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FACULTY OF MEDICINE

STUDY PROGRAM 0912.1 MEDICINE

DEPARTMENT OF RADIOLOGY AND IMAGING

APPROVED

APPROVED at the meeting of the Commission for Quality Assurance and Evaluation of the Curriculum Faculty Medicine II Minutes No. ______of ______

Chairman, PhD, Professor Suman Serghei at the Council meeting of the Faculty Medicine

Minutes No. 1 of 21.09.21

Dean of Faculty Medicine II MD, PhD, Associate Professor Betiu Mircea

APPROVED at the meeting of the Chair of Radiology and Imaging Minutes No. 5 of 10.09.2021

Head of Chair Ph.D., Associate Professor Codreanu Ion

SILLABUS

DISCIPLINE MEDICAL IMAGING (GASTROENTEROLOGY, PEDIATRICS, ENT, SURGICAL DISEASES)

Integrated studies, cycle I

Type of course: Compulsory discipline

Curriculum developed by the team of authors:

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Chișinău, 2021



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I. INTRODUCTION

 General presentation of the discipline: place and role of the discipline in the formation of the specific competences of the professional / specialty training program.
 Discipline Medical Imaging is a clinical discipline in the process of preparing the future specialist. At present, no field of modern medicine can be imagined to be successive

specialist. At present, no field of modern medicine can be imagined to be successive without the use of data obtained using medical imaging methods for the purpose of diagnosing or controlling the efficacy of the treatment. The emergence of modern diagnostic methods (CT, MRI, SPECT, PET, etc.) makes diagnostic imaging a part of disciplinary complex.

- Mission of the curriculum (aim) in professional training: Selection of the optimal imaging method of investigation in various pathologies for differential diagnostic purposes, including the following compartments: oncology, gastrology, surgical diseases, pediatrics, neonatology, otorhinolaryngology, anesthesia and intensive care, medical rehabilitation, medical emergencies.
- Language (s) of the course: Romanian, English;
- Beneficiaries: students of the 5th year, Faculty of Medicine.

Code of the disciplin	Code of the discipline S.09.0.081		
Name of the discipline		Medical imaging (gastroenterology, pediatrics, ENT, surgical diseases)	
Person(s) in charge of discipline	of the	dr. în medicină, conf. univ. Oxana Malîga dr. hab. în medicină, conf. univ. Ion Codreanu	
Year	V	Semester	IX
Total number of hou	rs: 60, includin	g:	60
Curs	10	Practical work 10	
Seminars	10	Self-training 30	
Form of assessment	Ε	Number of credits 2	

II. MANAGEMENT OF THE DISCIPLINE

III. TRAINING AIMS WITHIN THE DISCIPLINE



At the end of the discipline study, the student will be able to:

• at the level of knowledge and understanding:

- \checkmark to know the imaging methods used in medical practice,
- \checkmark to know clinical criteria on the basis of which diagnostic procedures will be indicated,
- ✓ to know criteria and ways of selecting the diagnostic method in relation to the specificity and severity of the pathology,
- \checkmark to understand ways to combine imaging methods to perform differential diagnosis,
- \checkmark to know the radioimaging and anatomo-physiological particularities of children and newborns,
- ✓ to understand the importance of indicating imaging methods in relation to patient's accusations, value and limits of each method;
- ✓ to understand the importance of using imaging methods in monitoring of chronic disease and detection of acute phase.

• at the application level:

- \checkmark to be able to establish indications and contraindications for different imaging methods of investigation,
- ✓ to be able to assess the risks to which patients are exposed when performing specific diagnostic procedures,
- \checkmark to be able to apply the elements of differential imaging diagnosis.

• at the integration level:

- ✓ to appreciate the importance of Medical Imaging in the context of Medicine,
- ✓ to have skills to implement and integrate the accumulated knowledge into fundamental and clinical disciplines,
- \checkmark to assimilate new imaging achievements to be implemented in imaging diagnosis.

IV. PROVISIONAL TERMS AND CONDITIONS

- Knowledge of human anatomy and physiology,
- Knowledge of material of Radiology and Radioprotection course,
- Knowledge of clinical and paraclinical signs of diseases studied in the respective clinical disciplines.

