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

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ACADEMIC COURSE OUTLINE

ТРАВМАТОЛОГИЯ И ОРТОПЕДИЯ / TRAUMATOLOGY, ORTHOPEDICS

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**
10	3	108	16	40	0		16	0	Ex
9	2	72	10	20	0		42	0	PFE
Total	5	180	26	60	0	60	58	0	

ABSTRACT

The discipline program is compiled based on the requirements of the specialist degree program. A graduate (Physician-Therapist) must be prepared to solve problems of diagnosis, treatment, and prevention of diseases. In the process of mastering the discipline, students acquire knowledge, skills, and abilities for diagnosing the most common traumatic injuries and diseases of the musculoskeletal system, managing trauma and orthopedic patients, and selecting optimal treatment and prevention methods for traumatological diseases.

1. ACADEMIC COURSE GOALS AND OBJECTIVES

Goal:

Formation of competencies in the diagnosis, treatment, and prevention of major traumatological and orthopedic diseases.

Objectives:

• To form a system of knowledge on the etiology, pathogenesis, clinical presentation, diagnostic methods, treatment, and prevention of common musculoskeletal disorders and injuries.

• To develop readiness to identify major pathological conditions, symptoms, syndromes, and nosological forms of musculoskeletal injuries and diseases, and to formulate a preliminary diagnosis.

• To develop abilities and skills to formulate examination and treatment plans for trauma and orthopedic conditions, and to interpret results of additional investigations in accordance with clinical guidelines to establish a diagnosis.

• To develop the ability to provide medical care upon identifying signs of urgent and life-threatening conditions.

• To develop abilities and skills to select rational pharmacological, non-pharmacological, and other treatment types for musculoskeletal diseases and injuries, considering severity and following clinical guidelines; to evaluate treatment effectiveness and safety.

• To develop abilities and skills to implement medical rehabilitation programs, conduct preventive measures aimed at preventing musculoskeletal diseases, injuries, complications, and relapses.

• To develop clinical thinking, the ability to work with scientific literature, regulatory documents in traumatology and orthopedics, and to maintain medical documentation.

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

The discipline is part of the core curriculum. It is based on knowledge, skills, and abilities acquired from studying Anatomy, Physiology, Cytology, Embryology, Topographic Anatomy, Operative Surgery, Medical Microbiology, Virology, Immunology, Pharmacology, Internal Medicine Propaedeutics, Radiology, General Surgery, and faculty courses in Internal and Surgical Diseases.

The acquired competencies are necessary for the subsequent successful study of Polyclinic Therapy, Hospital Courses in Internal and Surgical Diseases, Surgical Profile Internship, "Polyclinic Practice," and other clinical disciplines.

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			
Providing medical care to patients in urgent and emergency forms.	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-3.1 [1] - Able to provide medical care to patients in urgent or emergency forms *The base:* Professional standard: 02.009	З-ПК-3.1[1] - Know: - clinical signs of sudden cessation of breathing, circulation, loss of consciousness, life-threatening mental disorders for the patient or others; - indications for external defibrillation; - principles of external electro-impulse therapy (defibrillation) devices and rules for performing external defibrillation; - rules for performing basic cardiopulmonary resuscitation.; У-ПК-3.1[1] - Be able to: - recognize conditions (sudden acute illnesses, exacerbations of chronic diseases) requiring medical care in urgent or emergency forms; -

