

MINISTRY OF EDUCATION AND SCIENCE OF UKRAINE

Petro Mohyla Black Sea National University

Medical Institute

Department of Surgical Disciplines

"I APPROVE IT"

First Vice-Rector

Grischenko N. M.



2021

WORKING PROGRAM OF THE ACADEMIC DISCIPLINE

ONCOLOGY AND RADIATION MEDICINE

Branch of knowledge 22 "Healthcare"

Specialty 222 "Medicine"

|                                      |                   |
|--------------------------------------|-------------------|
| Developer                            | Zaborovskyi V. I. |
| Head of the Developer Department     | Zack M.U.         |
| Guarantor of the educational program | Klimenko M. O.    |
| Director of the Institute            | Grischenko G. V.  |
| Head of NMV                          | Shkirchak S. I.   |

## Introduction

The academic discipline "Oncology and radiation medicine" includes the study of the basic concepts of clinical oncology and the principles of basic research of tumors, identification of diagnostic, prognostic and predictive biomarkers of the tumor process, individualization of treatment, etc. Within the framework of teaching the discipline, the issues of pathogenetic bases and mechanisms of development of malignant neoplasms, molecular and genetic features of their progression and metastasis are considered in detail. In the course of teaching the discipline, special attention is paid to highlighting the applied aspects of fundamental oncology, the organization of cancer services, clinical signs, diagnostics, principles of treatment of malignant tumors, the possibility of practical application and significance of individual laboratory methods for early diagnosis of solid tumors and lymphoproliferative diseases is given and/or demonstrated.

The discipline "Oncology and radiation medicine" is part of the basic part of student training and is an important subject, since at present the incidence of malignant tumors in the population remains high. In the structure of population mortality, malignant tumors occupy the 2nd-3rd place. Radical treatment of cancer patients is possible with early timely diagnosis of tumors, which requires in-depth training.

Radiation medicine is a complex scientific discipline that is closely related to a number of theoretical and applied fields of knowledge. The role of this discipline in the training of future doctors is constantly increasing. The constant expansion of the sphere of human contact with ionizing radiation sources, the possibility of emergency situations, which is accompanied by excessive exposure of professionals and the public, has made it relevant to study the effect of this factor on human health. Analysis of the consequences of the Chernobyl nuclear power plant accident revealed a number of shortcomings in the knowledge of doctors, which led to errors in providing medical care and prevention to victims of a nuclear disaster. In recent decades, radiation medicine has been supplemented with new approaches to the diagnosis and treatment of radiation pathology.

### 1. Description of the academic discipline

| <b>Naming of the indicator</b> | <b>Characteristics of the discipline</b> |                     |
|--------------------------------|--|---------------------|
| Name of the discipline         | Oncology and radiation medicine          |                     |
| Area of expertise              | 22 "healthcare"                          |                     |
| Specialization                 | 222 "Medicine"                           |                     |
| Specialization (if any)        |  |                     |
| Educational program            | Medicine                                 |                     |
| Higher education level         | Master's Degree                          |                     |
| Discipline status              | Custom version                           |                     |
| Course of study                | 5th                                      |                     |
| Academic year                  | 2020-2021                                |                     |
| Semester numbers:              | Full-time form                           | Correspondence form |
|                                | Ten                                      |                     |

|   |                           |                     |
|---|---------------------------|---------------------|
| Total number of ECTS credits/hours  | 4 credits / 120 hours     |                     |
| Course structure:<br><br><ul style="list-style-type: none"> <li>• lectures</li> <li>• practical exercises</li> <li>• hours of independent work of students</li> </ul> | Full-time form            | Correspondence form |
|   | 10                        |                     |
|   | 50                        |                     |
|   | 60                        |                     |
| Percentage of audience load   | 50%                       |                     |
| Language of instruction   | english                   |                     |
| Final control form  | Dif. credit – 10 semester |                     |

## 2. Purpose, objectives, and planned learning outcomes

**Goal** The study of oncology and radiation medicine is carried out on the basis of AKI training of a doctor: to acquaint students with the current state and principles of fundamental research in clinical oncology, taking into account the concept of the relationship between the tumor and the body, molecular genetic and pathophysiological foundations of the development of the tumor process; mastering knowledge, skills and abilities of early diagnosis of cancer, as well as the principles of radiation therapy treatment and prevention of tumor diseases; formation of competencies necessary in professional activities training of students in a complex of knowledge, skills and abilities in radiation medicine; to understand the processes that occur in the human body under the influence of ionizing radiation.

As an academic discipline, it is an integral part of clinical medicine, so studying the main provisions of this field of science is an important moment in training a doctor of any specialty.

**Learning objectives:** acquisition by a student of competencies, knowledge, skills and abilities for carrying out professional activities in the specialty:

- 1) learning the basics of theoretical oncology;
- 2) study of the main nosological forms of malignant tumors, their clinical manifestations, features of the course and diagnostic methods;
- 3) introduction to the organization of cancer care for the population and modern principles of treatment of cancer patients;
- 4) development of practical skills in the organization of cancer care, prevention, clinic and early diagnosis of malignant tumors and rehabilitation of patients;
- 5) study of clinical signs and methods of early diagnosis of tumors and cancer prevention, determination of the doctor's tactics when a malignant tumor is suspected;
- 6) study of the physical and radiobiological foundations of radiation medicine, diagnostic methods for indicating radiation doses in the body;
- 7) study of the effects of radiation exposure on the body and another organs and systems;

8) mastering differentiated treatment and emergency care for acute radiation injuries.

9) study of the prevention of radiation injuries and methods of rehabilitation of persons affected by radiation accidents.

**Prerequisites for studying the discipline (interdisciplinary relations).** Oncology and radiation medicine as an academic discipline:

a) it is possible if you have previously studied the relevant sections in other departments: medical physics, genetics, biochemistry, clinical pharmacology, pathological physiology and morphology, therapy, surgery, hygiene, social medicine, health organization and other disciplines;

b) lays the foundation for students' study of translational medicine, provides for the integration of teaching with this discipline and the formation of skills to apply knowledge on clinical oncology in the process of further training and in professional activities;

c) allows you to understand the processes that occur in the human body under the influence of ionizing radiation.

d) provides an opportunity to acquire practical skills and develop professional skills for the diagnosis and provision of medical care in certain pathological conditions and during the care of cancer patients.

e) forms the methodological foundations of clinical thinking.