V. THEMES AND ESTIMATE ALLOCATION OF HOURS

Lectures, practical hours/laboratory hours/seminars and self-training

Nr.	Nr. I/o		Number of hours		
d/o			Practical work	Self- training	
1.	Medical imaging in oncology	1	2	3	
2.	Medical imaging in gastroenterology	1	2	3	
3.	Medical imaging in surgical diseases	1	2	3	
4.	Medical imaging in anesthesia and intensive care	1	2	3	
5.	Imaging in medical emergencies	1	2	3	
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Nr	Nr. I/o THEME		Number of hours		
d/o			Practical work	Self- training	
6.	Medical imaging in otorhinolaryngology (ENT)	1	2	3	
7.	7. Peculiarities of imaging investigations and normal radiological anatomy in children		2	3	
8.	8. Medical imaging in pediatrics		2	3	
9. Medical imaging in neonatology		1	2	3	
10. Imaging in medical rehabilitation		1	2	3	
	Total	10	20	30	

VI. PRACTICAL SKILLS PURCHASED AT THE END OF THE COURSE

Mandatory essential practical skills are:

- Standard chest radiograph. Lung cancer.
- Standard chest radiograph. Lung metastases.
- CT. Lung metastases.
- CT. Liver metastases.
- CT: Brain tumor.
- MRI: Brain tumor.
- Bone scintigraphy: bone metastases
- Barium swallow: Esophageal cancer.
- Barium meal: Esophageal achalasia
- Barium meal: Gastric ulcer
- Barium meal: Gastric cancer
- Barium enema: Ulcerative colitis, Crohn's disease
- Barium enema: Cancer of the colon
- CT: Colon diverticula
- Ultrasonography of the gallbladder and bile ducts. Gallstones.
- CT. Acute appendicitis.
- CT. Acute pancreatitis.
- Barium meal. Hiatal and paraesophageal hernia.
- Standard chest radiograph. Pulmonary pre-edema.
- Standard chest radiograph. Pulmonary interstitial edema.
- Standard chest radiograph. Pulmonary alveolar edema.
- Standard chest radiograph. Acute respiratory distress syndrome.
- CT. Pulmonary edema.
- CT. Pulmonary artery thromboembolism.
- Application of the imaging diagnosis algorithm in strokes.
- Standard chest radiograph, CT, MRI, ultrasonography. Pneumothorax.
- Standard chest radiograph, CT, MRI, ultrasonography. Politraumatism.
- Standard radiograph. Inflammatory pathology of the paranasal sinuses.
- Standard radiograph. Masses of the paranasal sinuses.
- Standard radiograph. Hypertrophy of adenoid vegetations.



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- Standard radiograph. Acute laryngotracheitis.
- Standard radiograph. Foreign bodies of ENT organs.
- CT. Inflammatory pathology of the paranasal sinuses.
- CT. Otitis media.
- Standard chest radiograph. Pneumonia in children.
- Standard chest radiograph. Mucoviscidosis.
- Standard chest radiograph. Juvenile rheumatoid arthritis.
- Standard chest radiograph. Foreign bodies of the respiratory tract and digestive tract in children.
- Barium enema. Hirschsprung disease.
- Standard chest radiograph. Respiratory distress of newborns.
- Standard chest radiograph. Disease of hyaline membranes.
- Standard chest radiograph. Congenital broncho-pulmonary malformations.
- Standard chest radiograph. Meconium aspiration syndrome.
- Simple abdominal radiograph. Necrotizing enterocolitis of newborns.
- Simple abdominal radiograph. Esophageal atresia with and without tracheoesophageal fistula.
- Standard chest radiograph. Pulmonary fibrosis.