			identify clinical signs of sudden cessation of breathing, circulation, loss of consciousness, life-threatening mental disorders for the patient or others; - organize and perform basic cardiopulmonary resuscitation and external defibrillation measures.; В-ПК-3.1[1] - Possess skills in: - assessing the patient's condition requiring medical care in urgent and emergency forms; - performing basic cardiopulmonary resuscitation; - using medications and medical devices for providing medical care in emergency or urgent forms.
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**
	9 Semester						
1	The First Section	1-8	5/10/0	T-8 (25)	25	T-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-3.1, У-ПК-3.1, В-ПК-3.1, 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	The Second Section	9-16	5/10/0	T-15 (25)	25	T-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-3.1, У-ПК-3.1, В-ПК-3.1, 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 9 Semester		10/20/0		50		
	Assessment events for 9 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-3.1, У-ПК-3.1, В-ПК-3.1, З-ПК-3.2, У-ПК-3.2, В-ПК-3.2, З-ПК-3.3, У-ПК-3.3, В-ПК-3.3
	10 Semester						
1	The First Section	1-8	8/20/0	Т-8 (25)	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-3.1, У-ПК-3.1, В-ПК-3.1, 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	The Second Section	9-15	8/20/0	Т-14 (25)	25	Т-14	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-3.1, У-ПК-3.1, В-ПК-3.1, 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 10 Semester		16/40/0		50		
	Assessment events for 10 Semester				50	Ex	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-3.1, У-ПК-3.1, В-ПК-3.1, 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
Ex	Exam

SYLLABUS

Weeks	Topics / Content	Lect., hrs.	Pr./sem., hrs.	Lab., hrs.
	9 Semester	10	20	0
1-8	**The First Section**	5	10	0
1 - 4	**General issues of the specialty. Basic definitions. Skeleton regeneration. Trauma classification. Medical-social aspects.** Principles and methods of treatment. Fracture regeneration. Organization of care. Emergency traumatology. The place of traumatology in modern medicine. Definition of the term "orthopedics." Classification of musculoskeletal diseases. Goals and objectives of traumatology and orthopedics. Principles and methods of treatment in traumatology and orthopedics. Reparative regeneration of bone and cartilage after fracture. Methods of its stimulation. Fracture classification. Basic principles of fracture treatment: surgical and conservative treatment. Bone grafting. Organization of trauma and orthopedic care. Provision of emergency trauma care. Organization of emergency room operations. Inpatient work at multidisciplinary hospitals. Examination of trauma and orthopedic patients. Pre-rehabilitation stage. Rehabilitation of patients with musculoskeletal disorders.	All 2 Online 0	5 0	0 0
5 - 8	**Conservative treatment of fractures. Fracture types. Healing principles. Pediatric fractures. Osteoporosis. Traumatic dislocations and treatment.** Conservative treatment of fractures: immobilization (fixation) and extension methods. Plaster immobilization. Orthoses and their use. Skeletal traction. Principles of fracture healing. Healing timeframes. Principles of treatment for diaphyseal fractures of tubular bones and fractures of flat bones. Peculiarities of bone fractures in childhood. Epiphysiolysis. Typical childhood injuries. Delayed fracture consolidation and pseudoarthrosis formation. Bone mineral metabolism. Osteoporosis – causes (menopause, pregnancy, hormonal therapy, dysfunction), clinical features, treatment, and prevention. Pathological fractures. Sudeck's syndrome. Anatomical features of the shoulder, hip, knee, and elbow joints. Injuries to the shoulder joint. Shoulder dislocation. Elbow joint injuries. Radial head dislocation. Hip joint injuries. Hip dislocation. Knee joint injuries Knee dislocations (tibia dislocation, patella dislocation). Consequences of dislocations. Principles of diagnosing long-term consequences. Methods for correcting dislocations. Fracture-dislocations.	All 3 Online 0	5 0	0 0
9-16	**The Second Section**	5	10	0
9 - 12	**Surgical treatment methods. Osteosynthesis. Fixation devices. Arthroscopy. Joint endoprosthetics.** Diagnostic methods. Surgical treatment of injuries and diseases	All 2 Online	5	0

