

# SYLLABUS

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INTERNATIONAL EUROPEAN  
UNIVERSITY



SCHOOL OF  
MEDICINE

RADIOLOGY

2023



# SYLLABUS



|            |  |  |
|------------|--|--|
| Discipline |  |  |
|------------|--|--|

RADIOLOGY

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|------------|--|--|
| Teacher(s) |  |  |
|------------|--|--|

Burian Oleksii Vasylovych

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|---------------------------|--|--|
| Profile of the teacher(s) |  |  |
|---------------------------|--|--|

<https://medicine.ieu.edu.ua/kafedra-vnutrishnoyi-medytsyny-z-kursom-akusherstva-ta-hinikolohiyi>

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|---------------|--|--|
| Consultations |  |  |
|---------------|--|--|

Face-to-face consultations

First Wednesday of the month from 16.00 to 17.00

Online consultations

Second Tuesday of the month from 16.00 to 17.00

|                      |  |  |
|----------------------|--|--|
| Contact phone number |  |  |
|----------------------|--|--|

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| Discipline page |  |  |
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<https://medicine.ieu.edu.ua/kafedra-vnutrishnoyi-medytsyny-z-kursom-akusherstva-ta-hinikolohiyi>

|                       |        |                       |      |
|-----------------------|--------|-----------------------|------|
| Form of final control | offset | differentiated offset | exam |
|-----------------------|--------|-----------------------|------|

☐☒☐

## 1 Description of the discipline (abstract)

Medical radiology (from the Latin terms radius - ray and logos - science) is a medical scientific discipline that includes radiation diagnostics and radiation therapy. Radiation diagnostics studies the use of various radiations to recognise numerous diseases, to study the morphology and function of human organs and systems in normal and pathological conditions. The role of radiological diagnostics in the training of future doctors is constantly increasing. In recent decades, medical radiology has been supplemented by new research methods (computer and magnetic resonance imaging, ultrasound, positron and single-photon emission tomography, interventional methods). In this regard, a graduate of a higher medical education institution is required to be able to choose the optimal radiological examination method from a large number of currently available radiological methods to detect functional and morphological changes in the pathology of various organs and systems and to interpret the data of radiological methods of investigation in relation to the clinical diagnosis.

The subject of study of the discipline is modern radiation methods of research and radiation signs of diseases of various organs and systems and the main methods of radiation therapy.

Interdisciplinary relations: mastering the discipline "Radiology" is based on the study of medical biology, parasitology and genetics; medical and biological physics; biological chemistry; bioinorganic chemistry; human anatomy; normal physiology and is integrated with these disciplines, based on the knowledge of pathomorphology and pathological physiology that students receive in parallel with the study of radiology. All this lays the foundation for students to study propedeutics of internal diseases with patient care; general surgery with anaesthesiology and patient care; propedeutics of children's diseases with child care, which involves the integration of teaching with these disciplines and the development of skills to apply knowledge of radiology in the process of further education and in professional activities.

## 2 Aims and objectives of the discipline

1.1. **The purpose** of teaching the discipline "Radiology" is to teach future doctors the diagnostic capabilities of radiation methods with the definition of radiation semiotics of diseases; teaching the basics of radiation therapy, taking into account indications and contraindications.

1.2. **The main tasks** in the study of the discipline "Radiology" are:

- to teach the student to choose the optimal method of radiological examination from the existing radiation methods to detect functional and morphological changes in the pathology of various organs and systems;
- to learn to analyse radiation semiotics of functional and morphological changes in pathology of various organs and systems;
- to learn to choose the optimal method of radiotherapy for the treatment of tumour and non-tumour diseases.