VII. OBIECTIVE DE REFERINȚĂ ȘI UNITĂȚI DE CONȚINUT

Objectives	Content units			
Theme (chapter) 1. Medical imaging in oncology.				
 to know the value of different imaging methods of investigation used in oncology, demonstrate abilities to indicate optimal imaging investigations based on suspected pathology and degree of emergency, demonstrate ability to analyze the results, to apply elements of differential imaging diagnosis, to integrate the gained knowledge 	 The role of radiological investigations in oncology. Ultrasonography in oncology. Advantages, disadvantages. Indications, contrindications. Computed tomography in oncology. Advantages, disadvantages. Indications, contraindications. MRI in oncology. Advantages disadvantages. Nuclear medicine methods in oncology. Advantages disadvantages. Differential imaging diagnosis of benign and malignant tumors. Imaging of metastases. Radiological types of bone metastases. 			
Theme (chapter) 2. Medical imaging in gastroenterology.				
 to know the value of different imaging methods in assessing digestive tract pathology, demonstrate abilities to indicate optimal imaging investigations based on suspected pathology and degree of emergency, demonstrate ability to analyze the results, to apply elements of differential imaging diagnosis, to integrate the gained knowledge in other clinical disciplines. 	 Imaging diagnostic algorithm of digestive tract pathology. Methodology of digestive tract imaging. Specific examination procedures: Interventional radiology. Differential imaging diagnosis in inflammatory pathology of the digestive tract (gastritis, duodenitis, inflammatory bowel disease). The differential imaging diagnosis of ulcer disease (stomach, duodenum, colon). 			
Theme (chapter) 3. Medical imaging in surgical diseases.				



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Objectives	Content units
• to know the value of different imaging methods in surgical	1. Imaging methods for examination in surgical diseases. The value of abdominal ultrasound in surgical abdominal pathologies.
diseases, • demonstrate abilities to indicate	2. Imaging diagnostic algorithm in acute abdomen (standard radiograph, CT, ultrasonography).
optimal imaging investigations based on suspected pathology and degree of emergency.	3. Imaging evaluation in surgical pathology of the gallbladder. Cholangiography. Types: endoscopic, perioperative, postoperative on the Kehr tube (tube in "T"), by IRM. Indications of cholangiography by MRI.
 demonstrate ability to analyze the results 	4. Algorithm of imaging diagnosis in hiatal hernia.
 to apply elements of differential imaging diagnosis, 	5. Algorithm of imaging diagnosis in pathological masses: digestive tract, liver, pancreas, gallbladder.
• to integrate the gained knowledge	6. Imaging evaluation of the operated stomach.
Theme (chapter) 4. Medical im	aging in anesthesia and intensive care.
• to know the value of different imaging methods in the	1. The imaging diagnosis of pulmonary edema. Imaging semiology at various stages of development of pulmonary edema (venous congestion, pre-edema, edema).
diagnosis of pulmonary edema,	2. Imaging diagnosis in acute respiratory distress. Differential diagnosis.
respiratory distress, pulmonary artery embolism,to know the semiology of adverse	3. Algorithm of imaging diagnosis in pulmonary artery thromboembolism. Radiological semiology of pulmonary artery thromboembolism (conventional radiography, angiopulmonography, computed tomography, direct and indirect signs).
of radiological contrast agents,	4. Classification of adverse reactions to iodinated contrast agents.
• demonstrate ability to analyze the results,	
• to apply elements of differential imaging diagnosis.	
• to integrate the gained knowledge	
Theme (chapter) 5. Imaging in	medical emergencies.
• to know the value of different	1. Imaging examination methods used in medical emergencies
imaging methods in medical emergencies,	2. Algorithm of imaging diagnosis in strokes.
• demonstrate abilities to indicate optimal imaging investigations	3. Methodology of imaging examination in chest trauma (standard radiography, CT, MRI, ultrasonography). Pneumothorax.
based on suspected pathology and degree of emergency,	4. Methodology of imaging examination in polytrauma (standard radiograph, CT, MRI, ultrasonography).
• demonstrate ability to analyze the results,	
• to apply elements of differential imaging diagnosis,	
• to integrate the gained knowledge in other clinical disciplines.	
Theme (chapter) 6. Medical im	aging in otorhinolaryngology (ENT).
• to know the value of different	1. Conventional radiography in otorhinolaryngology. Radiological anatomy.
imaging methods in the diagnosis of ENT organs	2. Computed tomography in the exploration of middle and inner ear pathology.
pathology, to know the imaging anatomy of	3. The imaging examination methodology (standard radiography, CT, MRI) and imaging semiology of the paranasal sinus pathology
the ENT organs,	 4. Methods of investigation and imaging semiology in pathological masses of the ENT organs. Differential diagnosis
optimal imaging investigations	5. Imaging diagnosis of adenoid vegetations.



