ONTÚSTIK-QAZAQSTAN

-cd62-MEDISINA SKMA AKADEMIASY «Оңтүстік Қазақстан медицина академиясы» АҚ

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Department of Phthisiopulmonology and Radiology

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EDUCATIONAL PROGRAM OF RESIDENCY

7R01114 «Radiology»

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«Онтустік Қазақстан медицина академиясы» АҚ

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Educational program 7R01114 "Radiology" was developed by the Department of Phthisiopulmonology and Radiology

Head of Department, Associate Professor

Protocol No 119 or « 17 » 04. 2025

Agreed with employers:

Shymkent City Diagnostic Center Chief Physician

Discussed at the meeting of the AC therapeutic profile

Chairman of the AC, Associate Professor Protocol No 4 or «21 » 04, 2025

Kasayeva L.T.

Myrzakhmetova Sh.I.

Kauzbai Zh.A.

Approved by the Clinical Council

Chairman, Professor

Protocol No 8 OT «25» 04 2025

Nurmashev B.K.

Approved by the Academic Council Protocol No 13 or «2 » 05.2025

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Educational program passport

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The mission of the educational program Training of competitive radiologists.

The purpose of the educational program Preparation of highly qualified specialists for work in medical organizations, able to independently diagnose diseases and injuries using medical imaging techniques

3. Justification of the educational program:

-for students: receiving continuous integrated medical education, including basic training-bachelor's degree, internship and master's degree. At the end of 6 years of study, the graduate will be awarded an academic master's degree and a diploma with a doctor's qualification.

-the need in the labor market: provision of personnel with qualities such as high skill and professional perseverance, availability of the necessary practical and theoretical knowledge, competence, observation and insight, developed clinical thinking and passion.

4. Professional standard on the basis of which the educational program is developed:

Regulatory documents for the development of an educational training program

 Order of the Minister of Health of the Republic of Kazakhstan dated 07.04.2022 No. KR DSM-63 "On approval of state mandatory standards for levels of education in the field of healthcare";

· Professional standard "Radiology" (Order of the Minister of Health of the Republic of Kazakhstan dated

January 25, 2024 No. 46 "On approval of professional standards in the field of healthcare".

- · On Amendments and additions to the Order of the Minister of Health of the Republic of Kazakhstan "On approval of the list of medical specialties of residency programs" dated May 25, 2021 No. KR DSM - 43 and "On approval of standard training programs in medical and pharmaceutical specialties" dated January 9, 2023 No. 4. (Order of the Minister of Health of the Republic of Kazakhstan dated 10 November 2023, No. 164).
- 5. Field of professional activity: the area of professional activity of graduates who have completed the educational program 7R01114 Radiology includes in-depth development of theoretical issues of radiology; improvement of practical skills according to modern diagnostic principles, interpretation of examination results from the perspective of evidence-based medicine; independent provision of qualified medical care for various conditions and diseases.

6. Objects of professional activity:

- healthcare management organizations;
- healthcare organizations.
- educational organizations.
- organization of science;
- organization of social protection;
- children's population;
- a set of tools and technologies aimed at creating conditions for protecting the health of the child population.

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No	Gener	al information
	Characteristics of OP	Data
1	Registration number	7R09100117
2	Code and classification of the field of education	7R01 Healthcare (medicine)
3	Code and classification of training areas	7R011 Healthcare
4	Group of educational programs	R014"Radiology"
5	Name of the educational program	"Radiology" (residency)
6	Type of OP	Updated EP
7	Moscow Time level	7
8	The level of the NRK	7
9	ORC Level	7
10	Distinctive features of EP	No
11	List of competencies	CC1 Patient supervision: is able to formulate a clinical diagnosis, prescribe a treatment plan and evaluate its effectiveness based on evidence-based practice at all levels of medical care CC2 Communication and Collaboration: Able to effectively interact with the patient, their environment, and healthcare professionals to achieve the best outcomes for the patient CC3 safety and quality: He is able to assess risks and use the most effective methods to ensure a high level of safety and quality of medical care. CC4 Public health: He is able to act within the legal and organizational framework of the healthcare system of the Republic of Kazakhstan in his specialty, provide basic assistance in emergency situations, and work as part of interprofessional teams to implement national health promotion policies. CC5 Research: Able to formulate appropriate research questions, critically evaluate professional literature, effectively use international databases in daily activities, and participate in a research team CC6 Learning and Development: Able to learn independently and teach other members of a professional team, actively participate in discussions, conferences and other forms of continuous professional development.

