**FacultY OF MEDICINE No.2**

**STUDY PROGRAM 0912.1 MEDICINE**

**CHAIR OF ANESTHESIOLOGY AND Reanimatology No. 1**

**„VALERIU GHEREG”**

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| APPROVED at the meeting of the Commission for Quality Assurance and Evaluation of the Curriculum  Faculty Medicine  Minutes No.\_\_\_ of \_\_\_\_\_\_\_\_\_\_\_\_  Chairman, Associated professor,  D.habil.Med.Sc.    Suman Serghei \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ | | APPROVED at the Council meeting of the Faculty of Medicine No 2  Minutes No.\_\_\_ of \_\_\_\_\_\_\_\_\_\_\_\_\_  Dean of Faculty,Associated professor, D.Med.Sc.    Bețiu Mircea\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ | |
| APPROVED approved at the meeting of the chair of Anesthesiology and reanimatology No.1 „Valeriu Ghereg”  Minutes No. 4 of 29.12.2017  Head of chair, Associated professor, D.Med.Sc.  Șandru Serghei \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ | |

**SYLLABUS**

DISCIPLINE **ANESTHESIOLOGY AND INTENSIVE CARE**

Type of course: **Compulsory**

Chişinău, 2017

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

Anesthesia and Intensive Care is a field of medicine with its own theoretical base, original research, diagnostic and treatment methods which are implemented in many other medical fields: neonatology, neurology and neurosurgery, cardiology, ostetrics and gynecology, etc.

From the medical practice point of view Anesthesia and Intensive Care is the medical specialty wich uses pharmacological and technical means for providing necessary conditions for surgery, postoperative care and other diagnostic or treatment procedures as well as the diagnosis and treatment of variuous critical sates (i.e. acute respiratory failure, acute heart failure, kidney injury, liver failure, shock, acute consciousness disorders, hydroelectrolytic and acid-base disturbances).

* Mission of the curriculum in professional training

Anesthesia and Intensive Care aims at forming a style of thinking and acting inherently related with the critically ill / anesthetized patient management by familiarizing students with the general and loco-regional anesthesia methods as well as the accumulation of knowledge to perform the diagnosis and intensive care of the critically ill patients.

* Languages of the course: Romanian, Russian, English, French.;
* Beneficiaries: students of the V year, faculty Medicine No.2.

1. **MANAGEMENT OF THE DISCIPLINE**

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| --- | --- | --- | --- |
| Code of discipline | | **S.10.O.092** | |
| Name of the discipline | | ANESTHESIOLOGY AND REANIMATOLOGY | |
| Person(s) in charge of the discipline | | **Serghei Șandru,** Assistant Professor, PhD | |
| Year | **V** | Semester | **X** |
| Total number of hours, including: | | |  |
| Lectures | **16** | Practical hours | **20** |
| Seminars | **20** | Self-training | **28** |
| Clinical internship | | | **6** |
| Form of assessment | **DC** | Number of credits | **3** |

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 concept and criteria for defining the critical condition and the management

principles of the critically ill patient;

- to know general principles of Anesthesia and Intensive Care Service organisation and the management of a patient in critical condition;

- to know the components of general anesthesia;

- to know simple techniques of general and loco-regional anesthesia;

- to posses general knowledge concerning anesthetics agents and anesthesia equipment;

- to know the etiology, pathophysiology, classification, clinical picture and treatment of acute respiratory failure;

- to know the etiology, pathophysiology, classification, clinical picture and treatment of acute heart failure;

- to posses knowledge concerning shock (i.e.hypovolemic, cardiogenic, distributive, obstructive);

- to know fluids and blood derivates used for fluid and transfusion therapy;

- to posses general knowledge concerning nutrition of a patient in critical condition;

- to know the most common causes of consciousness disorders and have knowledge about mechanisms regulating intracranial pressure, determinants of cerebral blood flow, treatment principles of the comatose patient, diagnostic criteria of brain death;

- to know acid-base and water-electrolyte disturbances and their clinical importance;

- to know the etiology, the clinical picture and the principles of intensive care of patients with acute liver failure;

- to know the mechanisms of acute kidney injury and the principles of intensive care of patients with acute kidney injury;

- to know the principles of pain evaluation, as well asprinciples of analgesic use in the treatment of acute pain.

