ H99 Interventional Urology : , , Cham: Springer International Publishing, 2016

2. ЭИ P90 Practical Functional Urology : , , Cham: Springer International Publishing, 2016

3. ЭИ R67 Robotic Urology : , , Berlin, Heidelberg: Springer Berlin Heidelberg,, 2008

4. ЭИ У74 Клинические нормы. Нефрология : справочник, Гуранова Н.Н., Усанова А.А., Москва: ГЭОТАР-Медиа, 2020

5. ЭИ У 71 Урология. Стандарты медицинской помощи : Серия "Стандарты медицинской помощи", , Москва: ГЭОТАР-Медиа, 2016

SOFTWARE:

No special softwares is required

LMS AND ONLINE RESOURCES

https://online.mephi.ru/

http://library.mephi.ru/

9. LOGISTICAL SUPPORT

1. Демонстрационные модели мечеполовой системы (64-403)

2. Фантом мужской промежности для катетеризации мочевого пузыря (64-301)

3. Фантом женской промежности для катетеризации мочевого пузыря (64-301)

4. Катетеры Фолея и Нелатона (64-301)

5. Персональный компьютер: Процессор CPU Intel Core i7-8700 (3.2GHz/12MB/6 cores) Материнская плата Gig (Клиническая база)

6. Мышь, клавиатура (Клиническая база)

7. Проектор SMART P109 (Клиническая база)

8. Кушетка медицинская (Клиническая база)

9. Иное оснащение, предусмотренное порядками оказания медицинской помощи по соответствующему профилю (Клиническая база)

10. EDUCATIONAL AND METHODOLOGICAL RECOMMENDATIONS FOR STUDENTS

Before you begin studying the topic, you need to familiarize yourself with the main questions of the practical lesson plan and the list of recommended literature.

When preparing for a practical lesson, you should first review lecture notes, textbook sections, and teaching aids to gain a general understanding of the topic's place and significance in the course being studied. Then, consult additional literature and take notes on the recommended sources.

In the process of studying the recommended material, it is necessary to understand the structure of the topic being studied, identify the main points, follow their logic and thereby delve into the essence of the problem being studied.

It is necessary to keep records of the material being studied in the form of notes, which, along with visual memory, also includes motor memory and allows for the accumulation of an individual fund of auxiliary materials for the rapid repetition of what has been read, for the mobilization of accumulated knowledge.

Clinical practical classes

The most important stage of the practical lesson is the students' independent work on mastering practical skills: in-simulated conditions, at the patient's bedside, in the functional diagnostics room, etc.

Depending on the specific topic of the lesson, the student independently (or under the supervision of the teacher) questions the patient, conducts a clinical examination, is present during instrumental diagnostics and studies the results of additional studies, summarizes the data, presents it in the form of fragments of the medical history and reports the results to the teacher.

Achievements are assessed individually for each student, based on the degree of development of practical skills and their theoretical foundations.

Clinical case studies of specific patients are conducted for the entire group or through students' participation in clinical case studies and periodic scientific and practical conferences at the medical institutions where their practical training takes place. During these case studies, the instructor evaluates each student's active participation and clinical reasoning skills.

Solving situational problems proposed by the teacher, which develop clinical thinking and force the student to use knowledge gained in various subjects of the specialty.

Active and interactive forms of conducting classes are widely used in the educational process (work in small groups, activation of creative activities, use of computer training programs, conference classes).

The teacher supervises the students' independent work, preparation of abstracts, research and development work, work with the patient together with the teacher, interpretation of data from additional research methods, and completion of medical documentation.

Basic note-taking forms: outline (simple and detailed), excerpts, and abstracts. During preparation, it is important to compare sources, consider the material being studied, develop an action plan, and carefully consider your oral presentation.

Recommendations for preparing for the test.

Test – 10-15-20-25 points. Each question – 1 (2) point.