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12	Learning outcomes	LO1 is able to set up an examination plan, conduct an examination, and interpret a medical report based on the data obtained, evidence-based practice, and digital tools in compliance with the principles of inclusion. LO2 is able to keep medical records, including in electronic form, and monitor the quality of its management. To analyze the medical and statistical indicators of the work of the specialized medical department. LO3 is able to assess risks and use the most effective medical imaging methods to ensure a high level of safety and emergency medical care during radiological research. LO 4 able to act within the legal and organizational framework of the healthcare system of the Republic of Kazakhstan when conducting imaging methods, organize and conduct preventive radiological (screening) studies, medical examinations in accordance with regulatory legal acts. LO5 able to formulate adequate research questions, critically evaluate professional literature on medical imaging methods, effectively use international databases in their daily activities, participate in the work of the research team LO 6 able to study independently and to train other members of the professional team, to actively participate in discussions, conferences and other forms of continuous professional development
14	Form of study	Full - time
15	Language of study	Kazakh and Russian
16	Volume of credits	140
17	Awarded academic degree	Radiologist
18	Form of training	KZ36LAA000
19	Accreditation of the OP	Yes
20	Name of accreditation body Duration of accreditation	INDEPENDENT AGENCY FOR ACCREDITATION AND RATING
20	Information about the disciplines	Residency 10.06.2022-09.06.27yy. appendix 1,2

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Appendix 1

Matrix for correlating learning outcomes in the educational program as a whole with the competencies being developed

	RS1	RS2	RS3	RS4	RS5	RS6
КС1	+		+		+	
KC2		+	+	+		
КС3		+	+			
KC4	+					+
KC5			+	+		
KC6		+		+		

Appendix 2

Information about disciplines

Nο	Name of the discipline Short description (30-50 words)		Numb r of credit			Learning outcomes
	Pontonalow	CYCLE OF PROFILING DISCIPLINES Mandatory component Formation of knowledge about the organization				
1	Roentgenology	of the X-ray service, about policy documents, biological X-rays and the regulation of radiation diagnostic examinations; skills in conducting X-ray research methods: fluorography, fluoroscopy, radiography, tomography; recognition of a number of injuries and diseases, examination of organs and tissues using X-rays; provision of emergency medical care during radiological examinations. General X-ray semiotics and X-ray diagnostics, differential diagnosis of diseases of organs and systems	PD	UC	30	LO 1 LO 3 LO 5

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		from the perspective of evidence-based medicine and the use of digital technologies.				
2	Radiology in mammology	Formation of knowledge and skills of clinical and radiological diagnostics of breast diseases; organization and conduct of preventive radiological (screening) studies, medical examinations in accordance with regulatory legal acts. The norm and interpretation of data from radiation methods for the diagnosis of breast diseases (mammography, tomosynthesis, digital contrast mammography, computed tomography, magnetic resonance imaging, positron emission tomography with computed tomography, radioisotope diagnostics). Mammographic classification according to the BI-RADS system. Breast cancer screening. Digital information technologies. Compliance with the principles of inclusion when interacting with a patient in need of examination and emergency medical care during radiological examinations.	PD	UC	10	LO 2 LO 3 LO 4
3	Ultrasound diagnostics	Organization of ultrasound service and directive documents: orders, instructions, regulations, reporting of ultrasound departments. Ultrasound techniques – one-dimensional echography, Dopplerography, duplex sonography. Software system ultrasound diagnostics of diseases in adults and children. Ultrasound of the breast. Features of ultrasound in newborns. Neurosonography.	PD	UC	20	LO 2 LO 3
4	Nuclear medicine	The use of radionuclide drugs. Use of AI in radionuclide research methods: scanning, scintigraphy, single-photon and positron emission tomography. Radionuclide diagnostics of the endocrine, cardiovascular, osteoarticular system, liver and kidney pathology. Positron emission tomography (PET) is one of the most informative methods in the early diagnosis of serious diseases: cardiac, neurological, including oncological.	PD	UC	10	LO 1 LO 5
5	Magnetic resonance imaging	Organization of magnetic resonance imaging in polyclinics and hospitals. Physico-biological fundamentals of MRI – the principle of the method, types of installations, technologies, and scanning protocol, contrast technologies,	PD	UC	20	LO3 LO4