	of the musculoskeletal system. Surgical treatment options – their advantages and disadvantages. Osteosynthesis – modern principles Types of anesthesia for metal osteosynthesis: general anesthesia, epidural anesthesia, intraosseous anesthesia, conduction anesthesia. External osteosynthesis. Intramedullary osteosynthesis. Osteosynthesis according to AO - principles and advantages. External transosseous extrafocal compression-distraction osteosynthesis: principles of the method. External fixation devices (pin and rod). Use of external fixation devices for both staged treatment and final fracture fixation. Bone grafting. Osteotomy - purpose of application, types of osteotomy; bone trepanation - purpose of application; sequestrectomy, bone resection, bone grafting: autograft, allograft, osteoperiosteal bone grafting with a sliding graft according to Olbe-Khakhu-tov, bone grafting using the "bundle of brushwood" type according to Volkov. Weber ligament osteosynthesis. Tibial fractures. Humerus fractures. Femur fractures. Clavicle, scapula, and flat bone fractures. Methods of diagnosis, treatment, and rehabilitation of large joint injuries. Arthroscopy as a diagnostic and therapeutic method. Endoprosthetics of large joints.	0	0	0
13 - 16	**Polytrauma, multiple and combined injuries. TBI. Burns and frostbite.** Definitions of multiple, combined, and concomitant trauma, "polytrauma." Traumatic disease. Stages of progression. Traumatic shock, crush syndrome – causes. Compartment syndrome. Providing first aid to victims. Pain relief for mechanical injuries. Transportation and transport immobilization. Organizing inpatient care. The social significance of multiple trauma as a cause of mortality and disability. Clinical features of multiple trauma. Prevention, diagnosis, and treatment of potential early and late complications of multiple trauma. Traumatic brain injury. Various classifications. Concussion. Brain contusion. Area and depth of thermal burns, severity, and prognosis. Burn disease: pathogenesis, stages. Burn treatment – general and local. Frostbite. Treatment principles for patients with thermal injuries. Complications.	All		
		3	5	0
		Online		
		0	0	0
	10 Semester	16	40	0
1-8	**The First Section**	8	20	0
1 - 4	**Pelvic injuries, femoral fractures, tibial fractures, foot and knee injuries.** Shock and anti-shock measures. Venous thromboembolic complications. Kaplan's classification of pelvic fractures. Pelvic injuries. Acetabular floor fractures and central hip dislocation. Cystography. Treatment of pelvic bone fractures. Hip dislocation.	All		
		4	10	0
		Online		
		0	0	0

	Mechanism of various bone fractures. Fat embolism. Femoral neck fracture. Intertrochanteric hip fracture. Treatment considerations in the elderly, including the role of mobilization. Pseudarthrosis of the femoral neck, its causes, and treatment. Femoral shaft fractures and their complications. Conservative and surgical treatment options. Hip replacement. Causes, clinical signs, differential diagnosis, and treatment: knee extensor mechanism injuries. Hemarthrosis of the knee joint. Patellar fracture. Rupture of the patellar ligament. Fractures of the tibia. Injuries to the ankle joint. The role of the foot during walking – the basics of biomechanics. Flat feet, hallux valgus. Heel spurs. March fractures. Post-traumatic foot deformities. Orthopedic devices for foot deformities. Foot injuries. Calcaneal fractures. Fractures and dislocations of the talus, tarsal bones, and metatarsal bones. Complications			
5 - 8	**Fractures of humerus, elbow, forearm; hand injuries.** Proximal humerus fractures: diagnosis, potential complications, and treatment. Shaft and distal humeral metaphysis fractures. Forearm fractures. Classification, clinical diagnostic methods, and treatment options. Radial head and neck fractures. Diagnosis and treatment. Forearm fractures and fracture-dislocations. Diagnosis and treatment principles. Forearm dislocations Classification, diagnosis, reduction, and immobilization periods. Tendon and peripheral nerve injuries. Hand trauma. Dupuytren's contracture.	All 4 Online 0	 10 0	 0 0
9-15	**The Second Section**	8	20	0
9 - 12	**Spinal and thoracic injuries.** Degenerative diseases of the spine. Spinal injuries. Spinal malformations. Postural defects. Scoliosis. Sprengel's disease. Definition of stable and unstable spinal fractures. Frequency, classification, and mechanisms of spinal injury. Diagnosis and clinical features of complicated and uncomplicated spinal injuries. Treatment principles. Clinical features in childhood. Prehospital care. Rehabilitation principles. Spondylolisthesis. Clinical and radiographic presentation, treatment principles. Anterolisthesis. Spondylodiscitis. Etiology. Clinical and radiographic presentation, diagnosis, and treatment principles. Chest wall deformities. Frequency, classification, and mechanisms of injury of uncomplicated and complicated chest wall injuries. Diagnosis, clinical presentation of various injuries, and complications. Clinical features of chest trauma in children.	All 4 Online 0	 10 0	 0 0
13 - 16	**Orthopedic conditions in adults and children. Amputations. Exarticulations. Prosthetics.** Osteoarthrosis (osteoarthritis). Inflammatory joint diseases. Osteomyelitis – causes, treatment. Tuberculosis of the bone and joint. Bone tumors.	All 4 Online 0	 10 0	 0 0