TOPICS: Specified in each specific section

Answer requirements: A clear, detailed answer (2 points/question) or a choice of the correct answer to the test question (1 point/question).

Recommendations for preparing for a test/exam

Response requirements and evaluation criteria:

An "excellent" grade of 45-50 points on a test/exam is awarded for: a correct, complete, and logically constructed answer; the ability to use specialized terminology; the ability to illustrate theoretical principles with practical material.

A "good" grade of 35–44 points on the exam is awarded for: a correct, complete, and logically constructed answer with minor errors or inaccuracies; the ability to use specialized terminology, but incomplete conclusions or generalizations are made.

A “satisfactory” grade of 30–34 points on the exam is given for: a schematic, incomplete answer; inability to use special terms or ignorance of them; with one serious error;

An "unsatisfactory" grade of <30 points on the exam is given for: answering all questions on the ticket with serious errors; inability to use specialized terminology; inability to give examples of the practical use of scientific knowledge.

Admission to the exam in a discipline is granted based on a score of over 30 points.

A student can earn between 30 and 50 points per semester.

The minimum score for an exam answer is 30, the maximum is 50.

11. EDUCATIONAL AND METHODOLOGICAL RECOMMENDATIONS FOR TEACHERS

During practical classes, students are monitored for their assimilation of lecture material, patients are supervised, and practical skills are monitored.

To demonstrate and train practical skills, visual aids, surgical instruments, training devices, simulators of devices, or demonstrations of ophthalmological manipulations in real conditions are used. To assess their clinical thinking abilities, students are offered situational problems, clinical histories, test assignments, case studies, and attendance at medical conferences, consultations, and scientific symposia.

A key stage of the practical lesson is students' independent work on mastering practical skills: in-simulated conditions, at the patient's bedside, in the functional diagnostics room, etc. Depending on the specific lesson topic, the student independently (or under the instructor's supervision) interviews the patient, conducts a clinical examination, is present during instrumental diagnostics, and studies the results of additional studies, summarizes the data, presents it as fragments of the patient's medical history, and reports the results to the instructor.

Achievements are assessed individually for each student, based on the degree of development of practical skills and their theoretical foundations.

Clinical case studies of specific patients are conducted for the entire group or through students' participation in clinical case studies and periodic scientific and practical conferences at the medical institutions where their practical training takes place. During these case studies, the instructor evaluates each student's active participation and clinical reasoning skills.

Solving situational problems proposed by the teacher, which develop clinical thinking and force the student to use knowledge gained in various subjects of the specialty.

Active and interactive learning methods are widely used in the educational process (work in small groups, stimulating creative activity, using computer-based learning programs, and conference sessions).

In the theory of urology, this includes a clear definition of the disease, knowledge of the etiology and pathogenesis, clinical features, symptoms, principles of diagnosis, complications, differential diagnosis and treatment, and the specific features of the disease's course.

In the practice of urology, this includes mastering physical, laboratory, functional, and instrumental examination methods; practical skills in the most common medical procedures and surgeries; and maintaining medical records.

a) Provide students with the fundamentals of theoretical knowledge and practical skills in urology through a clinical analysis of symptomatology and examination methods: physical, instrumental, and radiographic. Functional, radioisotope, and

b) demonstrate and perform basic urological examination methods with students (palpation, percussion, rectal examination of the prostate (REP), bladder catheterization)

c) conduct case studies with students, analyzing the etiopathogenesis, clinical picture, diagnosis, and treatment methods of diseases such as acute and chronic pyelonephritis, kidney and urinary tract malformations, urolithiasis, congenital hydronephrosis and ureterohydronephrosis, nephroptosis, tuberculosis of the urinary tract, benign prostatic hyperplasia and prostate cancer, and kidney and bladder tumors.

d) pay special attention to the early diagnosis of specific diseases and neoplasms of the genitourinary system;

d) familiarize students with the most common diseases and injuries of the urinary tract, and malformations of this system in children.

e) teach students how to identify clinical markers of urinary tract pathology and indications for urinary tract screening. g) To familiarize students with the most informative methods of in-depth additional examination of the urinary tract, their complexities, risks, and cost-effectiveness.