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	*	reconstruction of tomograms, transformations. Using AI in MRI diagnostics of diseases of all organs and systems in adults and children of various ages.			1	
6	Computed tomography	Organization of computed tomography in polyclinics and hospitals. Physical and technical fundamentals of CT – the principle of the method, types of installations, technologies, and scanning protocol, contrast technologies, reconstruction of tomograms, transformations. Using AI in CT diagnostics of diseases of the musculoskeletal, cardiovascular, respiratory, digestive and urinary systems, and diagnosis of pelvic diseases.	PD	UC	20	LO 2 LO 4
7	Pediatric roentgenology	Organization of radiological services in children's medical institutions. Using artificial intelligence to diagnose a patient's condition: (AI can analyze patient data, including medical histories, radiological imaging results (e.g. X-ray or CT, MRI), to more accurately diagnose examination of organs and systems in children. Radiosemiotics of diseases of the musculoskeletal, respiratory, cardiovascular, digestive and genitourinary systems of children.	PD	UC	12	LO 3 LO 4
8	Comprehensive radiation diagnostics of diseases of organs and systems	Use of artificial intelligence in the interpretation of radiological examination results in thoracic and abdominal radiology. Thoracic radiology: pathology of the chest organs, mammary glands. Abdominal radiology: pathology of the abdominal cavity and retroperitoneal space.	PD	UC	12	LO 3 LO 4
	CYCI	LE OF PROFILING DISCIPLINES				
	Neuroradiology	Optional component The value of visual research methods in the	PD	EC		
9	Neuroradiology	diagnosis of nervous diseases. Diagnostic radiology of vascular and hereditary diseases. Visual diagnosis of multiple sclerosis. Visual diagnosis of acute traumatic brain injuries and their consequences. Visual diagnosis of brain tumors. Visual diagnosis of neurological diseases in children and adolescents.	PD	EC	2	LO 1 LO 2 LO 3

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	Cardioradiology ,	Diagnostic radiology and semiotics of cardiovascular diseases: congenital and acquired heart defects), coronary heart disease, angina pectoris, pericarditis, heart failure, heart attacks, aneurysms (abnormal protrusions and thinning of the walls) of the aorta.	PD	EC		
	Oncoradiology	Diagnostic radiology and semiotics of cancer diseases, early (preclinical) diagnosis of neoplasms, cancer screening, diagnostics and differential diagnostics of detected oncological changes, use of positron emission tomography (PET) followed by CT or MRI to assess the prevalence of the tumor process at the level of the whole organism.	PD	EC		
10	Interventional radiology	The concept of interventional radiology. The history of development. Materials for angiography. The main approaches to the bloodstream. Angiography of the arterial and venous systems. Interventional radiology in pulmonary embolism and cardiovascular diseases.	PD	EC	2	LO 1 LO 2 LO 3
	X-ray endovascular diagnosis and treatment	To develop knowledge about the possibilities of using endovascular methods for examining patients suffering from cardiovascular, oncological, neurosurgical, gynecological, urological, cardiological, and surgical diseases. Basic principles of organizing the provision of specialized medical care using x-ray endovascular diagnostic and treatment methods.	PD	EC		
	Total:			-	13	
	Final certification:				2	
	Total:			-	14	

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Professional standard: "Radiology"