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Objectives	Content units		
based on suspected pathology and degree of emergency,demonstrate ability to analyze the results,	6. Imaging diagnosis in ENT emergencies in adults and children (acute laryngotracheitis, epiglottis, foreign bodies).		
• to apply elements of differential imaging diagnosis.			
 to integrate the gained knowledge in other clinical disciplines 			
Theme (chapter) 7. Peculiarit	ies of imaging investigations and normal radiological anatomy in		
children.			
• to know the particularities of imaging investigations in children and newborns	 Methodology and particularities of imaging investigations in children. Indications, contraindications, radiation protection. Particularities of imaging investigation in neonatal period 		
• to know the radioimaging and	2. Particularities of neurol redicle sized easterns in shilden and neukerne		
anatomo-physiological particularities of children and newborns,	5. Particularities of normal radiological anatomy in children and newdorns.		
• to formulate indications and contraindications for imaging investigations in children,			
• to integrate the gained knowledge in other clinical disciplines			
Theme (chapter) 8. Medical imaging in pediatrics.			
• to know the particularities of	1. Pneumonia in children. Imaging methods of investigation.		
imaging investigations in children,	2. Mucoviscidosis. Clinical forms. Imaging methods of investigation.		
• demonstrate abilities to indicate	3. Juvenile rheumatoid arthritis. Imaging methods of investigation.		
based on suspected pathology	4. Foreign bodies of the respiratory tract and digestive tract in children. Imaging methods of investigation. Optimal projections.		
 demonstrate ability to analyze the results 	5. Hirschsprung disease. Imaging methods of investigation.		
 to apply elements of differential imaging diagnosis 			
 to integrate the gained knowledge in other clinical disciplines. 			
Theme (chapter) 9. Medical ima	aging in neonatology.		
• to know the particularities of	1. Diagnostic imaging in respiratory distress of newborns.		
conducting imaging investigations in newborns,	2. Hyaline membrane disease. Imaging methods of investigation.		
• demonstrate abilities to indicate	3. Diagnostic imaging in the transient tachypnea of newborns.		
based on suspected pathology	4. Diagnostic imaging in bronchio-pulmonary dysplasia.		
and degree of emergency,	5. Congenital bronchial-pulmonary malformations. Clinical manifestations during		
• demonstrate ability to analyze the results,	neonatal period. Imaging methods of investigation.		
• to apply elements of differential	6. Imaging diagnosis in meconial aspiration syndrome.		
 to integrate the gained knowledge 	7. First line imaging investigations in neonatal cerebral pathology.		
in other clinical disciplines.	8. Imaging diagnosis in necrotizing enterocolitis of newborns.		
	9. Esophageal atresia with and without tracheoesophageal fistula. Imaging methods of investigation.		



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Objectives	Content units		
Theme (chapter) 10. Imaging in medical rehabilitation.			
• to know the particularities of performing imaging	1. Radio-imaging methods and imaging evaluation of pulmonary system rehabilitation.		
investigations in medical rehabilitation	2. Imaging evaluation of rehabilitation therapy in heart failure.		
• demonstrate the ability to indicate	3. Radio-imaging methods in osteo-articular rehabilitation		
optimal imaging investigations	4. The radio-imaging algorithm in musculoskeletal rehabilitation.		
process, the organ (system) under rehabilitation and the rehabilitation stage,	5. The influence of radio-imaging on neurological rehabilitation		
• demonstrate ability to analyze the results,			
• to apply elements of differential imaging diagnosis,			
• to integrate the gained knowledge in other clinical disciplines.			

VIII. PROFESSIONAL (SPECIFIC (SC)) AND TRANSVERSAL (TC) COMPETENCES AND STUDY OUTCOMES

✓ Professional (specific) (SC) competences

- ✓ PC1. Responsible execution of professional tasks with the application of the values and norms of professional ethics, as well as the provisions of the legislation in force.
- ✓ PC2. Adequate knowledge of the sciences about the structure of the body, physiological functions and behavior of the human body in various physiological and pathological conditions, as well as the relationships between health, physical and social environment.
- ✓ PC3. Resolving clinical situations by developing a plan for diagnosis, treatment and rehabilitation in various pathological situations and selecting appropriate therapeutic procedures for them, including providing emergency medical care.
- ✓ PC5. Interdisciplinary integration of the doctor's activity in a team with efficient use of all resources.