# *at the application level:*

* to be able to identify patients with acute respiratory and heart failure, shock and coma patients, patients with acute liver failure and acute kidney injury;
* to be able to manage airway obstruction;
* to be able to ventilate the patient with self-inflating balloon (i.e. Ambu bag);
* to be able to perform oxygen therapy;
* to be able to interpret monitored parameters in the critically ill patient;
* to be able to interpret acid-base and hydroelectrolytic disturbances;
* to be able to evaluate pain syndrome using specific basic tools and questionnaires tailored to special patient groups (communicable adult / elderly, noncommunicable adult / elderly, child).

# *at the integration level:*

* to be able to use knowledge from basic/fundamental subjects;
* to be able to integrate knowledge from clinical subjects;
* to be able to actualize new advances in anesthesia and intensive care.

1. **provisional terms and conditions**

Anesthesiology and Intensive Care is a multidisciplinary clinical speciality, the study of which at the university level will enable the future physician to acquire the principles of monitoring and treatment of criticaly ill patients.

Good knowledge of physiology, pathophysiology, pharmacology, surgery, internal medicine, emergency medicine is required for appropriate knowledge of the subject.

1. **themes and ESTIMATE ALLOCATION of hours**

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

| No.  d/o | ТHEME | Number of hours | | | |
| --- | --- | --- | --- | --- | --- |
| Lectures | Seminars | Practical classes | Self-training |
|  | The organization of Anesthesia and Intensive Care units. [Management principles of the critically ill patient](https://www.ncbi.nlm.nih.gov/pubmed/21277449). | 0 | 2 | 3 | 0 |
|  | General and locoregional anestehesia. | 2 | 2 | 3 | 4 |
|  | Acute pain management | 1 | 0 | 0 | 0 |
|  | Acute respiratory failure. | 2 | 3 | 2 | 4 |
|  | Monitoring of cardiovascular function. Acute heart failure. | 2 | 2 | 3 | 4 |
|  | Transfusion and fluid therapy. Nutrition support in the critically ill patients. | 2 | 0 | 0 | 2 |
|  | Shock. | 2 | 3 | 2 | 4 |
| 8 | Hydroelectrolytic and acid-base disturbances. | 2 | 3 | 2 | 4 |
| 9. | Acute consciousness disorders. Brain death. | 2 | 2 | 3 | 4 |
| 10. | Acute liver failure. | 0 | 2 | 1 | 1 |
| 11. | Acute kidney injury | 1 | 1 | 1 | 1 |
| 12. | Practical training | **6** | | | |
|  |  | **16** | **20** | **20** | **28** |
| **Total** | | **90** | | | |