Profession Card "7.2 Radiologist"	Mandatory job functions:	1.Provision of qualified and specialized medical care under the supervision and control of a mentor 2. Conducting and monitoring the effectiveness of preventive (screening) studies, activities on sanitary and hygienic education and the formation of a healthy lifestyle of the population under the control and supervision of a mentor. 3. Interacting with patients, their environment and healthcare participants under the supervision and control of a mentor 4. Maintaining medical records and reports under the supervision and control of a mentor
	Additional job functions:	Continuous professional development
Conducting radiological examinations (radiology, ultrasound diagnostics, computed tomography, magnetic resonance imaging, nuclear medicine), interpretation of their results in adults and children	Skill 1 Conducting radiological examinations of organs and systems of the human body (radiology, ultrasound diagnostics, computed tomography, magnetic resonance imaging, nuclear medicine) for adults and children.	Skills 1. Select radiological examination methods in accordance with the clinical task. 2. Determine and justify indications and the feasibility of conducting additional and clarifying studies using radiation, instrumental and other types of diagnostics. 3. Explain the procedure for diagnostic testing to the patient and obtain informed voluntary consent from the patient for medical intervention, including in the form of an electronic document. 4. Perform radiological examinations using various types of equipment. 5. Provide recommendations and monitor, through questioning, the patient's preparation for performing a radiological examination. 6. Select physical and technical conditions for the research being carried out. 7. Perform radiological examinations of organs and systems of the body of adults and children, in a volume sufficient to solve the clinical problem, including - polypositional scintigraphy of the lungs, liver, spleen, skeleton - dynamic scintigraphy of the brain, heart, liver, kidneys, gastrointestinal tract, biliary system, arteries, veins and lymphatic vessels - single photon emission computed tomography (SPECT) of the brain, heart, lungs, liver, kidneys, gastrointestinal tract, biliary system, thyroid gland, parathyroid glands including stress tests - positron emission tomography (PET) of organs and body systems -

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SPECT of the heart synchronized with ECG - SPECT, PET with tumorotropic radiopharmaceuticals methods using oral and intravenous contrast radiological functional studies.

- 8. Position the patient during an X-ray and radiological examination (including computed tomography and magnetic resonance imaging) to solve a specific diagnostic problem.
- Perform post-processing of images obtained from radiological studies, including multiplanar reconstructions, and use maximum intensity projections.
- 10. Perform measurements when analyzing images.
- 11. Form an image layout to produce informative hard copies.
- 12. Use automated systems for archiving research and working in the hospital network.
- 13. Identify artifacts and distortions that occur during radiological examination,

Knowledge:

- 1. Physics and radiobiology of ionizing radiation.
- 2. Methods of obtaining radiological images.
- 3. Patterns of formation of radiological images.
- 4. Principles of design, types and characteristics of SPECT tomographs, PET tomographs.
- Fundamentals of image acquisition using scintigraphy, single-photon emission computed tomography, and positron emission tomography.
- 6. Radiodiagnostic devices and complexes.
- 7. Physical and technological principles of image acquisition. Image reconstruction and post-processing options.
- Digital medical imaging technology.
- 9. Information technologies and principles of remote transmission of radiological information.
- 10. Means of radiation visualization of individual organs and systems of the human body.
- 12. Indications and contraindications for radionuclide research.
- 13. Physical and technical principles of radionuclide research, including scintigraphy of various organs and systems, SPECT, PET.
- 14. Safety issues in radiological research.
- 15. Methods for performing functional, including pharmacological, tests during radiological studies.
- 16. Features of radiological studies in children.

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Skill 2:

Interpretation of the results of radiological examinations (radiology, ultrasound diagnostics, computed tomography, magnetic resonance imaging, nuclear medicine) of adults and children.

Skills

 Interpret and analyze information about the disease and/or condition obtained from patients (their legal representatives), as well as from medical records.

 Interpret and analyze the results obtained from radiological examination, identify specific signs and radiological symptoms and syndromes of the suspected disease, identify suspected diseases in accordance with the ICD.

Compare the data from the conducted study with previously performed results of diagnostic studies and other clinical and instrumental studies.