## 3 Learning outcomes

|       |                                                                                                                                                                                                                                                                                                                                                                  |
|-------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| PLO-1 | Have a thorough knowledge of the structure of professional activity. Be able to carry out professional activities that require updating and integrating knowledge. To be responsible for professional development, the ability to further professional and the ability to further professional learning with a high level of autonomy.                           |
| PLO-3 | Specialised conceptual knowledge, including scientific achievements in the field of health care and the basis for research, critical thinking of medical problems and related interdisciplinary issues.                                                                                                                                                          |
| PLO-6 | Establish the final clinical diagnosis by making an informed decision and analysing the obtained subjective and objective data of clinical, additional examination, differential diagnosis, following the relevant ethical and legal standards, under the supervision of a supervising physician in the conditions of healthcare facility (according to list 2). |



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|        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|--------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| PLO-7  | To prescribe and analyse additional (mandatory and optional) methods of examination (laboratory, functional and/or instrumental) (according to the list 4), patients with diseases of organs and systems of the body for differential diagnosis of diseases (according to list 2).                                                                                                                                                                                                                                                                                                                    |
| PLO-9  | Determine the nature and principles of treatment of patients (conservative, surgical) with diseases (according to list 2), taking into account the patient's age, in a health care facility, outside it and at the stages of medical evacuation, including in the field, based on a preliminary clinical diagnosis, observing the relevant ethical and legal standards, by making an informed decision according to existing algorithms and standard schemes, if necessary, expand the standard scheme, be able to justify personalised recommendations under the supervision of a medical supervisor |
| PLO-21 | Search for relevant information in professional literature and databases other sources, analyse, evaluate and apply this information.                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| PLO-22 | Apply modern digital technologies and specialised software, statistical methods of data analysis to solve complex healthcare problems.                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| PLO-24 | To organise the necessary level of individual safety (own and of the persons under his/her care) in the event of typical dangerous situations in the individual field of activity in the individual field of activity.                                                                                                                                                                                                                                                                                                                                                                                |
| PLO-25 | Clearly and unambiguously communicate your own knowledge, conclusions and arguments on health care and related issues to professionals and non-specialists.                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| PLO-27 | Communicate fluently in the state language and in English, both orally and in writing, to discuss professional activities, research and projects.                                                                                                                                                                                                                                                                                                                                                                                                                                                     |

4

ECTS Credits

The discipline takes 90 hours of 3 ECTS credits to complete. The programme is structured into 9 content sections.

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Structure of the discipline

| Titles of content modules and topics                                                                                                                                                                                                                      | Number of hours (full-time) |        |          |           |        |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------|--------|----------|-----------|--------|
|                                                                                                                                                                                                                                                           | Total                       | Lectio | Practice | Ind. work | Indep. |
| <b>Section 1</b>                                                                                                                                                                                                                                          |                             |        |          |           |        |
| <b><i>Content section 1. Introduction to radiology. Biological effect of ionising radiation. Dosimetry.</i></b>                                                                                                                                           |                             |        |          |           |        |
| Topic 1: Types of radiology departments. Features of the structure of radiological and radiological departments. OSPU. NRBU. Basic properties of ionising radiation. Biological effect of ionising radiation on healthy and pathologically altered cells. | 8                           | 2      | 3        | –         | 3      |

