Federal state budget educational institution of higher education
SIBERIAN STATE MEDICAL UNIVERSITY
Ministry of Health of the Russian Federation

APPROVED BY

Dean of Biomedicine Department
_____ / Svetlana V. Gusakova
"____" _____2020

Course Name:

BASICS OF PATHOLOGY AND ONCOLOGY

Field of study: Nuclear Science and Technology

Programme name: Nuclear Science and Technology

Specialization: Nuclear medicine

Level of study: Master Degree Programme

Semester, year: semester 2, year 1

Tomsk 2020

TOMSK POLYTECHNIC UNIVERSITY ТОМСКИЙ ПОЛИТЕХНИЧЕСКИЙ УНИВЕРСИТЕТ

APPROVED BY

Director of Nuclear Science & Engineering School
_____ / Oleg Yu. Dolmatov
"25" 06 2020

Course Name: Basics of Pathology and Oncology

Field of study: Nuclear Science and Technology

Programme name: Nuclear Science and Technology

Specialization: Nuclear medicine

Level of study: Master Degree Programme

Year of admission: 2019

Semester, year: semester 2, year 1

ECTS: 3

Total Hours: 108

Contact Hours: 40

- **Lectures:** 16
- **Practical experience:** 24

Self-study: 68

Assessment: Credit-test

Division: Biomedicine Department of Siberian State Medical University

Director of Programme _____ / Vera V. Verkhoturova

Instructor _____ / Olga I. Urazova

TOMSK POLYTECHNIC UNIVERSITY ТОМСКИЙ ПОЛИТЕХНИЧЕСКИЙ УНИВЕРСИТЕТ

Course Name: Basics of Pathology and Oncology

Course Overview

Course Objectives	The objective of the training course is to teach learners to master the basics of tumor and non-tumor pathology. The course is aimed at: 1) formation of knowledge about general laws and specific mechanisms of the origin, development and outcomes of pathological processes; 2) formation of skills to analyze features and nature of the dynamic changes in physiological functions of the organism in various pathological states; 3) formation of skills to use the knowledge of the fundamentals of human pathology for solving professional problems in the application of nuclear-physical technologies in medicine.
Learning Outcomes	**Upon completion of the course, a graduate will obtain the knowledge of:** - system and critical analysis methods; - methods of development of action strategy to identify and solve a problem situation; - laws of natural sciences and mathematical methods of a theoretical nature; - reproductive methods of cognitive activity, elements of systematic approach and system analysis**;** - features of professional etiquette of western and domestic cultures**;** - fundamental principles of report structuring and presentations preparation in a foreign language (English), accepted in the international community; - goals and objectives of a scientific research in the field of activity, the basic principles and methods of their organization; - main sources of scientific information and the requirements for the presentation of information materials; - basic concepts of general nosology, the role of the causes, conditions, and reactivity of the body in the occurrence and development of pathological reactions, typical pathological processes and pathological conditions, their manifestations and significance for the body in various diseases; - etiology, pathogenesis, manifestations and outcomes of typical forms of pathology of organs and systems, the principles of its diagnosis, etiotropic and pathogenetic therapy. **Upon completion of the course, graduates are expected to develop the following skills:** - to apply the methods of systemic approach and critical analysis of problem situations; - to develop an action strategy, make a concise decision for its implementation; - to solve tasks of theoretical and applicable nature; - to summarize the acquired natural science knowledge by the system analysis categories and approach, and by the analysis, synthesis, comparison and evaluation intellectual operations; - to compile and present technical and scientific information used in professional activities in a form of presentation; - to receive aurally authentic audio and video materials related to program track; - to make a general research plan on a given topic; - to propose research methods and techniques of results processing;