**Expected learning outcomes. As a result of studying the discipline, students should::**

- formation of an understanding of the essence of the basic concepts of fundamental and clinical oncology, basic theories of carcinogenesis, biology of tumor growth, the human genome and molecular markers in the diagnosis of malignant neoplasms;
- formation of an understanding of the main directions of fundamental and applied research in clinical oncology;
- mastering the basic diagnostic methods for studying biological material (hematological, biochemical, immunological, cytomorphological, molecular biology, etc. ) for the diagnosis of oncological diseases and their monitoring;
- formation of an understanding of current trends in the development of oncology and related sciences for future professional orientation.
- operate with knowledge about the biological effects of ionizing radiation on the human body, its effects on various organs and systems;
- master the issues of etiology, pathogenesis, clinic, course of acute and chronic radiation sickness and local radiation lesions, combined effects of various types of ionizing radiation, modern hypotheses of the effect of low doses of radiation on the human body;
- determine and analyze the diagnosis and possible clinical consequences of ingestion of radionuclides, the possibility of using therapeutic and preventive measures.;

According to the requirements of the educational and professional program, students must::

***TO KNOW:***

- semiotics, clinic, etiology, pathogenesis of benign and malignant tumors;
- programs of screening and diagnostics (clinical, laboratory, instrumental) of oncological diseases;
- doctor's tactics when a patient is suspected of having cancer;
- clinical picture, features of the course and possible complications in oncology;
- basic methods of laboratory and instrumental diagnostics used in oncology (indications for use, interpretation of results), rules for collecting pathological materials from the patient.
- nature and properties of ionizing radiation (alpha, beta, gamma, neutrons, X-rays);
- dosimetry of ionizing radiation, biological effect of ionizing radiation; - questions of etiology, pathogenesis, pathomorphology of radiation lesions;
- diagnostic methods of radiation medicine;
- clinic of acute and chronic radiation injuries: the principle of prevention of radiation injuries;
- the effect of ionizing radiation on various organs and systems of the body, the long-term effects of ionizing radiation, the effect of small doses of ionizing radiation on the human body;
- principles of prevention of radiation damage and its consequences, medical, psychological and social aspects of large-scale accidents at nuclear power plants;
- maintaining standard accounting and reporting medical documentation in medical institutions.

***BE ABLE TO:***

- recognize the clinical symptoms of cancer at an early stage of their development.
- conduct a survey of the patient in order to collect anamnesis, including: life history, obstetric and gynecological history, hereditary history, etc. be able to examine the patient.
- make a plan for laboratory and instrumental examination, interpret its results;
- conduct a physical examination of the patient, use subjective, objective and functional methods of studying the cancer patient;
- use subjective, objective and functional methods of cancer patient research;
- choose the necessary medical means for the treatment of cancer pathology and victims of external radiation or internal intake of radionuclides;
- choose adequate diagnostic methods for determining radiation damage to various organs and systems of the body;

- on the basis of dosimetry data, laboratory tests and clinical signs, diagnose radiation damage (severity, period of clinical course, etc.);
- carry out prevention of radiation damage;
- on the basis of knowledge about the damaging factors that occur in accidents at nuclear power plants, conduct sanitary and educational work with the population.
- willingness to implement ethical and deontological principles.

### ***HAVE COMPETENCIES***

- on the application of knowledge on oncology and radiation medicine for the promotion of a healthy lifestyle, as well as for the prevention of cancer pathology;
- the main promising areas of development of oncology and radiation medicine; formation of practical skills in the diagnosis and treatment of patients with cancer; nature, types and properties of radiation;
- the main promising areas of development of oncology and radiation medicine.

The developed program corresponds to ***educational and professional program (OPP)*** and focused on the formation of ***competencies***:

#### ***general (ZK) – ZK1-ZK3 OPP:***

**ZK1.** Ability to think abstractly, analyze and synthesize, learn and master modern knowledge.

**ZK2.** Ability to apply knowledge in practical situations.

**ZK3.** Knowledge and understanding of the subject area and understanding of professional activity.

#### ***professional (FC) - FC1-6; FC11; FC16; FC18 OPP:***

**FC1.** Patient interviewing skills.

**FC2.** Ability to determine the necessary list of laboratory and instrumental studies and evaluate their results.

**FC3.** Ability to establish a preliminary and clinical diagnosis of the disease.

**FC4.** Ability to determine the necessary mode of work and rest in the treatment of diseases.

**FC5.** Ability to determine the nature of nutrition in the treatment of diseases.

**FC6.** Ability to determine the principles and nature of treatment of diseases.

**FC11.** Skills in performing medical manipulations.

**FC16.** Ability to determine the management tactics of persons subject to medical supervision.

**FC18.** Ability to maintain medical records.

***Program-based learning outcomes (s) - PRN11, PRN13-18, PRN22, PRN25, PRN28, PRN30, PRN32, PRN33, PRN35, PRN41 OPP:***

**PRN11.**Collect data on patient complaints, medical history, and life history (including professional medical history), in the conditions of a health care institution, its department or at the patient's home, using the results of an interview with by the patient, according to the standard patient survey scheme. Under any circumstances (in a healthcare facility, department, or home at the patient, etc.), using knowledge about the person, his organs and systems.

**PRN13.** In the context of a healthcare institution, its subdivisions and among the attached population: be able to identify and record the leading clinical symptom or syndrome by making an informed decision, using preliminary data from the patient's medical history, data from the patient's physical examination, knowledge about the person, his organs and systems, by adhering to the relevant ethical and legal standards. Be able to establish the most likely or syndromic diagnosis diseases by making an informed decision, for the patient and the patient's examination data, based on the leading clinical symptom or syndrome, using knowledge about the person, their organs and systems, by adhering to the relevant ethical and legal standards.

**PRN14.** In the context of a healthcare institution or its subdivision: appoint a laboratory and / or instrumental examination of the patient by making an informed decision, based on the most probable or syndromic diagnosis, according to standard schemes, using knowledge about the person, his organs and systems, by adhering to the relevant ethical and legal standards. Perform differential diagnosis of diseases by making an informed decision, according to a certain algorithm, using the most probable or syndrome diagnosis, data from laboratory and instrumental examination of the patient, knowledge about the person, his organs and systems, adhering to the relevant ethical and legal norms. Establish a preliminary clinical diagnosis by making an informed decision and logical analysis, using the most probable or syndromic diagnosis, data from laboratory and instrumental examination of the patient, conclusions of differential diagnosis, knowledge about the person, his organs, etc. system, adhering to the relevant ethical and legal standards.

**PRN15.**Determine the necessary mode of work and rest during treatment diseases, in the conditions of a health care institution, at home in the patient and at the stages of medical evacuation, including in the field, on the basis of a preliminary clinical diagnosis, using knowledge about human beings, their organs and systems, adhering to the relevant ethical and legal standards. legal norms, by making an informed decision on the following issues: existing algorithms and standard schemes.

