**FACULTY OF MEDICINE**

**CURRICULUM 09.12.1 MEDICINE**

**CHAIR OF pathology**

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| APPROVED at the meeting of the Commission for Quality Assurance and Curriculum Evaluation of the Curriculum in Medicine Faculty  Minutes No.\_\_\_of\_\_\_\_\_\_\_\_\_\_\_\_\_\_  Chairman, PhD, associate prof.  Pădure Andrei\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ | | APPROVED at the Council meeting of the Faculty Medicine  Minutes No.\_\_\_\_ of \_\_\_\_\_\_\_\_\_\_\_\_\_\_  Dean of Faculty, PhD, Associate prof.  Placinta Gheoghe \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ | |
| APPROVED at the meeting of the chair of Pathology  Minutes No.6 of 01.03.2024  Head of chair, PhD, associate professor  Melnic Eugen \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ | |

**SYLLABUS**

**PATHOPHYSIOLOGY OF MULTIPLE ORGAN DYSFUNCTION**

**IN CRITICAL SITUATIONS**

**Integrated studies**

Type of course: **Optional**

Curriculum developed by the team of authors:

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Vasilie Lutan, PhD, professor

Chisinau, 2024

1. **INTRODUCTION**

* **General presentation of the discipline: place and role of the discipline in the formation of the specific competences of the professional / specialty training program**

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| --- |
| a) formation of the concept of the phenomenon of multiple organ dysfunction (MOD);  b) understanding the nosological entities that can be associated with the evolution of MOD;  c) knowledge of the general legalities of the origin, appearance, evolution and end of MOD;  d) studying the morpho-functional and biochemical changes imminent MOD;  e) knowledge of the pathogenetic principles of MOD correction and treatment; |
|  |

* **Mission of the curriculum (aim) in professional training**

Studying the morpho-functional and biochemical changes at the molecular, cellular, tissue, organ, system and whole organism level in BMD to strengthen a feasible pathogenetic diagnosis and treatment algorithm.

**Languages of disciplines: Romanian, Russian, English**

● **Beneficiaries:** students of the third year, Faculty of Medicine

1. **ADMINISTRATION OF THE DISCIPLINE**

|  |  |  |  |
| --- | --- | --- | --- |
| Discipline code | | **S.06.A.057** | |
| Name of the discipline | | Pathophysiology of multiple organ dysfunction  in critical situations | |
| Discipline Manager(s). | | Melnic Eugen, PhD, associate professor | |
| Year III |  | Semester | **VI** |
| Total number of hours, including: | | | **30** |
| Course | **10** |  |  |
| Seminars | **10** | Individual work | **10** |
| Clinical internship (total hours) | | |  |
| Evaluation form | **C** | Nr. of credits | **1** |

1. **TRAINING AIMS WITHIN THE DISCIPLINE**

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

*●* **at the level of knowledge and understanding:**

To know the laws of the origin, appearance, evolution and end of the pathological processes that lead to the development of critical states;

To know the structural, biochemical and functional changes at the molecular, cellular, tissue, organ, system and whole organism level that develop during critical states;

To know the principles of pathogenetic therapy of critical pathological processes.

**● at the application level:**

* To be able to interpret the pathophysiological parameters of nervous, cardiac, external breathing, digestive system, liver and kidney activity during critical conditions;

**● at the integration level:**

To be able to clinically analyze and interpret complex situational problems, which include pathological processes and syndromes located in the body's systems during critical states;

**ν**To be able to formulate the principles of etiotropic and pathogenetic therapy of various pathological processes that develop during critical conditions.

1. **PROVISIONAL TERMS AND CONDITIONS**

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| In the third year the students require the following: |
| • knowledge of the teaching language; |
| • confirmed competences in sciences at high school level (biology, chemistry, physics); |
| • confirmed competences in sciences at the level of the second university year (anatomy, biology |
| molecular, histology, physiology, biochemistry); |
| • digital skills (using the Internet, processing documents, tables |
| electronics and presentations, use of graphics programs); |

1. **THEMES AND ESTIMATE ALLOCATION OF HOURS**

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

| Nr.  d/o | THEME | Nr. of hours | | |
| --- | --- | --- | --- | --- |
| Lectures Practical works Individual work | Practical works | Individual work |
|  | Acute respiratory distress in adults | 2 | 2 | 1 |
|  | Pathophysiology of cardiogenic shock | 2 | 2 | 1 |
|  | Pathophysiology of acute renal failure | 2 | 2 | 1 |
|  | Pathophysiology of Systemic Inflammatory Response Syndrome (SIRS) | 2 | 2 | 1 |
|  | Disturbances of acid-base and hydro-electrolyte balance in critical states | 2 | 2 | 1 |
| **Total** | | **10** | **10** | **10** |

1. **PRACTICAL TOOLS PURCHASED AT THE END OF THE COURSE**

The practical works as appropriate are (spring semester):