To teach students the indications for referring patients for in-depth nephrourological examination at a specialized hospital.

h) To familiarize students with the basic methods of surgical treatment of urological pathology. To teach students the optimal timing for referring patients for surgical treatment and the late complications that prehospital physicians may encounter.

i) To provide the necessary knowledge on disability assessments, issuing sick leave certificates, and referrals to the Medical and Social Expertise Commission.

The instructor supervises students' independent work, preparation of essays, research projects, collaborative work with the patient, interpretation of additional research data, and completion of medical documentation.

Working with educational literature is considered a type of academic work and is completed within the hours allotted for its study. Each student is provided with access to the electronic library collections of the institute and department. Students' training helps them develop skills in interacting with patients, taking ethical and deontological principles into account.

Independent work helps develop skills in working with patients, working with literature, analytical thinking, documentation skills, accuracy, and discipline.

Students' initial knowledge level is determined by testing, and ongoing assessment of their understanding of the subject is determined by oral questioning during classes, clinical case studies, solving typical situational problems, and answering test questions.

At the end of each course, students undergo midterm and final assessments, including quizzes, practical skills assessments, and solving situational problems.

Grading and criteria for tests, extended quizzes, homework, and the final test:

1) - Tests are graded according to the following scale: 1 point for every 1 correct answer. A student who has not started the work receives -1 point.

2) - Extended quizzes are graded according to the following scale: complete answer -2 points, incomplete answer -1 point, no answer -0 points, and a student who has not started the work receives -2 points.

3) - Homework must be completed by all students to be eligible for the final assessment. Late submissions will result in a -1 point deduction from the final score.

4) - Presentation report grading criteria. Recalculation from a 100-point to a 10 (5)-point system.

5) - Essay grading criteria. Maximum 10 points. Possibly upgraded to a 5-point system.

10 points are awarded if all abstract writing requirements are met: the problem is identified and its relevance justified, a brief analysis of the issue is provided and a logical position is presented, conclusions are formulated, the article is fully analyzed, the length is maintained, and formatting requirements are met.

9 points are awarded if the following abstract writing requirements are met: the problem is identified and its relevance justified, a brief analysis of the issue is provided and a logical position is presented, conclusions are formulated, the article is fully analyzed, but the length and formatting requirements are not met.

8 points – the basic abstract requirements are met, but some shortcomings are present. Specifically, there are inaccuracies in the presentation of the material; there is a lack of logical consistency in the judgments; the abstract is not within the specified length; and there are omissions in the formatting. 7 points – the basic abstract requirements are met, but the following shortcomings are present: there are inaccuracies in the presentation of the material; there is no logical consistency in the judgments; conclusions are not formulated, the abstract is not within the scope of the abstract; there are omissions in the formatting.

6 points – there are significant deviations from the abstracting requirements; the topic is only partially covered; there are factual errors in the abstract content, conclusions and a personal point of view on the problem are missing.

5 points – there are significant deviations from the abstract requirements: the topic is only partially covered; there are factual errors in the presentation of materials and methods, conclusions and a personal point of view on the problem are missing, the format is not maintained.

4 points – there are significant deviations from the abstract requirements: the relevance of the topic is not disclosed; Factual errors were made in the presentation of materials and methods, conclusions and personal perspective on the problem are missing, and the format is not followed.

3 points – there is no analysis of the relevance of the research topic, approaches, and methods used, although the formal length of the abstract is met.

2 points – the abstract topic is not covered, revealing a significant misunderstanding of the problem. However, the abstract length and formal requirements are met.

1 point – the abstract topic is not covered, revealing a significant misunderstanding of the problem.

0 points – the student did not submit an abstract.

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