## 5 Structure of the discipline

| Titles of content modules and topics                                                                                                                                                                                          | Number of hours (full-time) |          |          |           |             |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------|----------|----------|-----------|-------------|
|                                                                                                                                                                                                                               | Total                       | Lecture  | Practice | Ind. work | Indep. work |
| Topic 2. Radioactivity and dose. Dosimetry of ionising radiation: units and methods<br>Determination of radioactivity and radiation dose.                                                                                     | 7                           | -        | 3        | -         | 4           |
| <b>Total by content section 1.</b>                                                                                                                                                                                            | <b>15</b>                   | <b>2</b> | <b>6</b> | -         | <b>7</b>    |
| <i>Content section 2. Imaging methods in radiological diagnostics.</i>                                                                                                                                                        |                             |          |          |           |             |
| Topic 3. Physical and technical bases of X-ray and CT examination. Physical and technical bases of of radionuclide, ultrasound, MRI examination.                                                                              | 8                           | 2        | 3        | -         | 3           |
| <b>Total by content section 2.</b>                                                                                                                                                                                            | <b>8</b>                    | <b>2</b> | <b>3</b> | -         | <b>3</b>    |
| <i>Content section 3. Comprehensive radiological diagnostics of diseases of the chest cavity cavity.</i>                                                                                                                      |                             |          |          |           |             |
| Topic 4. Radiation methods of research and radiation anatomy of the chest cavity. Fundamentals of radiation semiotics of pathology of the thoracic cavity.                                                                    | 8                           | 2        | 3        | -         | 3           |
| Topic 5. Radiation methods of examination of the respiratory system of the respiratory system. Radiation signs of inflammatory diseases of the respiratory system and lung tumours.                                           | 7                           | -        | 3        | -         | 4           |
| Topic 6. Radiation methods of examination and signs of of diseases of the cardiovascular system.                                                                                                                              | 7                           | -        | 3        | -         | 4           |
| <b>Total by content section 3.</b>                                                                                                                                                                                            | <b>22</b>                   | <b>2</b> | <b>9</b> | -         | <b>11</b>   |
| <i>Content section 4. Comprehensive radiological diagnostics of abdominal organs of the abdominal cavity.</i>                                                                                                                 |                             |          |          |           |             |
| Topic 7. Radiation methods of examination and signs of gastrointestinal diseases. Radiation methods of research, radiation signs of diseases and radiation anatomy of the of the hepatobiliary system.                        | 9                           | 2        | 3        | -         | 4           |
| <b>Total for the content section 4.</b>                                                                                                                                                                                       | <b>9</b>                    | <b>2</b> | <b>3</b> | -         | <b>4</b>    |
| <i>Content section 5. Comprehensive radiological diagnostics of urinary system diseases.</i>                                                                                                                                  |                             |          |          |           |             |
| Topic 8: Radiological methods of research and radiological anatomy of the urinary system. Radiation signs of kidney and urinary tract diseases. Radiation signs of developmental anomalies and tumours of the urinary system. | 6                           | -        | 3        | -         | 3           |
| <b>Total for the content section 5.</b>                                                                                                                                                                                       | <b>6</b>                    | <b>-</b> | <b>3</b> | -         | <b>3</b>    |
| <i>Content section 6. Comprehensive radiological diagnostics of diseases of the musculoskeletal system.</i>                                                                                                                   |                             |          |          |           |             |