● Determination of mediators of inflammation

• Determination of pH and alkaline blood reserves

• Determination of blood pressure and arm-ankle gap

• Determination of cardiac arrhythmias in the ECG examination

1. **OBJECTIVES AND CONTENT UNITS**

|  |  |  |
| --- | --- | --- |
| **Topic (chapter) 1. Acute respiratory distress in adults** | | |
| **Objectives** | **Content units** | |
| * to define the notion of acute respiratory distress, acute respiratory insufficiency, hypoxemia, hypercapnia, respiratory acidosis. * to know the structural, biochemical and functional changes at the molecular, cellular, tissue, organ, system and whole organism level that develop during acute respiratory distress in adults. * demonstrate skills in interpreting clinical and paraclinical data in a patient with acute respiratory distress. * to apply theoretical knowledge for the clinical interpretation of data and solving complex clinical cases on the subject. * to integrate theoretical pathophysiological knowledge with clinical disciplines. | | Etiological factors involved in the development of acute respiratory distress in adults.  Pathogenetic mechanisms involved in the development of acute respiratory distress in adults. The role of inflammatory cells (neutrophils) and proinflammatory cytokines in the development of acute respiratory distress in adults.  Changes in hemodynamic and respiratory parameters during acute respiratory distress in adults.  Pathogenetic principles of correction of dysregulated functions and pathogenetic treatment in acute respiratory distress in adults.  Interpretation of pathophysiological parameters of external breathing and cardiac activity during acute respiratory distress. |
| **Topic (chapter) 2. Pathophysiology of cardiogenic shock** | | |
| **Objectives** | **Content units** | |
| * To define the notion of cardiogenic shock, cardiac output, systolic volume, end-systolic volume, end-diastolic volume, inotropic effect, bathmotropic effect, chronotropic effect, dromotropic effect. * to know the structural, biochemical and functional changes at the molecular, cellular, tissue, organ, system and whole organism level that develop during cardiogenic shock. * demonstrate skills in interpreting clinical and paraclinical data in a patient with cardiogenic shock. * to apply theoretical knowledge for the clinical interpretation of data and solving complex clinical cases on the subject. * to integrate theoretical pathophysiological knowledge with clinical disciplines. | | Etiological factors involved in the development of cardiogenic shock. Pathogenic mechanisms involved in the development of cardiogenic shock.  Changes in hemodynamic parameters (cardiac output, systolic volume, end-systolic volume, end-diastolic volume, inotropic effect, bathmotropic effect, chronotropic effect, dromotropic effect) during cardiogenic shock.  Pathogenetic principles of correction of dysregulated functions and pathogenetic treatment in cardiogenic shock.  Interpretation of pathophysiological parameters of cardiac activity during cardiogenic shock. |
| **Topic (chapter) 3. Pathophysiology of acute renal failure** | | |
| **Objectives** | **Content units** | |
| * To define the notion of acute renal failure, glomerular filtration rate, renal clearance. * to know the structural, biochemical and functional changes at the molecular, cellular, tissue, organ, system and   whole body that develops during acute renal failure.  demonstrate skills in interpreting clinical and paraclinical data in a patient with acute renal failure.   * to apply theoretical knowledge for the clinical interpretation of data and solving complex clinical cases on the subject. * to integrate theoretical pathophysiological knowledge with clinical disciplines. | | Prerenal, renal and postrenal etiological factors involved in the development of acute renal failure.  The pathogenetic mechanisms involved in the development of acute renal failure.  Changes in the biochemical parameters of blood and urine in a patient with acute renal failure.  Pathogenetic principles of correction of deregulated functions and pathogenetic treatment in acute renal failure. |
| **Topic (chapter) 4. Pathophysiology of Systemic Inflammatory Response Syndrome (SIRS)** | | |
| **Objectives** | **Content units** | |
| * To define the notion of Systemic Inflammatory Response Syndrome (SIRS), pro-inflammatory cytokines. * To know the structural, biochemical and functional changes at the molecular, cellular, tissue, organ, system and whole organism level that develop during SIRS. * demonstrate skills in interpreting clinical and paraclinical data in a patient with SIRS. * to apply theoretical knowledge for the clinical interpretation of data and solving complex clinical cases on the subject. * to integrate theoretical pathophysiological knowledge with clinical disciplines. | | Etiological factors involved in the development of SIRS.    The pathogenetic mechanisms involved in the development of SIRS. The role of inflammatory cells and pro-inflammatory cytokines in the development of SIRS.  Changes in blood biochemical parameters in a patient with SIRS.  Pathogenetic principles of correction of dysregulated functions and pathogenetic treatment in a patient with SIRS. |
| **Topic (chapter) 5. Disturbances of acid-base and hydro-electrolytic balance in critical states** | | |
| **Objectives** | **Content units** | |
| * To define the notion of hyperhydration (hypo-osmolar, iso-osmolar, hyperosmolar), dehydration (hypo-osmolar, iso-osmolar, hyperosmolar). Metabolic acidosis, respiratory acidosis, metabolic alkalosis, respiratory alkalosis. * to know the structural, biochemical and functional changes at the molecular, cellular, tissue, organ, system and whole organism level that develop during hydro-electrolyte and acid-base dyshomeostasis in terminal states. * demonstrate skills in interpreting clinical and paraclinical data in a patient with hydro-electrolyte and acid-base dyshomeostasis. * to apply theoretical knowledge for the clinical interpretation of data and solving complex clinical cases on the subject * to integrate theoretical pathophysiological knowledge with clinical disciplines. | | Etiological factors involved in the development of hydro-electrolyte dyshomeostasis (hypo-osmolar hyperhydration, iso-osmolar hyperhydration, hyperosmolar hyperhydration, hypo-osmolar dehydration, iso-osmolar dehydration and hyperosmolar dehydration), and acid-base dyshomeostasis (metabolic acidosis, respiratory acidosis, metabolic alkalosis, respiratory alkalosis) in the terminals states.  Pathogenetic mechanisms involved in the development of hydro-electrolytic and acid-base dyshomeostasis in terminal states.  Changes in the biochemical parameters of blood and urine in a patient with hydro-electrolyte and acid-base dyshomeostasis.  The pathogenetic principles of correction of deregulated functions and pathogenetic treatment in a patient with hydro-electrolytic and acid-base dyshomeostasis. |