	- to conduct a research according to the plan agreed with the head; to present obtained results; - to analyze the result of clinical studies and experimental modeling in the study of pathological reactions, processes, conditions and diseases (including oncological ones), and correctly understand their significance, capabilities, limitations and prospects; - to make a motivated conclusion about the causes, conditions, mechanisms of pathogenesis and sanogenesis in specific form of pathology. **Upon completion of the course, graduates should acquire the practical experience in:** - use of the methodology of systemic and critical analysis in problem situations; - execution of the goal setting, evaluation of its achievement, action strategies development; - application of the laws of natural sciences and mathematical methods and models to solve problems of theoretical and applicable nature; - use of reproductive methods of cognitive activity, and intellectual operations to solve problems of natural science disciplines; - use of the skills of monologic statement in a foreign language according to his (her) specialty, expounding his (her) position in a well-argued manner, and using of auxiliary aids (tables, graphs, diagrams, etc.); - using the obtained foreign language knowledge (English) at a sufficient level for conducting future professional activities; - possession of the systematic knowledge in the future occupation; - possession of the in-depth chosen orientation of training knowledge, basic skills of conducting of the trial on the proposed topic; - use of the skills of a systematic analysis of the principles of individual organs and systems functioning in typical pathological processes and individual organs and systems pathology; - possession of the principles of algorithms substantiation and interpretation of the clinical and experimental studies results in a tumor and non-tumor pathology.
Course Outline	The training course is delivered through the following teaching modes: – 8 lectures; – 12 practical experiences. The course consists of 3 sections, which are given below. **Section 1. General nosology** **Section 2. Typical pathological processes** **Section 3. Typical metabolic disorders** Each section includes several lectures and practical experiences. As part of the study, the course provides for 11 seminars with the solution of tests and case tasks. The test includes 10 questions with one correct answer; it is rated at 2.5 points. The case task describes the action of pathogenic factors, pathological process or disease, contains questions to justify the conclusion; it is evaluated with 2.5 points. The execution of 11 tests and solution of 11 case tasks are scored with the maximum of 55 points. It is planned for each learner to prepare and present a review on the pathogenic effect of chemical and biological factors of the environment. The preparation of review is evaluated with the maximum of 5 points. Assessment criteria for a review are as follows: design, content and structure, teamwork skills, information search, analysis and generalization, goals and conclusions formulation; managing questions at a defense of a review.

	The training course ends in a colloquium, which is rated at a maximum of 40 points.
Course Structure	The course includes three basic sections: general nosology, typical pathological processes and typical disorders of the metabolism. **Section 1. General nosology** Subject and tasks of pathology. General principles of construction of biomedical experiments. The main concepts of general nosology - norm, health, pathological reaction, pathological process, pathological condition, disease. The role of causes and conditions in the occurrence of diseases. General pathogenesis and outcomes of diseases. Mechanisms of recovery. Principles of therapy. Damaging effect of mechanical, physical, chemical and biological environmental factors on the body. General reactions of the organism to damage: types and factors of reactivity and resistance formation. The concept of stress and shock - non-specific reactions of the body to the action of strong and extreme stimuli. *Topics of lectures*: Lecture 1. Subject and methods of general pathology. General nosology. *Topics of practical experiences*: Practical experience 1. Subject and methods of general pathology. General nosology. General doctrine of the disease. Etiology and pathogenesis. Practical experience 2. Pathogenic effect of mechanical and physical factors of the environment. Practical experience 3. Pathogenic effect of chemical and biological factors of the environment. Practical experience 4. General reactions of the organism to damage. The role of the reactivity and resistance of the organism in pathology. Stress. Shock. **Section 2. Typical pathological processes** Causes, mechanisms and manifestations of cell damage. Necrosis and programmed cell death. The concept of the immune system. Innate and adaptive immunity. Immunodeficiency. Types of immune hypersensitivity reactions. Allergy. Typical disorders of peripheral blood circulation. The role of violations of the regulation of vascular tone and rheological properties of blood in pathology. Inflammation and fever: causes and mechanisms of development. Etiology of tumors. Carcinogens. General pathogenesis and stages of tumor growth. Metastasis. Tumor atypism. Signs of malignancy and benign tumors. Interaction of the tumor and the body. Methods of diagnosis and treatment of tumors. *Topics of lectures*: Lection 2. Cell pathophysiology. Lection 3. The role of the immune system in pathology. Lection 4. Allergy. Lection 5. Pathology of microcirculation and peripheral circulation. Lection 6. Pathophysiology of tumor growth. *Topics of practical experiences*: Practical experience 5. Typical cell response to damage. Practical experience 6. Inflammation and fever. Practical experience 7. The role of the immune system in pathology. Allergy. Practical experience 8. Basic mechanisms of microcirculation disorders. Types of peripheral circulation disorders. Practical experience 9. Tumor growth, carcinogenesis, morphogenesis of tumors **Section 3. Typical metabolic disorders**