 Interpret and analyze the results of radiological studies performed in other medical organizations.

 Interpret and analyze data from radiological studies performed earlier in comparison with the obtained image, evaluate the dynamics of the pathological process.

6. Interpret, analyze and record radiological studies of organs and systems of the body: - organs of the chest and mediastinum, including: - planar and tomographic radiological studies of the lungs, - vascular bed of the pulmonary circulation, - organs of the mediastinum; organs of the digestive system, including: - salivary glands, - esophagus, - stomach, - biliary tract, intestines, - cholecystography, - planar and tomographic radiological studies of the liver; - planar and tomographic radiological studies of the spleen; pancreas of the head and neck, including -planar and tomographic radiological studies of the brain, - studies of the nasolacrimal ducts of the endocrine system. including - planar and tomographic radiological studies of the thyroid and parathyroid glands - planar and tomographic radiological studies of the adrenal glands - planar and tomographic radiological studies of the pancreas mammary (breast) glands, including planar and tomographic radiological studies of the mammary glands - planar and tomographic radiological studies of the "sentinel" lymph node Lymphatic system, including: - lymphangiography sentinel lymph node scintigraphy Soft tissues and skin: - soft tissue scintigraphy - sentinel lymph node scintigraphy for skin melanoma studies of the heart and pulmonary circulation, including:planar and tomographic radiological examinations of the heart, planar and SPECT ventriculography synchronized with ECG of bones and joints, including - scintigraphy

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		of skeletal bones in the "whole body" mode - planar and tomographic radiological examinations of various parts of the skeleton - three-phase bone scintigraphy of the urinary system, including - planar and tomographic radiological studies of the kidneys - dynamic scintigraphy of the kidneys - static scintigraphy of the kidneys- radionuclide cystography; pelvic organs, including: - scintigraphy of the fallopian tubes - planar and tomographic radiological studies of the pelvic organs. 7. Interpret, analyze and record the results of radiological studies performed in adults and children. 8. To draw up and submit to the attending physician a plan for further radiological examination of the patient in accordance with the current procedures for the provision of medical care, clinical recommendations (treatment protocols) on issues of providing medical care, taking into account the standards of medical care. 9. To identify and analyze the reasons for discrepancies between the results of radiological studies and the data of other diagnostic methods, clinical and pathological diagnoses. 10. Providing remote telemedicine consultations on radiological examinations. 11. To draw up a conclusion of a radiological study with a formulation of the nosological form of the pathological process in accordance with the ICD or a presentation of the proposed differential diagnostic series. Knowledge: 1. Radiological anatomy of organs and systems of adults and children in normal conditions 2. Radiation symptoms and syndromes 3. Radiation semiotics of pathological conditions of organs and systems 4. Standards for the design of radiological examination protocols 5. The main radiological symptoms and syndromes of diseases of organs and systems. 7. Differential diagnostic series of radiological symptoms and syndromes of diseases of organs and systems. 7. Differential diagnostic series of radiological symptoms and syndromes and syndromes.
Labor function 2: Providing emergency medical care during	Skills 1: Providing emergency medical care during radiological	Skills: 1. Recognize conditions that require emergency and urgent medical care, including clinical signs of sudden cessation of blood circulation and/or breathing.