## 5 Структура дисципліни



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|                                                                                                                                                                                                                                                      |           |          |           |          |           |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|----------|-----------|----------|-----------|
| Topic 9: Radiation methods of research and radiation anatomy of the musculoskeletal system. Radiation signs of traumatic injuries of the musculoskeletal system. Radiation signs of inflammatory diseases and tumours of the musculoskeletal system. | 7         | -        | 3         | -        | 4         |
| <b>Total for the content section 6.</b>                                                                                                                                                                                                              | <b>7</b>  | <b>-</b> | <b>3</b>  | <b>-</b> | <b>4</b>  |
| <i>Content section 7. Comprehensive radiological diagnostics of diseases of the breast, reproductive and endocrine systems.</i>                                                                                                                      |           |          |           |          |           |
| Topic 10. Radiological methods of research and radiological anatomy of the breast. Radiation signs of breast diseases. Radiation methods of research in endocrinology. Radiological signs of thyroid gland diseases.                                 | 6         | -        | 3         | -        | 3         |
| <b>Total for substantive section 7.</b>                                                                                                                                                                                                              | <b>6</b>  | <b>-</b> | <b>3</b>  | <b>-</b> | <b>3</b>  |
| <i>Content section 8. Comprehensive radiological diagnostics of diseases of the central nervous system, oncology and emergency conditions and emergency conditions.</i>                                                                              |           |          |           |          |           |
| Topic 11. Radiation methods of research and radiation anatomy of the CNS. Radiation signs of diseases and injuries of the central nervous system.                                                                                                    | 7         | -        | 3         | -        | 4         |
| <b>Total for substantive section 8.</b>                                                                                                                                                                                                              | <b>7</b>  | <b>-</b> | <b>3</b>  | <b>-</b> | <b>4</b>  |
| <i>Content section 9. Principles and methods of radiotherapy.</i>                                                                                                                                                                                    |           |          |           |          |           |
| Topic 12: Radiological diagnostics in oncology. Principles and methods of radiotherapy. Fundamentals of radiotherapy for tumour and non-tumour diseases.                                                                                             | 6         | -        | 3         | -        | 3         |
| <b>Total for substantive section 9.</b>                                                                                                                                                                                                              | <b>6</b>  | <b>-</b> | <b>3</b>  | <b>-</b> | <b>3</b>  |
| <b>Total hours from section 1</b>                                                                                                                                                                                                                    | <b>86</b> | <b>8</b> | <b>36</b> |          | <b>42</b> |
| <b>13. Differentiated credit</b>                                                                                                                                                                                                                     | <b>4</b>  |          | <b>4</b>  |          |           |
| <b>Total</b>                                                                                                                                                                                                                                         | <b>90</b> | <b>8</b> | <b>40</b> |          | <b>42</b> |

6

## Individual tasks

Individual tasks are one of the forms of organising learning, which aims to deepen, generalise and consolidate the knowledge that students receive in the course of their studies, as well as to apply this knowledge in practice. Individual assignments are completed by students independently under the guidance of a teacher.

Individual tasks include: writing abstracts and creating multimedia presentations with reports at meetings of the department's scientific student circle, participation in the department's research work, participation in writing abstracts and articles at student scientific conferences.

List of tasks for individual student work: Defence of an individual research project; participation in the work of a student research group and presentations at scientific forums; participation in a student competition in the discipline; selection of video and audio materials from sections of the discipline; selection of materials and creation of a presentation on a relevant topic or section of the discipline.

7

## Teaching methods

According to the sources of knowledge, teaching methods are used: verbal - narration, explanation, lecture, instruction; visual - demonstration, illustration; practical - practical work, problem solving. According to the nature of the logic of cognition, the following methods are used: analytical, synthetic, analytical-synthetic, inductive, deductive. According to the level of independent mental activity, the following methods are used: problematic, search, research. 1. Verbal methods: lecture, conversation;

2. Visual methods: illustration, demonstration
  3. Practical methods: practical work and solving situational tasks to develop skills and abilities;
  4. Independent work of students on comprehension and assimilation of new material
  5. Use of control and educational computer programmes
  6. Innovative teaching methods: Case-based learning (learning through the analysis of a clinical case, situation); brainstorming; educational discussion; educational debate; role play; team-based learning; think-pair-share.
- The types of classes according to the curriculum are: lectures; practical classes; independent work of students.

8

## Control methods

Current control is carried out on the basis of control of theoretical knowledge, practical skills and abilities. The forms of current control are: oral questioning (frontal, individual, combined), interview; practical testing of the formed professional skills (conducted on the basis of the results of solving clinical cases, working with medical documentation, performing practical skills, working at the patient's bedside); test control ("open" and "closed" test tasks).

Current control is mandatory. When assessing the mastery of each topic in all disciplines of the curriculum, the student is given grades on a 4-point (traditional) scale for current learning activities, taking into account the approved assessment criteria for the discipline. All types of work provided by the curriculum are taken into account. The student must receive a grade for each topic. The teacher conducts a survey of each student in the group at each lesson and gives a grade in the student's attendance and progress record on a traditional scale ("5", "4", "3", "2").

When assessing a student's current learning activities, 20% of the grade is based on the student's independent work, which takes into account the knowledge of the topic of the independent lesson and the work in the notebook.

