INTERNATIONAL HIGHER SCHOOL OF MEDICINE

Department of Cardiac Surgery and Radiology

SYLLABUS
Radiotherapy

2025-2026 academic year
for students of medical faculty
4th course VIII semester, groups (according to the timetable)
1 credit (30 h, including auditorial 18 h, independent work – 12 h)

Lecturer: **docent Kadyrova A. I.**
+996555943406 (Whatsapp)
Email: al-kadyrova@yandex.ru
Venue: Zoom:

Practical classes: **ass. Kulbaeva B. N.**
+996 558 545547 (Whatsapp)
Email: lakewood507@gmail.com
Venue: National Center of oncology, room 011

The Syllabus is considered
at the meeting of the department of Natural Sciences Disciplines
Protocol № 1 dated 03.09.2025
Head of the department _____I.H. Bebezov

Course Objective: consists of studying radiotherapy methods for their adequate use for treatment of malignancies.
Knowledge:
• Types and properties of radiation;
• biological effect of ionizing radiation;
• methods of protection against ionizing radiation;
• biological fundamentals of neoplasm development;
• definition of dosimetry, pre-radiation preparation;
• treatment volume, critical organs;
• external beam radiotherapy techniques, stereotactic surgery;
• brachytherapy, types;
• indications and contraindications to EBRT and brachytherapy;
• side effects of radiotherapy, prevention and management.
Skill:
• Determine indications and contraindications for radiotherapy;
• submit a referral for radiation examination in terms of treatment choosing procedure;
• choose adequate type of radiotherapy according to stage of malignancy, if indicated;
• prepare the patient for radiotherapy séance;
• identify side effects and form adequate recommendations for further management.
Attitude: An algorithm for using radiotherapy for malignant tumors.
Pre-requisites. To study this academic discipline requires knowledge, skills and abilities, formed by previous disciplines: Macro- and microanatomy, Normal physiology, Pathophysiology, Medical physics.
Post-requisites. As a result of studying this section, the foundation is laid for further study by students of the following clinical disciplines: Oncology

THEMATIC PLAN OF LECTURES

№	Theme of lecture	Hours	Date
1	Biological fundamentals of radiotherapy.	2	According to actual timetable
3	External beam radiotherapy.	2	According to actual timetable
4	Brachytherapy.	2	According to actual timetable
Total		**6 hours**	

THEMATIC PLAN OF PRACTICAL CLASSES

№	Theme of practical class	Hours	Date
1	Introduction to radiotherapy		
1	Physical, technical basics of radiotherapy.	2	1.09.25-29.12.25
2	Radiobiology.	2	1.09.25-29.12.25
3	Methods of radiotherapy. Side effects, management.	2	1.09.25-29.12.25
4	Side effects of radiotherapy	2	
5	Unit control	2	1.09.25-29.12.25
Total		**10 hours**	

THEMATIC PLAN OF INDEPENDENT WORK OF STUDENTS

№	Theme of independent work	Hours	Date
Unit I Radiotherapy	Studying stereotactic surgical techniques Situational tasks. Abstracts and presentations on specific topics.	12	1.09.25-29.12.25

Recommended reading for the discipline:

1.Basic

№	Authors	Title	The year of publishing
1	Paul R Symonds, John A Mills, Angela Duxbury	Walter and Miller's Textbook of Radiotherapy: Radiation Physics, Therapy and Oncology 8th Edition	2019

2.Additional

№	Authors	Title	The year of publishing
1	Philip Mayles, Alan E. Nahum, J.C. Rosenwald	Handbook of Radiotherapy Physics Theory and Practice, Second Edition, Two Volume Set	2021
2	International Atomic Energy Agency	Radiation Biology: A Handbook for Teachers and Students	2010

Resources of the information and telecommunication network "Internet"

1. IAEA: https://www.iaea.org/
2. PubMed: https://www.ncbi.nlm.nih.gov/
3. MedLine: https://www.nlm.nih.gov/
4. Radiologykey: https://radiologykey.com/

Grading policy and procedures for all types of work

For the period of studying the discipline, the student gains points for the relevant parameters (per unit):
current score - 40 points
independent work - 20 points
control score (final assessment of knowledge per unit) - 40 points
Maximum score - 100 (40+20+40)