**PRN16.**Determine the necessary therapeutic nutrition in the treatment of the disease, in the conditions of a health care institution, at the patient's home and at home. stages of medical evacuation, including in the field on the basis of preliminary clinical diagnosis, using the knowledge of the person, his bodies and systems, adhering to the relevant ethical and legal standards. norms, by making an informed decision on existing ones algorithms and standard schemes.

**PRN17.**Determine the nature of treatment (conservative, operative) of the disease in a health care facility, at the patient's home, and at the workplace. stages of medical evacuation, including in the field on the basis of preliminary clinical diagnosis, using the knowledge of the person, his bodies and systems, adhering to the relevant ethical and legal standards. norms, by making an informed decision on existing ones algorithms and standard schemes. Determine the principles of treatment of the disease in the conditions of health care facilities, at the patient's home and at the stages of medical treatment evacuation procedures, including in the field, based on a preliminary clinical report. diagnosis, using knowledge about a person, his organs and systems, adhering to the relevant ethical and legal standards, by making an informed decision based on existing algorithms and standard schemes.

**PRN18.**Establish a diagnosis by making a reasonable decision. decisions and assessments of a person's condition, under any circumstances (at home, on the street, health care institution, subdivision), including in an emergency situation, in the field, in conditions of lack of information and limited time, using standard methods of physical examination, etc. possible medical history, knowledge about the person, his organs and systems, by adhering to the relevant ethical and legal standards.

**PRN22.**Perform medical manipulations in a medical center. based on a preliminary clinical diagnosis and/or indicators of the patient's condition, using knowledge of the following factors: human beings, their organs and systems, adhering to the relevant ethical and legal standards. legal norms, by making an informed decision and using standard techniques.

**PRN25.** To form, in the conditions of a health care institution, its divisions in production, using a generalized procedure for assessing the state of health human health, knowledge about a person, his organs and systems, following appropriate ethical and legal standards, through the adoption of a reasonable decision, among the assigned population: dispensary groups of patients;in the group of healthy people subject to dispensary observation (newborns, children, teenagers, pregnant women, representatives of professions, must pass a mandatory dispensary examination).

**PRN28.** Organize the implementation of secondary and tertiary prevention activities among the assigned population, using a generalized procedure for assessing the state of human health (screening, preventive medical examination, seeking medical help), knowledge about the person, his organs and systems, adhering to the relevant guidelines. ethical and legal standards, by making an informed decision, in the context of a health care facility, in particular: form groups of dispensary observation; organize health-improving activities in a differentiated manner medical examination groups.

**PRN30.**Conduct detection and early diagnosis of infectious diseases in the conditions of a healthcare institution or its subdivision; primary anti-epidemic measures in the focus of an infectious disease.

**PRN32.** In a healthcare facility or at the patient's home based on the obtained data on the patient's health status, using standard schemes, using knowledge about a person, his organs and systems, following the appropriate ethical and legal standards, through the adoption of an informed decision: determine the tactics of examination and secondary prevention of patients, to determine the tactics of examination and primary prevention of healthy individuals subject to dispensary observation; calculate and prescribe the necessary food products for children of the first year of life.

**PRN33.**Determine the presence and degree of life activity restrictions, type, degree and duration of incapacity for work with the execution of the relevant documents, in accordance with the



Legislation of the Russian Federation. conditions of a health care institution based on data on the disease and its course, and the specifics of a person's professional activity.

**PRN35.** In the service area using standard descriptive methods, analytical epidemiological and medico-statistical studies: conduct screening to identify the most important non-communicable diseases; evaluate the dynamics of morbidity rates, including chronic ones, when compared with static average data non-communicable diseases, disability, and mortality, integral health indicators; identify risk factors for the occurrence and course of diseases; form risk groups of the population.

**PRN41.** In the context of a healthcare institution or its subdivision using standard methods: conduct selection and use unified clinical protocols guidelines for the provision of medical care developed on the basis of evidence-based take part in the development of local protocols for providing medical care; conduct quality control of medical services based on: statistical data, expert evaluation, and sociological research data. Research using indicators of structure, process, and performance; identify barriers to improving quality and safety medical assistance.

### 3. Academic discipline program

The educational process is organized according to the European Credit Transfer and Accumulation System (ECTS).

The program of the discipline "Oncology and radiation medicine " is structured into one block.

#### Structure of the academic discipline

| Topic names  | Total hours | l.       | pr.      | sec. d.  |
|--|-------------|----------|----------|----------|
| <b>1</b>   | <b>2</b>    | <b>3</b> | <b>4</b> | <b>5</b> |
| <b>Topic 1.</b> Organization of cancer care.                           | 5,5         | 0,5      | 2        | 3        |
| <b>Topic 2.</b> Epidemiology and prevention of malignant tumors.       | 7,5         | 0,5      | 4        | 3        |
| <b>Topic 3.</b> Patterns of development of malignant tumors.           | 7,5         | 0,5      | 4        | 3        |
| <b>Topic 4.</b> Preclinical and clinical periods of tumor development. | 7,5         | 0,5      | 4        | 3        |
| <b>Topic 5.</b> Basic principles of diagnosis of malignant tumors.     | 7,5         | 0,5      | 4        | 3        |
| <b>Topic 6.</b> Principles of treatment of malignant tumors.           | 5,5         | 0,5      | 2        | 3        |
| <b>Topic 7.</b> Antitumor chemotherapy drugs.                          | 5,5         | 0,5      | 2        | 3        |

|  |            |           |           |           |
|--|------------|-----------|-----------|-----------|
| <b>Topic 8.</b> Skin tumors. Melanoma.   | 5,5        | 0,5       | 2         | 3         |
| <b>Topic 9.</b> Head and neck tumors.  | 5,5        | 0,5       | 2         | 3         |
| <b>Topic 10.</b> Breast cancer.  | 5,5        | 0,5       | 2         | 3         |
| <b>Topic 11.</b> Lung cancer.  | 5,5        | 0,5       | 2         | 3         |
| <b>Topic 12.</b> Tumors of the urinary and genital organs.                                     | 5,5        | 0,5       | 2         | 3         |
| <b>Topic 13.</b> Bone and soft tissue tumors.  | 5,5        | 0,5       | 2         | 3         |
| <b>Topic 14.</b> Tumors of the abdominal cavity.   | 5,5        | 0,5       | 2         | 3         |
| <b>Topic 15.</b> The subject of radiation medicine, its relation to other medical disciplines. | 7,5        | 0,5       | 4         | 3         |
| <b>Topic 16.</b> Радіонуклеїди.  | 5,5        | 0,5       | 2         | 3         |
| <b>Topic 17.</b> Basic research methods in radiology.  | 5,5        | 0,5       | 2         | 3         |
| <b>Topic 18.</b> Acute radiation sickness.   | 5,5        | 0,5       | 2         | 3         |
| <b>Topic 19.</b> Acute local radiation injuries.   | 5,5        | 0,5       | 2         | 3         |
| <b>Topic 20.</b> Long-term effects of ionizing radiation.                                      | 5,5        | 0,5       | 2         | 3         |
| <b>TOGETHER</b>  | <b>120</b> | <b>10</b> | <b>50</b> | <b>60</b> |