The final (summative) control is carried out

- in the form of a written test, which includes test tasks, theoretical questions
- control of practical skills (solving clinical cases, defence of medical history, assessment of the correctness of practical skills - a practice-oriented exam).

In accordance with the specifics of professional training, preference is given to test and practice-oriented control.

Differential test is a form of final control of student's mastering of theoretical and practical material in the discipline.

9

## Form of final control of progress

The maximum number of points for a discipline is 200 points. The ratio between the results of the assessment of current learning activities and the final control of knowledge is 60% and 40%.

The discipline ends with the final control in the form of a differential test.

Only those students who have no academic debt (all missed classes have been completed) and whose average grade for the current academic activity in the discipline is at least "3" are allowed to take the differential test.

The maximum number of points that a student can gain for current academic activities to be admitted to the differential examination is 120 points and is determined as the sum of the arithmetic mean of all grades obtained in the semester.

The minimum number of points that a student must score for the current academic activity is 72 points. Recalculation of the average grade for current academic performance (on a 120-point scale) in Table 1.

**Table 1.**

Recalculation of the average grade for the current academic performance into a multi-point scale for disciplines that end with differential credit



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| 4-point | 200-point | 4-point | 200-point | 4-point | 200-point | 4-point | 200-point          |
|---------|-----------|---------|-----------|---------|-----------|---------|--------------------|
| 5       | 200       | 4.47    | 179       | 3.94    | 158       | 3.42    | 137                |
| 4.97    | 199       | 4.44    | 178       | 3.92    | 157       | 3.39    | 136                |
| 4.94    | 198       | 4.42    | 177       | 3.89    | 156       | 3.37    | 135                |
| 4.92    | 197       | 4.39    | 176       | 3.87    | 155       | 3.34    | 134                |
| 4.89    | 196       | 4.37    | 175       | 3.84    | 154       | 3.32    | 133                |
| 4.87    | 195       | 4.34    | 174       | 3.82    | 153       | 3.29    | 132                |
| 4.84    | 194       | 4.32    | 173       | 3.79    | 152       | 3.27    | 131                |
| 4.82    | 193       | 4.29    | 172       | 3.77    | 151       | 3.24    | 130                |
| 4.79    | 192       | 4.27    | 171       | 3.74    | 150       | 3.22    | 129                |
| 4.77    | 191       | 4.24    | 170       | 3.72    | 149       | 3.19    | 128                |
| 4.74    | 190       | 4.22    | 169       | 3.69    | 148       | 3.17    | 127                |
| 4.72    | 189       | 4.19    | 168       | 3.67    | 147       | 3.14    | 126                |
| 4.69    | 188       | 4.17    | 167       | 3.64    | 146       | 3.12    | 125                |
| 4.67    | 187       | 4.14    | 166       | 3.62    | 145       | 3.09    | 124                |
| 4.64    | 186       | 4.12    | 165       | 3.59    | 144       | 3.07    | 123                |
| 4.62    | 185       | 4.09    | 164       | 3.57    | 143       | 3.04    | 122                |
| 4.59    | 184       | 4.07    | 163       | 3.54    | 142       | 3.02    | 121                |
| 4.57    | 183       | 4.04    | 162       | 3.52    | 141       | 3       | 120                |
| 4.54    | 182       | 4.02    | 161       | 3.49    | 140       | < 3     | 70-119<br>(retake) |
| 4.52    | 181       | 4.00    | 160       | 3.47    | 139       |         |                    |
| 4.49    | 180       | 3.97    | 159       | 3.44    | 138       |         |                    |

The maximum number of points that a student can score in a differential test is 80 (the minimum number is at least 50).

The grade in a discipline is determined comprehensively as the sum of points for current learning activities and points for differential assessment.