1. **PROFESSIONAL (SPECIFIC (SC)) AND TRANSVERSAL (TC) COMPETENCES AND STUDY FINalities**

**Ꝩ Professional (specific) (SC) competences**

* SC1. The responsible execution of professional tasks with the application of the values and norms of professional ethics, as well as the provisions of the legislation in force.
* SC2. Adequate knowledge of the sciences about the structure of the body, the physiological functions and the behavior of the human body in various physiological and pathological states, as well as the existing relationships between the state of health, the physical and the social environment.
* SC5. Interdisciplinary integration of the doctor's work in the team with the efficient use of all resources.
* SC6. Conducting scientific research in the field of health and other branches of science.
* **Transversal competences (TC)**

● TC1. Autonomy and responsibility in activity linked to capacity of student to use and to implement the obtained theoretical knowledges in the various maneuvers of practical applications.

**Note. The aims of the discipline** (they are deduced from the professional competences and formative values of the informational content of the discipline).

1. **THE STUDENT'S INDIVIDUAL WORK**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Nr. | Expected product | Realization strategies | Evaluation criteria | Realization deadline |
| 1. | Working with textbooks | Studying the material from the recommended textbooks  Summarizing the material in the form of postulates  Rendering the material in the form of improvised schemes  Marking questions that require special consultation | The ability to reproduce the main concepts and content of the material; the ability to render the essential.  The ability to express the material in logical schemes;  Ability to explain the material.  Ability to answer control questions. | During the optional course |
| 2. | Working with the materials of the theoretical course | Studying the material of the theoretical course Studying the representations of the theoretical course Summarizing the material in the form of postulates | The ability to supplement the material from the textbook with information from the theoretical course.  The ability to reproduce verbatim and interpret the presentations of the theoretical course. | During the optional course |
| 3. | Working with online materials | Studying the online materials on the department's WEBSITE.  Working with encyclopedic materials, dictionaries, scientific news | Supplementing information with materials and literature. | During the optional course |

1. **METHODOLOGICAL SUGGESTIONS FOR TEACHING-LEARNING-ASSESSMENT**

* **Teaching and learning methods used**

The teaching of the optional course will be done by classical methods with modern instructive elements by discussing clinical cases.

The theoretical course consists of the exposition of the main themes in the form of theses with the elucidation of the etiology, pathogenesis, manifestations, consequences, biological significance and principles of pathogenetic correction of the pathological processes that underlie the development of critical states. The exposition is supplemented by illustrations demonstrated through multimedia. The course material (theses and illustrative material) is offered to students in electronic form.

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

In the process of teaching the subject, the following are used:

(1) The real and virtual pathophysiological experiment;

(2) Logical cascading resolving of situational problems and clinically critical situations.

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

In the optional course, the following forms of knowledge assessment will be practiced:

Current: the current interpretation of the situational problems in the topic.

The final evaluation with grade formed (0.5+0.5) from the grade for theoretical knowledge and the

grade for solving critical problems and critical situations.

Absences from the course are recovered.

**Method of mark rounding at different assessment stages**

| **Intermediate marks scale (annual average, marks from the examination stages)** | **National Assessment System** | **ECTS Equivalent** |
| --- | --- | --- |
| **1,00-3,00** | **2** | **F** |
| **3,01-4,99** | **4** | **FX** |
| **5,00** | **5** | **E** |
| **5,01-5,50** | **5,5** |
| **5,51-6,0** | **6** |
| **6,01-6,50** | **6,5** | **D** |
| **6,51-7,00** | **7** |
| **7,01-7,50** | **7,5** | **C** |
| **7,51-8,00** | **8** |
| **8,01-8,50** | **8,5** | **B** |
| **8,51-9,00** | **9** |
| **9,01-9,50** | **9,5** | **A** |
| **9,51-10,0** | **10** |

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

1. **RECOMMENDED LITERATURE:**

*A. Compulsory*

1. Porth C.M., Matfin G. Pathophysiology. Concepts of Altered Health States; 2009.
2. Robbins and Cotran. Pathologic Basis of Diseases. 2015.

*B. Additional*

1. Harrison’s. Principles of Internal Medicine; 2012.