## 4. Content of the academic discipline

### 4.1. Lecture plan

| №<br>S.<br>P. | TOPIC  | Quantity<br>hours |
|---------------|--|-------------------|
|               | <p><b>Organization of cancer care. Epidemiology and prevention of malignant tumors.</b></p> <p>Structure of the cancer network in Ukraine. Oncological dispensary, its functions. General characteristics of the state of cancer care in the region. Division of cancer patients into clinical groups. Accounting documentation. Medical examination of cancer patients. Analysis of the causes of cancer and analysis of cases of malignant tumors. Morbidity and mortality from malignant tumors. Gender and age characteristics of patients. Dynamics and structure of morbidity. Geographical features of the spread of malignant tumors. The concept of primary and secondary prevention. Socio-hygienic and individual cancer prevention measures. Fight against smoking. Food hygiene. Anti-cancer sanitary and educational work. Deontology in oncology.</p>   | 2                 |
|               | <p><b>Patterns of development of malignant tumors.</b></p> <p>Molecular and genetic mechanisms of carcinogenesis. The role of oncogenes. The role of internal and external environmental factors in the development of malignant tumors. Chemical and physical carcinogens. Virusogenetic theory of the occurrence of malignant tumors. Antitumor immunity. Modern scientific achievements in uncovering the mechanisms of carcinogenesis and treatment of malignant tumors. Facultative and obligate precancerous diseases. The concept of dysplasia. The course of the cancer process. Early cancer. Forms of growth of malignant tumors. Evaluation of the spread of the process: principles of classification of tumors by stage. Preclinical and clinical periods of tumor development. Pathogenesis of malignant tumor symptoms: changes in water-electrolyte metabolism and acid-base balance. Protein-energy deficiency syndrome. Pain syndrome. Paraneoplasia</p> | 2                 |

|                 |   |           |
|-----------------|---|-----------|
|                 | of cancer patients. Changes in the regulation of the aggregate state of blood in cancer diseases: thromboembolism, DIC-syndrome, bleeding.  |           |
|                 | <p><b>Basic principles of diagnosis of malignant tumors. Principles of treatment of malignant tumors.</b></p> <p>Collection and evaluation of complaints and medical history in cancer patients. Features of physical examination methods in case of suspected malignant tumor. X-ray, endoscopic, ultrasound, thermographic and isotope diagnostic methods. Computed tomography. Nuclear magnetic resonance. Recognition of cancer in the preclinical period. The role of preventive checkups in timely cancer detection. Forms, methods and frequency of preventive examinations. Formation of high-risk groups. Screening methods. The concept of monitoring. Classification of special treatment methods. Combined and complex treatment. Radical, palliative and symptomatic methods. Principles of ablasy, antiblasty, zoning and case management in surgical oncology. Methods of radiation therapy of malignant tumors. Radiosensitive and radioresistant tumors. Mechanism of action of ionizing radiation on malignant tumors. Means of increasing radio sensitivity. Indications and contraindications for chemotherapy. Basic principles of chemotherapy. Regional and endolymphatic chemotherapy. The concept of hormone poisoning, hormone-dependent and hormone-active tumors. Hormone and immunotherapy. Labor, social and medical rehabilitation of cancer patients.</p> | 2         |
|                 | <p><b>The subject of radiation medicine and its relation to other medical disciplines.</b></p> <p>History of radiation medicine development. Natural radiation background. Artificial sources of ionizing radiation. Biological effect of ionizing radiation. Radiosensitivity of various body tissues.</p> <p>Types of radiation damage. Acute radiation sickness. Acute local radiation injuries. Chronic radiation sickness. Etiology, pathogenesis, diagnosis, clinic, treatment.</p>   | 2         |
|                 | <p><b>Toxicology of basic radionuclides.</b></p> <p>Features of diagnostics and clinics when radionuclides enter the human body. Medical, social, environmental and psychological aspects of large-scale accidents at nuclear power plants (based on the Chernobyl accident model). National Register of Ukraine of Persons who suffered as a result of the Chernobyl disaster: purpose, structure, purpose, tasks.</p>   | 2         |
| <b>TOGETHER</b> |   | <b>10</b> |

#### 4.2. Practical training plan

| № S.<br>P. | TOPIC  | Number<br>hours |
|------------|--|-----------------|
| 1.         | <b>Topic 1. Organization of cancer care.</b> | 2               |

|    |  |   |
|----|--|---|
|    | Structure of the cancer network in Ukraine. Oncological dispensary, its functions. General characteristics of the state of cancer care in the region. Division of cancer patients into clinical groups. Accounting documentation. Medical examination of cancer patients. Analysis of the causes of cancer and analysis of cases of malignant tumors.  |   |
| 2. | <p><b>Topic 2. Epidemiology and prevention of malignant tumors.</b></p> <p>Morbidity and mortality from malignant tumors. Gender and age characteristics of patients. Dynamics and structure of morbidity. Geographical features</p> <p>features of the spread of malignant tumors. The concept of primary and secondary prevention. Socio-hygienic and individual cancer prevention measures.</p> <p>Fight against smoking. Food hygiene. Anti-cancer sanitary and educational program</p> <p>work. Deontology in oncology.</p>   | 4 |
| 3. | <p><b>Topic 3. Patterns of development of malignant tumors.</b></p> <p>Molecular and genetic mechanisms of carcinogenesis. The role of oncogenes. The role of internal and external environmental factors in the development of malignant tumors. Chemical and physical carcinogens. Virusogenetic theory of the occurrence of malignant tumors. Antitumor immunity. Modern scientific achievements in uncovering the mechanisms of carcinogenesis and treatment of malignant tumors. Facultative and obligate precancerous diseases. The concept of dysplasia. The course of the cancer process. Early cancer. Forms of growth of malignant tumors. Evaluation of the spread of the process: principles of classification of tumors by stage.</p>                                       | 4 |
| 4. | <p><b>Topic 4. Preclinical and clinical periods of tumor development.</b></p> <p>Pathogenesis of malignant tumor symptoms: changes in water-electrolyte metabolism and acid-base balance. Protein-energy deficiency syndrome. Pain syndrome. Paraneoplasia of cancer patients. Changes in the regulation of the aggregate state of blood in cancer diseases: thromboembolism, DIC-syndrome, bleeding.</p>  | 4 |
| 5. | <p><b>Topic 5. Basic principles of diagnosis of malignant tumors.</b></p> <p>Collection and evaluation of complaints and medical history in cancer patients. Features physical examination methods for suspected malignant tumors.</p> <p>X-ray, endoscopic, ultrasound, thermo graphic and isotope diagnostic methods. Computed tomography. Nuclear magnetic resonance. Laboratory tests: changes in peripheral blood, biochemical and immunological tests, morphological methods. Mandatory minimum of outpatient examinations. Recognition of cancer in the preclinical period. The role of preventive checkups in timely cancer detection. Forms, methods and frequency of preventive examinations. Formation of high-risk groups. Screening methods. The concept of monitoring.</p> | 4 |