Of the 120 points allocated for current learning activities, an additional 4 to 12 points are allocated to assess the individual independent work of higher education students, according to the work curriculum. Incentive points are added to the final grade in the discipline at the end of its study. Points in the discipline for students who have successfully completed the programme are converted into the national scale and the ECTS system (Table 2).

**Table 2**

| Scale for transferring points to the national system |                       |
|------------------------------------------------------|-----------------------|
| according to the national system                     | 200-point             |
| passed                                               | from 120 to 200 point |
| no passed                                            | less 119 point        |

| Scale of assessment: national and ECTS             |                 |                               |          |
|----------------------------------------------------|-----------------|-------------------------------|----------|
| Sum of points for all types of learning activities | ECTS assessment | Score on the national scale   |          |
|                                                    |                 | for exam, differentiated test | for test |
| 180-200                                            | A               | excellent                     | Passed   |
| 160-179                                            | B               | good                          |          |



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|         |    |                                                                    |                                                           |
|---------|----|--------------------------------------------------------------------|-----------------------------------------------------------|
| 150-159 | C  | satisfactorily                                                     |                                                           |
| 130-149 | D  |                                                                    |                                                           |
| 120-129 | E  |                                                                    |                                                           |
| 50-119  | FX | satisfactorily<br>unsatisfactory with the<br>possibility of retake | No passed with the<br>possibility of retake               |
| 0-49    | F  | unsatisfactory with<br>mandatory re-study of<br>the discipline     | No passed with<br>mandatory re-study of<br>the discipline |

## 10 Methodological support

1. The working curriculum of the discipline;
2. Plans of lectures, practical classes and independent work of students;
3. Theses of lectures on the discipline;
4. Methodical instructions for practical classes for students;
5. Methodological materials that provide independent work of students;
6. Tests and control tasks for practical classes;
7. List of questions for the exam

## 11 Recommended reading

### Main (basic):

1. Kravchuk S.Y. Radiology: textbook / S.Y. Kravchuk. - Kyiv: VSV "Medicine", 2019. - 296 p.
2. Radiology. Radiotherapy. Radiological diagnostics: Textbook for students of higher education institutions of the IV level of accreditation / O.V. Kovalsky, D.S. Mechev, V.P. Danilevich - Vinnytsia: Nova Knyha, 2017. 512 p.
3. Radiation diagnostics: [In 4 vols] / Koval G.Y., Mechev D.S., Miroshnychenko S.I., Sharmazanova O.P. et al: T. I. - 2018.- 302 p.

### Auxiliary:

1. Comprehensive Textbook of Clinical Radiology, 6 Volume Set 1st Edition. - Elsevier India. - 2023.
2. Diagnostic, therapeutic and prophylactic algorithms in internal medicine: a textbook / [V. Denesiuk et al. eds] ; edited by Prof. V. Denesiuk ; Vinnytsia National Medical University named after M. Pirogov, Department of Internal Medicine № 3. - Kyiv : SLC Centre, 2015. - 151 p. : figs, tab.
3. Radiology (radiological diagnostics and radiotherapy). Test tasks. In parts. -Kyiv, Book Plus. 2015. - 104 c.

### Information resources:

1. <https://radiographia.info/>
2. <http://nld.by/help.htm>
3. <http://learningradiology.com>
4. <http://www.radiologyeducation.com/>
5. <http://www.radiologyeducation.com/>
6. <https://www.sonosite.com>

## 12 Tips for successful studying on the course

If you want to be successful in this discipline, you need to:

1. Be active, persistent, inquisitive, consistent
2. Be tidy and polite
2. Systematically prepare for practical classes
3. Perform tasks for independent work and defend them in class.



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3. To be present at the class in a medical gown
  4. To solve tests and tasks independently, to work actively in class.
  5. Prepare presentations and crosswords on the discipline. Participate in student scientific conferences and engage in research work in the department's scientific circles.

I wish you perseverance, dedication and motivation to learn. And then success will come to you!

See you in class!

Don't forget your medical gowns!