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radiological examinations	examinations, in accordance with clinical protocols and standards of medical care.	2. Provide medical care to patients in conditions that pose a threat to the life of patients, including clinical death (cessation of vital functions of the human body (circulation and (or) respiration) 3. Use medicinal products and medical devices when providing emergency and urgent medical care. 4. Perform basic cardiopulmonary resuscitation. 5. Provide qualified medical care in case of anaphylactic shock. Knowledge: 1. Procedure and rules for providing medical care in the event of complications during radiological examinations 2. Clinical signs of complications from the administration of contrast agents in radiological studies. 3. Clinical signs of sudden cessation of blood circulation and/or respiration. 4. Prevention of side effects when using contrast agents in radiology. 5. Algorithm for providing medical care in case of
Labor function 3: Organization and implementation of preventive radiological (screening) studies, medical examinations.	Skills 1: Organization and implementation of preventive radiological (screening) studies, medical examinations in accordance with regulatory legal acts.	anaphylactic shock. Skills: 1. Conducting radiological studies as part of preventive (screening) studies. 2. Conducting analysis and interpretation of the results of radiological studies, comparing them over time. 3. Preparation of a conclusion on a radiological examination with registration in the examination protocol of the dose of X-ray radiation received by the patient during the examination. 4. Determining medical indications for additional research. 5. Preparation of an emergency notification upon detection of a radiological picture of an infectious or socially significant disease. 6. Using an automated system for archiving research
		results. Knowledge: 1. Principles and procedures for organizing preventive (screening) studies 2. Early signs of diseases, as well as the impact of harmful and (or) hazardous production factors, methods of forming risk groups for the development of occupational diseases. 3. Automated systems for collecting and storing the results of X-ray examinations.

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Labor function 4: Participation in the management of medical documentation, medical and statistical information	Skills 1: Maintaining medical records, analyzing medical and statistical information, in accordance with the requirements of regulatory legal acts in the field	Skills: 1. Plan work and prepare a report analyzing your own performance indicators. 2. Maintain medical records, including in electronic form, and monitor the quality of their maintenance. 3. Conduct an analysis of medical and statistical indicators of the work of a specialized medical department. 4. Use personal data of patients and information in work in accordance with the law. 5. Use information systems in accordance with established procedures.
		Knowledge: 1. Order of the Acting Minister of Health of the Republic of Kazakhstan dated October 30, 2020 No. ҚР ДСМ-175/2020 "On approval of forms of accounting documentation in the field of healthcare, as well as instructions for filling them out (registered with the Ministry of Justice of the Republic of Kazakhstan on November 4, 2020 No. 21579). 2. Order of the Minister of Health of the Republic of Kazakhstan dated December 22, 2020 No. ҚР ДСМ-313/2020 "On approval of forms of reporting documentation in the field of healthcare" (registered with the Ministry of Justice of the Republic of Kazakhstan on December 23, 2020 No. 21879). 3. Order of the Minister of Health of the Republic of Kazakhstan dated December 10, 2020 No. ҚР ДСМ-244/2020 "On approval of the rules for maintaining primary medical documentation and submitting reports" (registered with the Ministry of Justice of the Republic of Kazakhstan on December 11, 2020 No. 21761). 4. Electronic accounting and documentation systems. 5. Confidentiality of patients' medical information. 6. Fundamentals of medical statistics.
Additional work function 1 Continuous professional development	Skills 1: Striving for professional improvement	Skills: 1. Participate in professional training events: conferences, seminars, webinars, advanced training courses. 2. Participate in academic and scientific activities. 3. Participate in the work of professional associations, committees and working groups to discuss health issues and exchange experiences with colleagues. Knowledge: 1. Order of the Minister of Health of the Republic of

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		Kazakhstan dated December 21, 2020 No. ҚР ДСМ-303/2020 "On approval of the rules for additional and informal education of specialists in the field of health care, qualification requirements for organizations implementing educational programs for additional and informal education in the field of health care, as well as the rules for recognizing the learning outcomes obtained by healthcare professionals through additional and informal education (registered with the Ministry of Justice of the Republic of Kazakhstan on December 22, 2020, No. 21847). 2. Order of the Minister of Health of the Republic of Kazakhstan dated December 20, 2020 No. ҚР ДСМ-283/2020 "On approval of the rules for confirming the results of continuous professional development of health workers" (registered with the Ministry of Justice of the Republic of Kazakhstan on December 22, 2020 No. 21843). 3. Opportunities to network and communicate with colleagues in your professional field. 4. Current trends, research and development in the specialized field	
Requirements for personal competencies:	specialized field. Empathy Sociability Tolerance and respect Cooperation and teamwork Stress resistance Reflection and self-analysis Compliance with professional ethics Openness and readiness to learn Activity and initiative Striving for professional development		

Head of the educational and methodological center