1. **REFERENCE OBJECTIVES of CONTENT UNITS**

| **Objectives** | **Content units** |
| --- | --- |
| **Theme (chapter) 1.** The organization of Anesthesia and Intensive Care units. [Management principles of the critically ill patient](https://www.ncbi.nlm.nih.gov/pubmed/21277449)**.** Acute pain management. | |
| * to define the notion of critically ill patient; * to know the need and role of the Anesthesia and Intensive Care (AIC) service in the overall health service structure; * to know the general principles and criteria of patient admission in the AIC department; * to know the peculiarities of the anesthesia-intensive care activity. | The notion an criteria of critically ill patient.  The general management principles of critically ill patients.  The organization of Anesthesia and Intensive Care units. |
| **Theme (chapter) 2.** General and locoregional anesthesia. | |
| * to define the notion of anesthesia; * to know the components of anesthesia and the medicines that are used to provide them; * to be able to select the endotracheal tube and perform orotracheal intubation on the intubation manikin; * to apply ASA and Mallampati scores; * to apply the accumulated knowledge for the preparation of a pre-anesthesia evaluation and prparation plan; * to make an anesthesia plan and prescribe the drugs needed to provide anesthesia components; * to know the anatomical aspects of epidural and spinal anesthesia; * to know techniques of locoregional anesthesia; * to know local anesthetics, classification, mechanism of action and side effects; * to know the main complications of general and locoregional anesthesia; * to integrate accumulated knowledge to treat the complications of anesthesia. | Opioid analgesics.  Pre-anesthetic evaluation and premedication. Anesthesia risk, ASA score.  Stages of general anesthesia.  Monitoring during anesthesia.  Anesthesia and monitoring equipment.  Mechanism of action of the local anesthetic. Differential anesthetic block.  Classification and clinical characteristics of local anesthetics.  Techniques for loco-regional anesthesia.  Spinal anesthesia.  Epidural anesthesia.  Complications of general and locoregional anesthesia. |
| **Theme (chapter) 3.** Acute pain management. | |
| * to be aware of "pain - the fifth vital sign", "pain treatment - a fundamental human right" concepts; * to be aware of the pain problem: medical, social, cultural, economic, political, legislative, organizational aspects. * to know the national and international structures dealing with the management of the pain problem; * to understand and interpret the notion of "nociception", "pain", „nociceptive pain”, „neuropathy” and pain syndrome semiology; * to be able to diagnose acute and chronic pain syndromes; * to have a standardized methodological approach for the patient suffering from pain; * to be able to use the main diagnostic tools for pain; * to be familiar with the general principles of the management of pain; * to know the general rules for the development of an acute pain control program (association of techniques and drugs, identification of nociceptive, neuropathic, psychological components of pain); * to know the main myths and prejudices about pain, analgesics, treatments. | Taxonomy of pain according to IASP (nociception, pain, pain syndrome, suffering, acute pain, persistent, chronic pain, induced pain, nociceptive pain, nocipatic pain, neuropathic pain, somatic pain, visceral pain, cancer pain, primary and secondary hyperalgesia, hyperpathia).  Pain as a multi-dimensional phenomenon: biological, medical, social, cultural, managerial, political, economic, legislative-legal aspects.  Principles of the treatment of acute and chronic pain (structures, processes, resources, endowments, missions, models).  The physiology of nociception and pain perception. Upward and downward modulation of nociception, adaptive and maladaptive neuroplasticity, remapping.  Theories of pain (intensity, specificity, patterns, control, neuromatrix, neurosignature).  The formation of pain perception. Pain dimensions.  One-dimensional tools and questionnaires for acute pain assessment in different patient groups (children, adults, elderly people, people with communication deficit). |
| **Theme (chapter) 4.** Acute respiratory failure. | |
| * to know the definition of hypoxemic and hypercapnic respiratory failure; * to know the pathophysiology of acute respiratory failure; * to know the equation for calculation of O2 arterial content; * to make a plan for tretment of patients with acute respiratory failure; * to know the management strategies for airway obstruction; * to know criteria of acute respiratory distress syndrome; * to know principles of treatment of patients with acute respiratory distress syndrome; * to know the peculiarities of lung ventilation in patients with acute respiratory distress syndrome; * to know the indications for oxygen therapy, complications of oxygen therapy; * to know the basic principles of mechanical ventilation; * to know the principles of drug therapy of patients with acute respiratory failure; * to know the clinical devices and clinical parameters of respiratory monitoring with the ability to integrate this information into the management of acute respiratory failure. | Acute respiratory failure. Definition and classification.  Hypoxemic and hypercapnic respiratory failure. Causes. Mechanisms of hypoxemia and hypercapnia. Clinical picture.  Managemment of airway obstructions.  Acute respiratory distress syndrome. Etiology. Clinical picture. Diagnosis. Treatment.  Severe exacerbation of bronchial asthma. Clinical picture. Principles of treatment.  Oxygen therapy. Indications. Complications. Mechanical ventilation. Indications. Complications.  Repiratory function monitoring |
| **Theme (chapter) 5.** Monitoring of cardiovascular function. Acute heart failure. | |