	Benign and malignant pathologies. Post-traumatic deformities, malunion fractures. Complications of open fractures, traumatic osteomyelitis. Preventive measures. Fracture nonunion and pseudoarthrosis. Contractures and ankylosis. Treatment of contractures. Congenital hip dislocation. Congenital clubfoot. Congenital muscular torticollis. Lower limb length inequality. Hereditary diseases. Paralytic deformities. Flaccid and spastic paralysis. Etiology, pathogenesis, and clinical presentation of osteochondropathy.			

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**
	9 Semester
1 - 4	**General issues of traumatology** General issues: classification, regeneration, social aspects
5 - 8	**Conservative treatment of fractures of tubular and flat bones.** Principles, timing and outcomes of treatment of fractures and dislocations in adults and children.
10 - 12	**Surgical methods of fracture treatment** Injuries of large joints, diagnosis and treatment.
13 - 16	**Multiple, combined, combined and thermal lesions** Polytrauma. Traumatic brain injury.
	10 Semester
1 - 4	**Principles of treatment for pelvic trauma, fractures of the proximal femur, tibia, foot, and knee joint injuries.** Clinical presentation, diagnostics
5 - 8	**Treatment principles for fractures of the humerus, elbow, forearm bones, and hand injuries and diseases** Treatment principles for fractures of the humerus, elbow, forearm bones, and hand injuries and diseases Clinical, diagnostics
9 - 12	**Spinal and Chest Injuries** Spinal and Chest Injuries Clinical and Diagnostic Procedures
13 - 15	**Orthopedic pathologies in adults and children.** Orthopedic pathologies in adults and children. Amputations. Exarticulations. Prosthetics.

6. EDUCATIONAL TECHNOLOGIES

Traditional methods (lectures, clinical practice) and interactive forms are used: training-based practicals (clinical cases, role-play), interactive clinical case discussions with patient demonstrations, involving students in research, preparation of presentations, reports, essays.

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)**	**Assessment activity (Syl 2)**
ОПК-4	З-ОПК-4	PFE, T-8, T-15, T-8, T-15	Ex, T-8, T-14, T-8, T-14
	У-ОПК-4	PFE, T-8, T-15, T-8, T-15	Ex, T-8, T-14, T-8, T-14
	В-ОПК-4	PFE, T-8, T-15, T-8, T-15	Ex, T-8, T-14, T-8, T-14
ОПК-6	З-ОПК-6	PFE, T-8, T-15, T-8, T-15	Ex, T-8, T-14, T-8, T-14
	У-ОПК-6	PFE, T-8, T-15, T-8, T-15	Ex, T-8, T-14, T-8, T-14
	В-ОПК-6	PFE, T-8, T-15, T-8, T-15	Ex, T-8, T-14, T-8, T-14
ОПК-7	З-ОПК-7	PFE, T-8, T-15, T-8, T-15	Ex, T-8, T-14, T-8, T-14
	У-ОПК-7	PFE, T-8, T-15, T-8, T-15	Ex, T-8, T-14, T-8, T-14
	В-ОПК-7	PFE, T-8, T-15, T-8, T-15	Ex, T-8, T-14, T-8, T-14
ПК-3.1	З-ПК-3.1	PFE, T-8, T-15, T-8, T-15	Ex, T-8, T-14, T-8, T-14
	У-ПК-3.1	PFE, T-8, T-15, T-8, T-15	Ex, T-8, T-14, T-8, T-14
	В-ПК-3.1	PFE, T-8, T-15, T-8, T-15	Ex, T-8, T-14, T-8, T-14
ПК-3.2	З-ПК-3.2	PFE, T-8, T-15, T-8, T-15	Ex, T-8, T-14, T-8, T-14
	У-ПК-3.2	PFE, T-8, T-15, T-8, T-15	Ex, T-8, T-14, T-8, T-14
	В-ПК-3.2	PFE, T-8, T-15, T-8, T-15	Ex, T-8, T-14, T-8, T-14
ПК-3.3	З-ПК-3.3	PFE, T-8, T-15, T-8, T-15	Ex, T-8, T-14, T-8, T-14
	У-ПК-3.3	PFE, T-8, T-15, T-8, T-15	Ex, T-8, T-14, T-8, T-14