|    |  |   |
|----|--|---|
| 6. | <p><b>Topic 6. Principles of treatment of malignant tumors.</b></p> <p>Classification of special treatment methods. Combined and complex treatment. Radical, palliative and symptomatic methods. Principles of ablasy, antiblasty, zoning and case management in surgical oncology. Radical, extended, and combined operations.</p>  | 2 |
| 7. | <p><b>Topic 7. Antitumor chemotherapy drugs.</b></p> <p>Classification of antitumor chemotherapy drugs. The mechanism of their action. Indications and contraindications for chemotherapy. Basic principles of polychemotherapy. Regional and endolymphatic chemotherapy. Hormone and immunotherapy. The concept of hormone poisoning, hormone-dependent and hormone-active tumors. Medical, surgical and radiological methods of hormonal correction.</p>   | 2 |
| 8. | <p><b>Topic 8. Skin tumors. Melanoma.</b></p> <p>Skin cancer. Epidemiology. contributing factors. Facultative and obligate precancerous skin conditions. Muscle-destructive processes of the skin. Basal cell carcinoma. Clinic, diagnosis, treatment, and prognosis. Skin cancer prevention tools.</p> <p>Melanoma. Epidemiology of melanomas. Types of pigmented nevi, factors that affect the development of contribute to their rebirth. Prevention of malignancy of nevi.</p> <p>By Clark. Special examination methods (radioisotope and laboratory diagnostics, epiluminescentdermatoscopy, thermography).</p>   | 2 |
| 9. | <p><b>Topic 9. Head and neck tumors.</b></p> <p>Cancer of the lower lip. Morbidity and predisposing factors. Obligate and optional skirmishes. Forms of growth and ways of metastasis. Classification by stage. Diagnostic methods. Treatment.</p> <p>Cancer of the oral mucosa. Morbidity rate. Contributing factors. Precancerous conditions. Forms of tumor growth and ways of metastasis. Classification by stage. Diagnostic methods. Treatment. Thyroid cancer. Morbidity rate. Etiological factors. Precancerous conditions. Cancer prevention. Diagnostic methods. Treatment. Forecast.</p> <p>Cancer of the larynx and pharynx. Clinic. Diagnostics. Combined analysis methods treatment. Features of metastasis. Prevention.</p> | 2 |
| 10 | <p><b>Topic 10. Breast cancer.</b></p> <p>Epidemiology. Etiopathogenesis. The role of hormonal disorders. Risk factors. Prevention. Clinical forms. Screening and high-risk groups. Self-examination. Methods of examination, palpation of mammary glands and lymph nodes. Mammography, ultrasound. Breast Cancer Treatment glands. Radical mastectomy. Organ-saving operations operations. Combined and complex treatment. Treatment results and prognosis. Dispensary monitoring and rehabilitation measures.</p>  |   |

|    |  |   |
|----|--|---|
|    |  | 2 |
| 11 | <p><b>Topic 11. Lung cancer.</b></p> <p>Epidemiology. Etiological factors. Precancerous diseases. Gender and age characteristics. Clinical and anatomical classification. Forms of tumor growth. Histological variants. Central and peripheral lung cancer. Pathways of metastasis. Clinical manifestations of lung cancer, mediastinal tumors, lymphogranulomatosis. Clinical, radiological, and endoscopic syndromes. Diagnostics. The value of fluorography. Organization of screening. High-risk groups.</p>   | 2 |
| 12 | <p><b>Topic 12. Tumors of the urinary and genital organs.</b></p> <p>Causes and main mechanisms of development of cancer of the urinary and genital organs. Pathomorphology. Clinical picture and diagnosis of the disease. Stages process. Principles of treatment of patients with kidney tumors. Principles of treatment of patients with neuroblastoma. Cervical tumors. Tumors of the uterine body. Vaginal tumors. Vulvar tumors. Ovarian tumors. Precancerous diseases. Classification and main characteristics of car vehicles. Pharmacodynamics and pharmacokinetics. Indications and contraindications application means.</p>  | 2 |
| 13 | <p><b>Topic 13. Bone and soft tissue tumors.</b></p> <p>Bone tumors. Classification. Morbidity rate. Pathoanatomic service characteristic. Main types of malignant tumors: osteogenic sarcoma, Ewing's sarcoma, chondrosarcoma, secondary malignancies. Clinical picture.</p> <p>Diagnostics. "Signaltrivogs". The main radiological symptoms.</p> <p>radioisotope diagnostics. Significance of morphological research. Surgical, radiation, combined and complex treatment. Organ-preserving operations. Remote results. Medical examination of cured patients.</p> <p>Pukhlinim yakikhtkanin. Morbidity rate. Pathoanatomical characteristics.</p> <p>Localization. Clinical picture. "Alarms" .Differential diagnosis.</p> <p>Examination methods: ultrasound, computed tomography and magnetic resonance imaging. The value of angiography and morphological examination. Treatment. remote locations results.</p> | 2 |
| 14 | <p><b>Topic 14. Tumors of the abdominal cavity.</b></p> <p>Significance of exogenous and endogenous carcinogens. The role of nitrosamines. Precancerous diseases of the gastrointestinal system and abdominal organs. Risk groups. Cancer prevention the esophagus, stomach, intestines, colon and rectum. Importance of dispensary monitoring of patients with precancerous diseases of the stomach. Pathomorphology. Growth patterns. Dysplasia and stomach cancer. diffuse and in-test tumor types. Metastasis. Classification by TNM. Stages of stomach, bowel, and pancreatic cancer. Complications. Clinical picture.</p>  | 2 |