| * to know the definition of normal and altered cardiac function; * to know the components of cardiac output, tissue perfusion and oxygen transport; * to know the components of cardiac output (preload, afterload, contractility, heart rate); * to know the laws for fluid flow (turbulent/laminar flow, water exchange between body compartments, oxygen transport and consumption). * to be able to differentiate cardiogenic from noncardiogenic pulmonary edema; * to know the symptoms of acute heart failure, pulmonary edema; * to understand that acute heart failure is a medical emergency and to be able to issue reasonable hypotheses about the causes of heart failure; * to be familar with the monitoring of vital functions; to understand the principles of monitoring of cardiovascular system; * to know the principles of the treatment of patients with heart failure. | The definition of acute heart failure. Causes of right, left and global ventricular failure and diastolic failure.  Components of oxygen transport. Components of cardiac output. Turbulent and laminar flow.  Definition of preload and afterload.  Monitoring the cardiovascular system and definition of 10 parameters of cardiovascular function.  Inra-aortic baloon pump counterpulsation.  Cardiac output measurement techniques. [Treatment of life-threatening arrhythmias.](https://www.ncbi.nlm.nih.gov/pubmed/6269450) Vasoactive and inotropic drugs used in the management of acute cardiovascular failure (adrenaline, noradrenaline, phenylephrine, dobutamine, dopamine, ephedrine). |
| **Theme (chapter) 6.**Shock. Transfusion and fluid therapy. Nutrition support in the critically ill patients. | |
| * to know the shock definition; * to know the classification of shock; * to know the etiology, pathophysiology, clinical signs, diagnostic tests and the principles of the intensive therapy of the patients with different types of shock; * to integrate practical knowledge of shock with those obtained from other clinical and fundamental disciplines; * to identify patients with shock and develop a treatment plan for patients in shock; * to know the characteristics of the blood components and the indications for their use; * to know the characteristics of solutions for infusion therapy and the indications for their administration; * to know the indications and components of parenteral nutrition; * to develop a parenteral nutrition plan for a critically ill patient. | Shock. Definition. Classification. Pathophysiology.  The hypovolemic shock. Etiopathogenesis. Clinical picture. Treatment.  Cardiogenic shock. Etiopathogenesis. Clinical picture. Treatment.  Septic shock. Etiopathogenesis. Clinical picture. Treatment.  Anaphylactic shock. Etiopathogenesis. Clinical picture. Treatment.  Neurogenic shock. Etiopathogenesis. Clinical picture. Treatment.  Pulmonary artery embolism. Etiopathogenesis. Clinical picture. Treatment.  Indications for perioperative transfusion.  Red cell concentrate. Fresh frozen plasma. Cryoprecipitate. The platelet concentrate.  Infusion therapy. Electrolyte and colloidal solutions.  Indications for parenteral nutrition. Components. Principles of appreciating nutritional needs. |
| **Theme (chapter) 7.** Hydroelectrolytic and acid-base disturbances. | |
| * to know fluid compartments and general principles of hydro-electrolyte equilibrium (osmolarity, tonicity, VanHoff law, Saint Giorgy law, Nernst equilibrium); * to know the modern principles of water exchange between fluid compartments (revised Starling equation); * to know the role of glycocalyx in vascular permeability, membrane potential; * to be able to identify a patient with hypovolemia (tilt table test, signs of water deficiency, volumetric loading test); * to be able to diagnose disorders of extracellular volume (hypovolemia, hypervolemia); * to be able to select solutions for infusion solution; * to know the acid-base balance parameters; * to know the pulmonary and renal regulation of acid-base balance; * to understand the acid-base disturbances in critically ill patients. | Hydric sectors (intravascular, extravascular, transcellular, intracellular).  Solutions for infusion: characteristics and general indications of use.  Hypovolemia and hypervolemia (types, symptoms, treatment).  Hypo- and hypernatremia, etiology, symptomatology, treatment.  Hypo- and hyperpotasemia, etiology, symptomatology, treatment.  Indices of acid-base balance.  Regulation of acid-base balance.  Metabolic and respiratory acidosis.  Metabolic and respiratory alcalosis.  . |
| **Theme (chapter) 8.** Acute consciousness disturbances. Brain death. | |
| * to know the criteria for a conscious/ unconscious patient; * to be aware of the ABCDE principle of evaluating a coma patient; * to be familiar with Monroe-Kellie's doctrine and its applicability for the management of a patient with elevated ICP; * to know the factors that determine the cerebral blood flow; * to know the notions of primary and secondary brain injury; * to know the factors that determine the secondary cerebral lesions and the principles of treatment of the patient with consciousness disorders. | Degrees of neurological status alteration.  The etiology of coma.  Key concepts of neurointensive care.  Factors that determine brain blood flow and intracranial pressure.  Diagnosis of coma (medical history, general physical examination, neurological examination, paraclinical exam).  General principles of coma treatment.  Cerebral death: diagnostic criteria. Patient diagnosed with cerebral death as potential donor of organs |
| **Theme (chapter) 9.** Acute liver failure. | |
| * to know the definition of acute liver failure; * to know the causes of acute liver failure; * to know the clinical manifestations of acute liver failure; * to know the principles of intensive care in liver failure | Liver failure. Definition. Causes.  Etiotropic treatment.  Specific disorders treatment (cardiovascular, respiratory, nervous, coagulopathy, infection, kidney failure). |
| **Theme (chapter) 10).** Acute kidney injury. | |
| * to define acute kidney injury and know the diagnostic criteria; * to know the risk factors for the development of acute kidney injury and clinical conditions that can precipitate acute kidney injury; * to know the most common forms of acute kidney injury; * to know key principles of acute kidney injury treatment; * to know the criteria for setting up renal replacement therapy. | Acute kidney injury. Definition. Classification. Criteria. Causes.  Diagnostic criteria for acute kidney injury. Risk factors and the most common causes of acute kidney injury among intensive care patients.  Clinical manifestation. General principles of treatment of acute kidney injury.  Renal replacement therapy. Indications and methods of extra-renal clearence treatment. |