	В-ПК-3.3	PFE, T-8, T-15, T-8, T-15	Ex, T-8, T-14, T-8, T-14

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:

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

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 Т65 Traumatology and Orthopedics : учебник, Garkavi A. V., Kavalerskiy G. M., Lychagin A. V., Москва: ГЭОТАР-Медиа, 2023

2. ЭИ К 61 Травматология и ортопедия : учебное пособие для вузов, Распопова Е. А., Коломиец А. А., Москва: Юрайт, 2024

FURTHER READING:

1. ЭИ С60 Детская травматология : учебник, Соловьев А.Е., Москва: ГЭОТАР-Медиа, 2024

2. ЭИ М12 МРТ. Позвоночник и спинной мозг : Серия "Практическая магнитно-резонансная томография", , Москва: ГЭОТАР-Медиа, 2020

3. ЭИ Т65 Травматология и ортопедия : учебник, , Москва: ГЭОТАР-Медиа, 2023

SOFTWARE:

No special softwares is required

LMS AND ONLINE RESOURCES

https://online.mephi.ru/

http://library.mephi.ru/

9. LOGISTICAL SUPPORT

1. Демонстрационные модели опорно-двигательного аппрарата (64-402)

2. Фантом реанимационный (торс) с электрическим контроллером (64-301)

3. Манекен сердечно-легочной реанимации Р4201CPR ВОЛОДЯ. Модификация 1 (64-301)

4. Учебный автоматический наружный дефибриллятор МУ0353 (64-301)

5. Мешок Амбу КД-МП-В (64-301)

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

7. Мышь, клавиатура (Клиническая база)

8. Проектор SMART P109 (Клиническая база)

9. Видеокамера Microsoft LifeCam Cinema HD (Клиническая база)

10. Кушетка медицинская (Клиническая база)

11. Монитор (Клиническая база)

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

13. Ножницы для разрезания повязок по Листеру (64-403)

14. Шина лестничная Крамера для нижних конечностей (64-403)

15. Шина лестничная Крамера для верхних конечностей (64-403)

10. EDUCATIONAL AND METHODOLOGICAL RECOMMENDATIONS FOR STUDENTS

• Recommendations for seminar preparation: review lecture notes, textbooks, recommended literature; take structured notes.

• Clinical practicals: independent skill development through patient interaction, clinical examinations, observing diagnostics, presenting findings. Participation in clinical conferences is assessed.

• Preparation for tests and exams: criteria for grades (Excellent, Good, Satisfactory, Fail) based on completeness, logic, terminology use, and practical illustration of knowledge. Minimum passing score is 30 out of 50.

11. EDUCATIONAL AND METHODOLOGICAL RECOMMENDATIONS FOR TEACHERS

• Organize clinical practicals focusing on independent student work with patients under supervision.

• Conduct clinical case discussions and involve students in conferences.

• Use situational tasks to develop clinical reasoning.

• Grading scales: tests (1 point per correct answer), written assignments (0-2 points), mandatory homework (penalty for late submission), presentations, and essays (detailed 10-point criteria provided, assessing problem statement, analysis, logic, conclusions, and formatting).

Author(s):

ZHandarov Kirill Aleksandrovich / Жандаров Кирилл Александрович /