|                 |  |           |
|-----------------|--|-----------|
| 15              | <p><b>Topic 15. The subject of radiation medicine, its relation to other medical disciplines.</b></p> <p>History of radiation medicine development. Nature, types and properties of radiation exposure. Natural radiation background and its components. Artificial sources of ionizing radiation. Nature, types and properties of radiation. Biological effect of ionizing radiation. Radiosensitivity of various body tissues. Dosimetry. Ionizing radiation. The principle of structure of dosimeters, radiometers, and their types.</p>  | 4         |
| 16              | <p><b>Tema 16. Radionuclide</b></p> <p>Toxicology of basic radionuclides. Effects of internal human radiation exposure. The effect of low doses of ionizing radiation on the human body. Incorporation of radionuclides. Assessment of the degree of radionuclide contamination of the environment, soil, water, and food.</p>   | 2         |
| 17              | <p><b>Topic 17. Basic research methods in radiology.</b></p> <p>Diagnostic and prognostic value of hematological, biochemical, cytogenetic and other research methods for assessing pathological changes in human organs and systems after the action of ionizing radiation. Clinical consequences of the influence of ionizing radiation on organs and systems. Methods of radiation therapy of malignant tumors. Radiosensitive and radioresistant tumors. Mechanism of action of ionizing radiation on malignant tumors. Radio sensitivity enhancement tools</p>                              | 2         |
| 18              | <p><b>Topic 18. Acute radiation sickness.</b></p> <p>Etiology, pathogenesis, clinic, diagnosis, treatment, consequences, medical and social expertise. Equipment and operation of special medical institutions for providing assistance to persons exposed to ionizing radiation radiation. Somatic, teratogenic, and genetic consequences of radiation exposure. Analysis of the most characteristic medical histories of people who have suffered acute radiation sickness and local radiation injuries. Chronic radiation sickness. Etiology, pathogenesis, diagnosis, clinic, treatment.</p> | 2         |
| 19              | <p><b>Topic 19. Acute local radiation injuries.</b></p> <p>Features of the clinic, diagnosis and treatment of persons exposed to combined radiation. Etiology, pathogenesis, clinic, diagnosis, treatment, consequences, medical and social expertise. Medical examination of personnel working with ionizing radiation sources. Groups of primary dispensary patients, categories and levels of follow-up Clinical analysis of patients and writing a medical history.</p>  | 2         |
| 20              | <p><b>Topic 20. Long-term effects of ionizing radiation.</b></p> <p>Stochastic and non-stochastic effects of radiation. The effect of low doses of ionizing radiation on the human body. Incorporation of radionuclides. Problems of bone marrow transplantation in acute radiation sickness.</p>  | 2         |
| <b>TOGETHER</b> |  | <b>50</b> |

### 4.3. Tasks for independent work

For independent work of students, tasks of a theoretical nature are submitted, which are not sufficiently thoroughly considered in the framework of lectures and practical classes. The student must work through the literature sources and be ready to answer the questions posed during practical classes and the test. Practical tasks include tests and tasks.

| № S.<br>P.      | TOPIC   | Number of<br>hours |
|-----------------|---|--------------------|
| 1.              | Molecular and genetic mechanisms of carcinogenesis.   | 3                  |
| 2.              | Modern classifications of solid malignant neoplasms.  | 3                  |
| 3.              | Chemical and radiation carcinogenesis.  | 3                  |
| 4.              | Hormonal and early carcinogenesis, its molecular bases.   | 3                  |
| 5.              | Features of tumor cell biology. Oncogenes and tumor growth suppressor genes.  | 3                  |
| 6.              | Neovascularization and tumor growth. Mechanisms of metastasis of malignant tumors.  | 3                  |
| 7.              | The environment and cancer. Inflammation and cancer. Tumor stem cells.  | 3                  |
| 8.              | Tumor immunology and mechanisms of tumor resistance.  | 3                  |
| 9.              | General and distinctive signs of a benign and malignant tumor process. Methods of laboratory diagnostics of oncohematological diseases. | 3                  |
| 10              | Cytogenetics and genetics of tumors. Medical and genetic counseling.  | 3                  |
| 11              | The main methods of treatment of patients with malignant tumors.  | 3                  |
| 12              | Cytostatic drugs. Classification. Mechanism of action. Principles of polychemotherapy.  | 3                  |
| 13              | Radiation therapy of malignant tumors. Basic principles.  | 3                  |
| 14              | Equipment and operation of special medical institutions for providing assistance to persons exposed to ionizing radiation.              | 3                  |
| 15              | Medical examination of personnel working with ionizing radiation sources.   | 3                  |
| 16.             | Groups of people working with ionizing radiation sources, primary dispensary records, categories and levels of observation.             | 3                  |
| 17.             | National Register of Ukraine of Persons who suffered as a result of the Chernobyl disaster: purpose, structure, purpose, tasks.         | 3                  |
| 18.             | Symptomatic therapy of cancer patients.   | 3                  |
| 19.             | Modern nanotechnologies in the diagnosis and treatment of malignant tumors neoplasms  | 3                  |
| 20.             | Labor, social and medical rehabilitation of cancer patients   | 3                  |
| <b>TOGETHER</b> |   | <b>60</b>          |



## **Individual tasks**

Selection and review of scientific literature on the subject of the program of the student's choice with the writing of the abstract and its public defense.

Selection and review of scientific literature on the subject of research work of the department with the preparation of a scientific report at a meeting of the SSS or at student conferences.

Scientific research on the subject of research work of the department with the publication of the results in scientific publications.

Participation in the student scientific circle and presentations at scientific forums.

Participation in the student Olympiad in the discipline.

Patient supervision.

## **Typical tasks for checks of the mastered material in practical classes (examples)**

1. The highest incidence of esophageal cancer is registered in the age group of  
in the interval:

- a) 40-50 years old;
- b) 50-60 years old;
- c) 60-70 years old;
- d) 70-80 years old. Answer: b.

2. The cervical esophagus starts from the level of:

- a) the lower edge of the annular cartilage;
- b) the lower edge of the thyroid cartilage;
- c) tracheal bifurcations;
- d) in the jugular fossa.

3. The intra-thoracic esophagus starts from the level of:

- a) the first edge;

- b) clavicles;
- c) jugular tenderloin;
- d) the sternum.

4. In the case of the spread of tumor infiltration to Adventitia, it can be argued that the size of the tumor is responsible for:

- a) T1;
- b) T2;
- c) T3;
- d) T4.

5. The lymph node closest to the primary tumor is called the:

- a) watchdog;
- b) dangerous;
- c) cancer cells;
- d) tumorous.