1. **PROFESSIONAL (specific (Sc)) and TRANSVERSAL (Tc) COMPETENCES AND STUDY OUTCOMES**

* **Professional (specific) (Sc) competences**
* PC1. To know the notion and criteria of critically ill patient.
* PC2. To know the components of anesthesia.
* PC3. To know the methods of general anesthesia and loco-regional anesthesia techniques.
* PC4. To understand the main changes in the monitored parameters in a criticaly ill patient.
* PC5. To know the etiology, pathophysiology, clinical signs of critically ill patients.
* PC6. To elaborate and intensive care plan for patients with acute respiratory failure, cardiovascular, kidney, liver failure, various types of shock, acute consciousness disorders, hydroelectrolytic and acid-base disturbances.
* PC7. To know how to administer oxygen.
* PC8. To be able to manage upper airway obstruction.
* PC9. To identify patients in coma and be aware of the seriousness and urgency of the condition.
* PC10. To be able to evaluate the patient with consciousness disorders according to the ABCDE algorithm.
* PC11. To know the factors that influence the progress of acute brain injury.
* PC12. To know the diagnostic criteria of acute kidney injury and the principles of management.
* **Transversal competences (tc)**
* TC1. Ability to integrate knowledge from the fundamental and clinical disciplines to solve a concrete task (based on pre-anesthesia evaluation and preparation, anesthesia management plan, monitoring during anesthesia).
* TC2. Ability to interact with anesthesia-intensive care team members and other physicians in a concrete setting.
* TC3. Ability to use modern equipment (anesthesia machine, monitors, automatic syringes, artificial ventilaton devices, electronic patient data management systems).
* TC4. Ability to handle large volumes of data (their interpretation and use for guiding treatment, based on data from critical patient monitoring).
* TC5. Ability to make the right decisions and to act quickly in a critical care environment.
* TC6. Ability to work with multiple sources of information, including electronic ones, to integrate information and to use use in practice.
* **Study outcomes**
* To know the concept of critically ill patient.
* To know the peculiarities of diagnosis, monitoring and treatment of critically ill patients (with respiratory failure, cardiovascular, hepatic, neurological failures, shock, in coma states, etc.).
* To understand general and loco-regional anesthesia, drugs, methods and techniques used to administer anesthesia.
* To be able to carry out practically some diagnostic and therapeutical tests related to the administration of anesthesia and management of critically ill patient: preanesthesia assesment and preparation, orotracheal intubation on the manikin, practical use of technical devices: ventilators, automatic syringe, monitors, oxygen therapy devices etc. .
* To know the role and the organization structure of Anesthesia and Intensive Care units.

1. **STUDENT'S self-training**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| No. | Expected product | Implementation strategies | Assessment criteria | Implementation terms |
| 1. | Working with information sources | To select informational sources concerning the topic (monographs, scientific articles, the Internet), read texts carefully, synthesize relevant information, and summarize with ones own words about what one read | Ability to extract the essentials; interpretative skills; the volume of work. | Throughout the course |
| 2. | Preparing and making presentations | Preparing the plan and setting deadline for presentation. Determining the components of the PowerPoint presentation, poster or report: topic, purpose, results, conclusions, practical applications, bibliography. | Complying with components of the presentation structure, making connections with other domains, originality of the presentation, credibility of sources, proper use of images, correct use of terms, presentation time. | Throughout the course |

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

* ***Teaching and learning methods used***

The Anstheziology and Intensive Care course is delivered in a classical manner: lectures and practical works.