	The concept of basic and energy exchange. Hypo- and hyperglycemic conditions. Diabetes mellitus, its types. Experimental models of insulin insufficiency. Hyperlipemia (alimentary, transport, retention). Obesity. Atherosclerosis and its consequences. Causes and consequences of hypo-, hyper- and dysproteinemias. Paraproteinemia. Violations of the exchange of nucleic acids – gout. Disorders of water metabolism: basic types. Edemas. Violation of the balance of macro-and microelements. The concept of the acid-base state (ABS). Acidosis and alkalosis. Features of metabolic disorders and ABS in the pathogenesis of tumor growth and tumor progression. Cancerous cachexia. *Topics of lectures:* Lecture 7. Pathology of metabolism: carbohydrate, lipid and protein metabolism. Lecture 8. Pathology of metabolism: water-electrolyte and mineral metabolism. *Topics of practical experiences:* Practical experience 10. Pathology of the basic, energy, carbohydrate, lipid metabolism. Practical experience 11. Pathology of protein and nucleic acid metabolism. Starvation. Practical experience 12. Pathology of water-electrolyte, mineral metabolism. Disorders of the acid-base state.
Facilities and Equipment	The training course is provided by the Pathophysiology Department of the Siberian State Medical University in partnership with Tomsk polytechnic university. The academic process in supplied by the following facilities and equipment: Classroom for all types of training sessions, consultations, ongoing monitoring and interim certification (classroom): 634034, Tomsk region, Tomsk, Uchebnaya street, 39, Biological building, office 2320 - Chalkboard-1 PC., student table-8 PCs., chair-18 PCs., TV panel - 1 PC., laptop - 1 PC.
Grading Policy	In accordance with TPU rating system we use: - Current assessment which is performed on a regular basis during the semester by scoring the quality of mastering of theoretical material and the results of practical activities during seminars (performance tests, case-tasks). Max score for current assessment is 60 points, min – 33 points. - Course final assessment (colloquium) is performed at the end of the semester. Max score for colloquium is 40 points, min – 22 points. The final rating is determined by summing the points of the current assessment during the semester and colloquium scores at the end of the semester. Maximum overall rating corresponds to 100 points, min pass score is 55 points.
Course Policy	Class attendance will be taken into consideration when evaluating students' participation in the course / students are expected to actively engage in class discussions about the assigned readings. Attendance is strictly controlled. All classes require obligatory presence.
Teaching Aids and Resources	**Compulsory reading:** 1. Klimov, V. V. From Basic to Clinical Immunology / V. V. Klimov ; Siberian state medical university (Tomsk), Clinical immunology and allergy department. - Cham : Springer, 2019. - 377 p. - Текст: электронный // SpringerLink. – URL: https://link.springer.com/book/10.1007/978-3-030-03323-1 (дата обращения: 20.09.2020). – Режим доступа: по подписке. 2. Kumar, V. Robbins Basic Pathology : textbook / Vinay Kumar, Abul K. Abbas, Jon C. Aster. - 10th ed. - Philadelphia : Elsevier, 2018. - 935 p. - Текст: электронный // Clinicalkey. – URL: https://www.elsevier.com/books/robbins-basic-pathology/kumar/978-0-323-35317-5 (дата обращения: 20.09.2020). – Режим доступа: по подписке.

	Additional reading: 1. Biomarkers of the Tumor Microenvironment. Basic Studies and Practical Applications / by editors Lars A. Akslen, Randolph S. Watnick. - Cham : Springer, 2017. - 534 p. - Текст: электронный // SpringerLink. – URL: https://link.springer.com/book/10.1007/978-3-319-39147-2 (дата обращения: 20.09.2020). – Режим доступа: по подписке. 2. Khaitov, Rakhim M. Immunology / Rakhim M. Khaitov - Москва : ГЭОТАР-Медиа, 2019. - 272 с. - Текст : электронный // ЭБС "Консультант студента" : [сайт]. - URL : https://www.studentlibrary.ru/book/ISBN9785970449806.html (дата обращения: 20.09.2020). - Режим доступа : по подписке. 3. Litvitsky P. F. Pathophysiology. Concise lectures, tests, clinico-pathophysiological situations and clinico-laboratory cases : student manual / P. F. Litvitsky, S. V. Pirozhkov, E. B. Tezikov. - Электрон. дан. - Moscow : GEOTAR-Media Publishing Group, 2016. - 432 p. - Текст : электронный // ЭБС "Консультант студента" : [сайт]. - URL : https://www.studentlibrary.ru/book/ISBN9785970436004.html (дата обращения: 20.09.2020). - Режим доступа : по подписке. **Internet resources:** 1. ELS SSMU: Access mode: http://irbis64.medlib.tomsk.ru 2. ELS "Book-Up»: Access mode: http://books-up.ru 3. ELS «Lan'»: Access mode: http://e.lanbook.com 4. ELS «Urayt»: Access mode: http://www.biblio-online.ru 5. Springer: Access mode: http://link.springer.com 6. EBSCOhost MEDLINE with Full Text: Access mode: http://search.ebscohost.com 7. ClinicalKey: Access mode: https://www.clinicalkey.com 8. PubMed (Medline): Access mode: http://pubmed.com or http://www.ncbi.nlm.nih.gov/pubmed 9. Science: Access mode: http://www.sciencemag.org 10. ScienceDirect: Access mode: http://www.sciencedirect.com
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