6). Chronic radiation sickness can be caused by:

- A. general exposure
- B. mainly by local radiation from external sources
- C. from radionuclides that are relatively evenly distributed ( $^3\text{H}$ ,  $^{24}\text{Na}$ , and to a large extent  $^{137}\text{Cs}$ )
- D. none of the above
- E. all answers are correct

7). Chronic radiation sickness – a disease that occurs when:

- A. long-term (1-5 or more years) exposure to low doses of ionizing radiation
- B. in case of radiation exceeding the maximum permissible dose
- C. with a total radiation dose of 0.7-1.0 Sv
- D. all listed factors
- E. other response option

- 8). The incorporation of radioactive substances in the body is most often caused by ingestion:
- A. by inhalation
  - B. intravenous
  - C. by oral route
  - D. rectal
  - E. intramuscular
- 9). Chronic radiation sickness is included in the list of diseases:
- A. hematological services
  - B. professional services
  - C. cardiovascular diseases
  - D. oncological services
  - E. nervous people
- 10). Chronic radiation sickness is characterized by:
- A. damage to various organs
  - B. damage to various body systems
  - C. duration and undulation of the course of damage manifestations
  - D. simultaneous occurrence of damage with recovery and adaptation reactions
  - E. all answers are correct

#### **4.4. Ensuring the educational process**

1. Multimedia projectors, computers, screens for multimedia presentations, lecture presentations.
2. Diagrams, tables, tests, and videos.
3. Technical training tools: a training manipulative class.
4. Differential credit tickets.

## 5. Final control

### List of questions of final control (differential test)

1. Clinical signs of benign skin tumors.
2. Clinical signs of basal cell carcinoma and squamous cell carcinoma of the skin.
3. Methods of diagnosis and treatment of stage I, II, III, and IV skin cancer.
4. Clinical signs of nevus dysplasia.
5. Clinical signs of skin melanoma (superficial and vertical growth phases).
6. Methods of diagnosis and treatment of skin melanoma.
7. Epidemiology of cancer.
8. Etiological factors of cancer occurrence.
9. Cancer incidence in Ukraine, its dynamics; gender-age and regional characteristics.
10. TNM-cancer classification.
11. Regional lymphatic collectors and features of tumor metastasis.
12. Histological structure of malignant tumors.
13. Obligate and facultative precancerous diseases.
14. Classification of benign head and neck tumors.
15. Clinical manifestations of papilloma, keratoacanthoma, and nonepithelial tumors.
16. Methods of tumor diagnosis.
17. Tactics of treatment of tumors.
18. Clinical manifestations of papilloma,
19. Clinical manifestations of papillomatosis.
20. Clinical manifestations of pachydermia.
21. Clinical manifestations of dyskeratosis.
22. Clinical manifestations of fibroids.
23. Clinical manifestations of cysts.
24. The main clinical symptoms of laryngeal tumors.
25. Methods of diagnosis of laryngeal tumors.
26. Characteristics of the main methods of diagnosis of malignant tumors.
27. Treatment of laryngeal cancer, factors influencing the choice of the scope of surgery.
28. Therapeutic tactics for metastatic lesions of the neck lymph nodes.
29. The role of etiological factors in the development of benign thyroid tumors.
30. Nodular and diffuse goiter, thyroiditis as precancerous diseases of the thyroid gland.
31. Clinical symptoms of thyroid tumors.
32. Clinical symptoms of the puffy mammary gland.
33. Clinical symptoms of soft tissue tumors.
34. Clinical symptoms of lung and mediastinal tumors,
35. Clinical symptoms of abdominal puffy organs.
36. Clinical symptoms of bone cancers
37. Clinical symptoms of tumors of urinary tract.
38. Clinical symptoms of genital tumors.
39. Methods for the diagnosis of thyroid cancer.
40. Treatment of thyroid adenoma.
41. Radioiodine therapy in patients with thyroid cancer.
42. Possibilities of radiation therapy for head and neck cancer.
43. Nature and properties of ionizing radiation (alpha -, beta -, gamma -. neutrons, x-rays).

44. The concept of dose, dose rate. Units of the International System (SI).
45. Methods of dose determination. Types of dosimeters.
46. Radioactivity (concept; units, types of radioactive decay).
47. Methods for determining radioactivity.
48. Natural and artificial sources of radiation
49. Modern understanding of the main mechanisms of biological action of ionizing radiation.
50. Pathogenesis of radiation-induced tissue injuries.
51. Radiosensitivity of various body tissues.
52. Pathogenesis of acute radiation sickness.
53. General and clinical classification of radiation injuries.
54. Prevention of radiation damage.
55. Biological effects of low doses of ionizing radiation.
56. Somatic, teratogenic, and genetic consequences of radiation exposure.
57. Ways of radionuclide ingestion.
58. Methods for determining the presence of radionuclides in the body.
59. Medical consequences of large-scale accidents in nuclear production.

**"0" ticket option dif. offset**

Petro Mohyla Black Sea National University

Higher education level-Master's degree

Branch of knowledge: 22 Healthcare

Specialty 222 Medicine

Academic discipline – **ONCOLOGY AND RADIATION MEDICINE**

**Option # 0**

1. Etiological factors of cancer occurrence- **the maximum number of points is 20.**
2. Clinical symptoms of soft tissue tumors - **the maximum number of points is 20.**
3. Routes of radionuclide entry into the body - **the maximum number of points is 20.**
4. Methods for determining radioactivity - **the maximum number of points is 20.**

*Approved at the Department meeting "Obstetrics and Gynecology", protocol no. \_\_\_ of" \_\_\_"  
\_\_\_\_\_ 2021 city of*

**Head of the Department prof. Tarasenko O.M.**

**Examiner**

**And there are 15 such tickets**

## **6. Evaluation criteria and diagnostic tools for learning outcomes**

### **Control methods**

- Survey (testing of theoretical knowledge and practical skills).
- Test control.
- Writing a review of scientific literature (abstracts).
- Preparing presentations.

**Current control.** Testing in practical classes of theoretical knowledge and development of practical skills, as well as the results of independent work of students. They are supervised by teachers according to the specific purpose of the curriculum. Assessment of the level of students' training is carried out by interviewing students, solving and analyzing situational problems and test tasks, and monitoring the assimilation of practical skills.

**Intermediate control.** Checking the possibility of using students' theoretical knowledge and practical skills on all the topics studied, as well as the results of independent work of students for practical application. Performed at the last lesson by section by passing practical skills, testing.

**Final control.** To the final control (dif. credit) students who have attended all the lectures and classroom classes provided for in the curriculum, who have completed their independent work in full, and who have scored no less than the minimum number of points in the course of training are allowed – **70 points per semester.**

### **Distribution of points awarded to students**

A student can get as much as possible **120 points** for current academic activities. Accordingly, a positive assessment at each seminar session can be: **from 2.8 to 4.8 points**. Score below **2.8 points** means "unsatisfactory", classes are not counted and are subject to testing in accordance with the established procedure.

In order to evaluate the results of training, a final control is carried out in the form of a dif. test. A student can get a maximum of 80 points in a test. A test is considered completed if the student has received at least 50 points.