Grading system for student's achievements

Grading criteria per discipline				
Maximum score	Intervals			
	«unsatisfactory»	«satisfactory»	«good»	«excellent»
Current control- 40	0-23	24-30	31-35	36-40
Interval description	Not ready for class	Passive, does not participate in the discussion of the lesson topic	Actively participates in the discussion of the topic of the lesson, periodically gets confused in the details.	Actively participates in the discussion of the topic of the lesson, gives a complete and accurate answer to the question.
Independent work - 20	0-11	12-15	16-17	18-20
Interval description	Doesn't answer questions on the topic	Has difficulty answering, has poor knowledge of the topic	Answers well, but occasionally gets confused in some answers	Confident, complete answer. Shows good knowledge of the topic, does not get confused in answers
Control work (module) – 40	0-23	24-30	31-35	36-40
Interval description	Doesn't answer questions	Has difficulty answering, does not know the answer well	Answers well, occasionally gets confused in some answers	Answers all questions correctly, completely. Don't get confused with answers

Conduct Policy: (lateness, absence, behavior in the auditorium, late submission of work).

- Punctuality and completion of tasks.
- Mandatory attendance of classes.
- Attending class in a clean medical uniform.
- Eliminating conversations on a cell phone in the classroom.
- Active participation in the learning process.

- Doing homework on time.
- Academic detention at the time specified by the teacher.
For violations of the Conduct Policy, the total points for discipline might be reduced to 1-10 points.

Academic Ethics Policy.
- Be tolerant, respect the opinions of others.
- Formulate objections in the correct form.
- Constructively support feedback in all classes.
- Plagiarism and other forms of dishonest work are unacceptable. Plagiarism includes the following: the absence of references when using printed and electronic materials, quotes, thoughts and works of other authors or students.
- Prompting and cheating during tests, exams, classes is unacceptable as well as passing an exam for another student, unauthorized copying of materials.
For violations of the Academic Ethics Policy, the total points for the discipline may be reduced to 1-10 points.

Guidelines for the lessons of the discipline
Radiotherapy
Key questions covered in lesson 1.
Stages of development of radiation therapy. Goals and objectives of radiation therapy. Physical basis of radiation therapy. Types of ionizing radiation. Indications and contraindications to radiation therapy. Types of radiation therapy planning. Radical radiation therapy. Palliative radiation therapy. Symptomatic radiation therapy. Physical and technical fundamentals of radiotherapy.
Recommended reading for the lesson:
1) Philip Mayles, Alan E. Nahum, J.C. Rosenwald – Handbook of Radiotherapy Physics. Theory and Practice, 2021
Key questions covered in lesson 2. Biological basis of radiation therapy: sublethal and lethal radiation damage; radiosensitivity of tumors and healthy tissues, radiosensitivity in different periods of the cell cycle, oxygen effect. Clinical Dosimetry. Fractional treatment regimens. 4 R's of radiobiology.
Recommended reading for the lesson:
1) Paul R Symonds, John A Mills, Angela Duxbury – Walter and Miller's Textbook of Radiotherapy: Radiation Physics, Therapy and Oncology 8th Edition, 2019
2) International Atomic Energy Agency Radiation Biology: A Handbook for Teachers and Students., 2010.
Key questions covered in lesson 3. Pre-radiation preparation. Treatment planning system. Overview of radiotherapeutic techniques. Determination of method of radiation therapy. The concept of external beam methods of radiation therapy, conventional and conformal, IMRT, IGRT, CBRT. The concept of brachytherapy. Types of brachytherapy; application, interstitial, intraluminal and intracavitary radiation therapy. Physical and technical equipment of brachytherapy. Advantages and disadvantages of brachytherapy. Systemic brachytherapy. Rules and regulations of adequate radioisotopes usage.
The concept of common and local, acute and chronic radiation injuries. Risks of complications in various organs. Symptoms of damage to radiation reactions. Prevention and management of radiation damage.
1) Paul R Symonds, John A Mills, Angela Duxbury – Walter and Miller's Textbook of Radiotherapy: Radiation Physics, Therapy and Oncology 8th Edition, 2019
Key questions covered in lesson 4.
Unit control**.** Tests, situational tasks.

Methodological instructions for the implementation of independent work on the discipline.
Radiotherapy
Every student is given an individual learning project which must be completed. The results should be reported in the form of presentation.
Every group is given one common learning project which must be completed. The results should be reported in the form of presentation.
Questions for projects
- History of radiotherapy.
- Radiobiological fundamentals.
- Treatment planning: contemporary techniques and 3D CT reconstruction role
- The device of X-ray machines, LINAC.
- Stereotactic surgery: overview and modalities.
- Brachytherapy sources device, systemic brachytherapy.
- Local radiation injuries, management.
- Common radiation damage, management
- Chronic radiation disease.