✓ Transversal competences (TC)

• **TC1.** Autonomy and responsibility in the activity.

✓ Study outcomes

Upon completion of the study, the student will be able to:

- to know clinical criteria on the basis of which diagnostic procedures will be indicated,
- to understand the importance of using imaging methods in chronic disease monitoring and acute phase detection,
- to understand ways to combine imaging methods to get the right diagnosis,
- to understand the value and limits of different imaging methods in relation to patient accusations and suspected pathology,
- to formulate optimal indications of planed and emergent imaging investigations;
- to apply elements of differential imaging diagnosis.



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IX. STUDENT'S SELF-TRAINING

Nr.	Expected product	Implementation strategies	Assessment criteria	Implementation terms
1.	Problem report	Oral communication, Power Point Presentation,	Knowing and mastering the theme, The completeness of the elucidation of the question raised for the referral, Ability to highlight the essence of the theme, The representativeness of the images used to illustrate the theme, Answer questions, Compliance with the prescribed regulation	For practical lesson
2.	Homework	Written work in the workbook depending on the question or problem formulated.	The correctness of solving the problem	To be ready for practical lesson
3.	Working with information sources	Read the lecture and the material in the manual to the theme carefully. To get acquainted with the list of additional information sources on the topic. Select the source of additional information for that theme. Wording of generalizations and conclusions related to the theme of the lesson.	The ability to extract the essential, Interpretative ability, The volume of work	During the semester

X. METHODOLOGICAL SUGGESTIONS FOR TEACHING-LEARNING-ASSESSMENT

- Teaching and learning methods used:
- Course
 - introductive
 - current
 - synthesis
 - theoretical and practical
 - debates
- Practical lessons
 - synthesis
 - repetitive
 - debates



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- Traditional methods
 - case study
 - role playing
 - interactive
 - tests

• Applied teaching strategies / technologies (specific to the discipline)

Analysis of radiographs, computed tomographs, magnetic resonance tomography, ultrasound and nuclear medicine investigation results.

• Methods of assessment (including the method of final mark calculation)

Current: each student's knowledge will be evaluated at each practical lesson in one or several ways: oral, test, control work, image interpretation, clinical case resolution. <u>20% of the mark is assigned to the individual work of the student.</u>

Final: semester IX - exam. The students, who have the average annual mark under the grade "5" or have not recovered absences from practical lessons by the end of the semester, are not admitted to the exam. The exam consists of testing by the Test Editor in the specialized room for this type of evaluation. The final grade for the exam consists of 0.5 of the average annual score and 0.5 of the one obtained by the test.

Intermediate marks scale (annual average, marks from the examination stages)	National Assessment System 2	ECTS Equivalent
3.01-4.99	4	FX FX
5,00	5	
5,01-5,50	5,5	E
5,51-6,0	6	-
6,01-6,50	6,5	n
6,51-7,00	7	
7,01-7,50	7,5	С
7,51-8,00	8	
8,01-8,50	8,5	B
8,51-8,00	9	
9,01-9,50	9,5	Α
9,51-10,0	10	

Method of mark rounding at different assessment stages



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The average annual mark and the marks of all stages of final examination (computer assisted, test, oral) - are expressed in numbers according to the mark scale (according to the table), and the final mark obtained is expressed in number with two decimals, which is transferred to student's record-book.

Absence on examination without good reason is recorded as "absent" and is equivalent to 0 (zero). The student has the right to have two re-examinations.

XI. RECOMMENDED LITERATURE:

A. Compulsory:

- 1. Materials of the Course of Medical Imaging, Department of Radiology and Medical Imaging.
- 2. Malîga O., Rotaru N., Obadă A. Medical imaging in tables and algorithms. Guidelines. Chisinau, 2015.
- 3. Holger Petterson. A Global Text Book of Radiology. Sweden, 2010.

B. Additional (available in electronic form at the chair):

1. David Sutton. Textbook of radiology and imaging, 7th edition.