#### **Assessment of student performance**

| <b>Type of activity (task)</b>     | <b>Maximum number of points</b>       |
|------------------------------------|---------------------------------------|
| Practical classes from 1st to 25th | 4.8 points for each of the 25 classes |
| <b>Together</b>                    | <b>120</b>                            |
| <b>Diff. credit</b>                | <b>80</b>                             |
| <b>Together with the dif. test</b> | <b>200</b>                            |

#### **Criteria for evaluating knowledge**

**With a score of 4 – 4.8 points in the practical lesson and 71-80 points in the test (A on the ECTS scale and 5 on the national scale)** the student's answer is evaluated if it demonstrates a deep knowledge of oncology and radiation medicine, the ability to apply theoretical material for practical analysis, and does not have any inaccuracies.

**Assessment of 3-4 points in the practical lesson and 61-70 points in the test (B and C on the ESTST scale, 4 on the national scale)** the answer is evaluated if it shows knowledge and the ability to apply it practically, but some fundamental inaccuracies are allowed.

**With a score of 2.8-3 points in the practical lesson and 50-60 points in the test (D and E on the ECTS scale and 3 on the national scale)** the student's answer is evaluated on the condition that he knows the basic theoretical provisions and can use them in practice.

## **7. Recommended sources of information**

### **7.1. Main features**

1. Bebeshko V. G., Kovalenko A.M., Bely D. A. Acute radiation syndrome and its consequences. Ternopil: TSMU Publ., 2006, 424 p. (in Russian)
2. Selected lectures on clinical oncology: Textbook. Bodnar G. V., Dumansky Yu. V., Antipova Sec. V., Popovich A. Yu. et al. - Lugansk: JSC "Luhansk Regional Printing House", 2009. - 560 p.
3. Galaychuk I. I. Klinicheskaya onkologiya [Clinical oncology]. Part I: Manual. - Ternopil. Ukrmedkniga Publ., 2003, pp. 7-17.

4. Gluzman D. F., Sklyarenko L. M., Nadgornaya V. A. Diagnostic oncohematology / Ed. by D. F. Gluzman. - K.: DIA, 2011. - 256 p.
5. Acute radiation sickness. Edited by A.M. Kovalenko. Kiev, 1998. - 244 p.
6. Malignant neoplasms of the hematopoietic system / Edited by V. F. Chehun and A.V. Ponamareva, Doktor Media Publ., 2012, 590 p.
7. Radiation therapy in cancer treatment. A practical guide. London. New York, 2000, 338 p. (in Russian)
8. Mechev D. S., Matyushko G. P., Romanenko V. A., Firsova N. M. Radiopharmaceutical preparations. Textbook. K., 1997, 24 p. 15.
9. Order of the Ministry of Health of Ukraine No. 340 of 28.11.97 "On improving the organization of the radiation diagnostics and radiation therapy service".
10. Radiation Safety Standards of Ukraine (NRBU-97). Col. 1998 - 135 p.
11. Ovcharenko A. P., And Lazar.P., Matyushko G. P. Osnovy radiatsionnoy meditsiny [Fundamentals of radiation medicine].- Odessa, Odessa Medical University, 2004. - 208 p.
12. Oncology: textbook / G. V. Bodnar, Yu. V. Dumansky, A. Yu. Popovich et al.; edited by G. V. Bodnar, Yu. V. Dumansky, A. Yu. Popovich. - K.: VSV "Medicine", 2013. - 544 p.
13. Oncology: academic manual. for students of higher medical institutions. Level III-IV of the project. Bakhcha V. P., Zhukova T. A., Korneev A.V. et al., edited by V. P. Bashtana, P. V. Sheleshko, and V. E. Litovchenko. - Poltava: LLC "ASMI", 2013. - 336 p.
14. Oncology. Izbrannye lektsii dlya studentov i vrachikov [Selected lectures for students and doctors], ed. by V. F. Chekhun, Moscow: Zdorovye Ukrainy, 2010, 768 p.
15. Oncology / ed. by I. N. Shchepotin. - K.: Kniga plus, 2006. - 495 p.
16. Oncology / edited by V. P. Bashtana, A. L. Odabash'yana, P. V. Sheleshka. Ternopil: Ukrmedkniga Publ., 2003, 316 p. (in Russian)
17. Radiation medicine. Edited by A. P. Lazar. - K.: Health, 1993. - 222 p.
18. Radio-biophysical and medical-hygienic consequences of the Chernobyl disaster: ways of cognition and overcoming. Practical guide for a family doctor / U. G. Bebeshko, B. Sec. Proster, M. I. Omelyanets. - Uzhgorod: ODO "Patent", 2017. - 504 p.
19. TNM-Classification, 7th edition. Fetsych T. G., Slipetsky G. G. / Under the general editorship of Doctor of Medical Sciences, prof. Fetsicha T. G.-Lviv-2014. - 169 p.

## **7.2. Additional Features**

1. Grodzinsky D. M. Radiobiology, Moscow: Lybid', 2001, 448 p.
2. Zherbin By. N., Chukhlovin A. By. Radiation Hematology, Moscow: Meditsina Publ., 1989, 1-76 p.
3. Kindzelsky L. P., Zverkova A. S., Sivkovich S. A. et al. Acute radiation sickness in the conditions of the Chernobyl disaster. - K.: Teleoptik", 2002. - 223 p.
4. J. Coggle Biological effects of radiation: Translated from English-Moscow: Energoatomizdat, 1986. - 184 p.
5. Radiation safety standards of Ukraine. Supplement: Radiation protection from potential radiation sources (NRBU-97 / D-2000). Kiev, 2000.- 80 p.
6. Practical oncology: selected lectures. Edited by Sec. A. Tyulyandin and V. M. Moiseenko, St. Petersburg: TOMM Center, 2004, 784 p –
7. Chronic effects of low-dose radiation on the nervous system. Experimental studies and clinical observations. Edited by Yu. P. Kukushki. Kiev, 1998. - 481 p.



8. 20 years of the Chernobyl disaster. A glimpse into the future. National Report of Ukraine, Moscow: "Atika" Publ., 2006, 224 p.

### **Informational content-electronic devices resources**

Vernadsky National Library – [www.nbu.gov.ua](http://www.nbu.gov.ua).

Ministry of Health of Ukraine – <http://www.moz.gov.ua>.

<https://books.google.com.ru/books?hl=ru&lr=&id=mdLUBQAAQBAJ&oi=fnd&pg=PP1&dq=Diag>

<https://books.google.com.ru/books?hl=ru&lr=&id=KZazAQAAQBAJ&oi=fnd&pg=PP1&dq=Diagnlaboratorian.Springer Science & Business Media>

<https://books.google.com.ua/books?id=NajTBwAAQBAJ&pg=PR2&dq=Molecular+diagnostics:+fo>