The lectures are given by the professors and assistant professors in multimedia format. During the practical works the students are familiarized with the operating room, general and loco-regional anesthesia techniques, and in the intensive care units - with management principles of critically ill patients (monitoring, principles of intensive care, data management). Students are also involved in discussing theoretical material and clinical cases. Strengthening students' theoretical and practical knowledge is done through clinical case simulation sessions at the University Center for Simulation in Medical Training (CUSIM).

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

Interactive lecture, questioning, brainstorming, individual study, work with manual and scientific articles, discussion, discussion of clinal cases, simulation session.

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

**Current**: frontal and / or individual control through:

* oral answers
* evaluation tests
* analysis of case studies.

Throughout the course, students, knowledge will be checked by 3 tests, which include all the studied material.

**Final**: differentiated colloquium

Upon completion of the course, students pass a differentiated colloquium, which consists of two tests: computerized and oral tests. Students will not be admitted to the colloquium if they have negative marks (i.e. lower than 5) for the checks during the course or who have not recovered absences from practical work.

The subjects for the colloquium (tests and theoretical questions) are discussed and approved at the chair meeting. The oral test consist of answering to two questions and is marked with grades from 0 to 10.

Computerized test consists of tests covering all the topics (40% of tests are simple and 60% - multiple choice questions). The student has 2 minutes to solve each test. The test is scored with marks from 0 to 10.

The knowledge level is rated using grades from 10 to 1 without decimals, as follows:

- grade 10 or "excellent" (ECTS - A equivalent) will be awarded for acquiring 91-100% of the material;

- grade 9 or "very good" (equivalent to ECTS - B) will be awarded for acquiring 81-90% of the material;

- grade 8 or "good" (equivalent to ECTS - C) will be awarded if 71-80% of the material is aquired;

- grades 6 and 7 or "satisfactory" (ECTS - D equivalent) will be awarded for the acquisition of 61-65% and 66-70% of the material;

- grade 5 or "weak" (ECTS - E equivalent) will be awarded for the acquisition of 51-60% of the material;

- grades 3 and 4 (equivalent to ECTS - FX) will be awarded for the acquisition of 31-40% and 41-50% of the material respectively;

- grades 1 and 2 or "unsatisfactory (equivalent to ECTS - F) will be awarded for the acquisition of 0-30% of the material.

**The final mark** will consist of the average mark of three tests (coefficient 0.5), computerizeed test (coefficient 0.2) and oral test (coefficient 0.3).

**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** |
| **8,51-8,00** | **9** |
| **9,01-9,50** | **9,5** | **A** |
| **9,51-10,0** | **10** |

The average annual mark and the marks of all stages of final examination (computer assisted, test, oral) - are expressed in numbers according to the mark scale (according to the table), and the final mark obtained is expressed in number with two decimals, which is transferred to student’s record-book.

*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.*

1. **RECOMMENDED literature:**

*A. Compulsory:*

1. [**P.G. Barash**](https://shop.lww.com/Handbook-of-Clinical-Anesthesia/p/9781451176155#editor_accordian) et al.Handbook of Clinical Anesthesia, 2013
2. Marino P.L. The ICU book, 2014.

<https://ia802501.us.archive.org/0/items/MarinosTheICUBook4thEd/Marino%27s%2C%20The%20ICU%20Book%2C%204th%20ed.pdf>

1. Hines R.L., Marschall K.E. Handbook of Stoelting,s anesthesia and coexisting disease, 2013.

*B. Additional:*

1. Oxford handbook of anaesthesia, 2011.
2. Hines R.L., Marschall K.E. Handbook of Stoelting,s anesthesia and coexisting disease, 2013
3. Raymer K. Understanding Anesthesia. A Learner's Handbook, 2013.

<http://anesthesiology.queensu.ca/assets/Clerks/UnderstandingAnesthesia1_1_2.pdf>

1. Loscalzo J. Harrison,s Pulmonary and Critical Care Medicine, 2010.

<http://umsha.ac.ir/uploads/Harrisons_Pulmonary_and_Critical.pdf>