

**Azerbaijan medical university  
Department of Biological Chemistry  
On the subject of clinical biochemistry**

**"I CONFIRM"  
Head of the Department of  
Biological Chemistry  
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**EMPLOYEE TRAINING PROGRAM  
(SYLLABUS)**

**CODE OF SUBJECT: 2406.02**  
**TYPE OF SUBJECT: Mandatory**  
**TEACHING TERM OF SUBJECT: XI, XII – MPF**  
**SUBJECT CREDIT: 2 credits**  
**FORM OF TEACHING THE SUBJECT: visual**  
**LANGUAGE OF TEACHING SUBJECT: Azerbaijani, Russian, English**  
**TEACHER GIVING THE LESSON:**  
**CONTACT NUMBER OF THE DEPARTMENT: (012)440 80 77**  
**E.mail: biochemistry@amu.edu.az.**

## **PREREQUISITES:**

Subject that must be taught in essential for the teaching of the subject: "**static and dynamic biochemistry**".

## **COREQUISITES:**

There is no need to teach other subjects at the same time as teaching this subject.

## **DESCRIPTION OF THE SUBJECT:**

Clinical biochemistry studies the diagnosis, monitoring, screening and prognosis of a number of diseases using modern biochemical, hematological, immunoenzyme and other analytical methods.

## **OBJECTIVE OF THE SUBJECT:**

The main purpose of the course is to teach students the basics of clinical biochemistry.

## **SCIENTIFIC RESULTS:**

As a result of teaching the subject, students master the assessment of hemostasis parameters, diagnostic and prognostic value of biochemical, immunoenzyme, hematological analysis results.

## **SCIENTIFIC LECTURES:**

There is no lecture on this subject.

## PLAN OF SCIENTIFIC TOPICS

№	The subject of the lessons	Hours
1.	<p><i>Familiarity with the group, internal discipline and safety rules. The subject of clinical biochemistry. Clinical examination of blood. Biochemistry and pathobiochemistry of the kidneys.</i></p> <p><b>Lab. work:</b> general analysis of blood. Determination of coagulogram parameters. Determination and diagnostic value of urea and creatinine in blood serum.</p>	6
2.	<p><i>Biochemistry and pathobiochemistry of nutrition, digestion and liver.</i></p> <p><b>Lab. work:</b> Determination and diagnostic value of enzyme activity (ALT, AST, QF, QQT) and bilirubin fractions in blood serum.</p>	6
3.	<p><i>The role of endogenous factors in the development of diseases. Basics of medical genetics.</i></p> <p><b>Lab. work:</b> Determination of hemoglobin fractions by electrophoresis and isoelectrofocis. Mass and spectrophotometric determination of glucose-6-phosphate dehydrogenase enzyme. Determination of proline and hydroxyproline in blood and urine in patients with collagenosis.</p>	6
4.	<p><i>Molecular mechanisms of the tumor process and ischemic heart disease. Metabolic aspects of atherosclerosis.</i></p> <p><b>Lab. work :</b> Determination and diagnostic value of oncomarkers in blood serum (CEA, CA 15-3, CA 125, CA 19-9, AFP, PSA), cholesterol fractions.</p>	6
5.	<p><i>Biochemistry and pathobiochemistry of the endocrine system.</i></p> <p><b>Lab. work:</b> Determination and diagnostic value of hormones (T3, T4, TSH, LH, FSH, insulin, prolactin) in the blood serum by enzyme-linked immunosorbent assay.</p>	6

**Total: 30 hours**

## **LABORATORY TRAINING QUESTIONS TO STUDY**

### ***LESSON I***

#### ***Clinical examination of blood. Biochemistry and pathobiochemistry of the kidneys***

1. Pathological and clinical biochemistry, goals and objectives of the subject (prognosis, diagnosis, monitoring, screening). Sensitivity and specificity.
2. General examination of blood. Shaped elements of blood.
6. Erythrocyte sedimentation rate.
3. Chemical composition of blood in normal and pathology.
4. Respiratory function and acid-base balance of blood in normal and pathology.
5. Coagulogram (coagulation time, PT, TT, APTT, INR, fibrinogen). Coagulation and counter-coagulation system.
6. Morphofunctional features of the kidneys. Renal blood circulation, filtration, reabsorption, secretion.
7. Regulation of renal function. The role of the kidneys in the regulation of water-salt metabolism and acid-base balance.
8. Kidney diseases and metabolic disorders observed in this case.
9. Physicochemical properties, normal and pathological components of urine. Microscopy of urine sediment.
10. Biochemical diagnosis of kidney disease. Reberg test. Azotemias.

### ***LESSON II***

#### ***Biochemistry and pathobiochemistry of nutrition, digestion and liver***

1. The main components and norms of food. Irreplaceable components of food.
2. Digestion and absorption of food (oral cavity, stomach, intestines). Nutritional pathologies.
3. Features and disorders of the digestive process in the stomach (gastritis, ulcers, gastric cancer, etc.).
4. Pancreatic function and disorders (pancreatitis, mucivisidosis).
5. Disorders of digestion and absorption in the intestines (syndromes).
6. The role of the liver in carbohydrate and lipid metabolism.
7. The role of the liver in protein and pigment metabolism. Jaundice.
8. Neutralizing function of the liver and its disorders.

9. Clinical and biochemical syndromes of the liver and their biochemical diagnosis.
10. Fatty hepatic dystrophy. Gallstone disease.

### ***LESSON III***

#### ***Molecular basis of hereditary diseases***

1. Mutagenesis. Gene mutations. Incidence of the mutations and consequences of mutations. Duplication and divergence of genes in mutagenesis.
2. Polymorphism of proteins. Medical and genetic services.
3. Congenital defects of metabolism - hereditary enzymopathies. Congenital disorders of carbohydrate metabolism (glycogenosis, galactosemia, pentosuria, fructosuria, etc.).
4. Disorders of amino acid metabolism (phenylketonuria, albinism, tyrosinosis, alkaptonuria, etc.).
5. Congenital disorders of porphyrin, bilirubin, purine and pyrimidine metabolism (porphyria, xanthinuria, gout, Les Noyhan syndrome, orotaciduria, jaundice, Krieglner-Nayyar and Jil. ber syndromes).
6. Mucopolysaccharidoses and mucopolipidoses.
7. Hereditary diseases associated with defects of non-enzymatic proteins (analbuminemia, antitrypsin, haptoglobin and ceruloplasmin deficiency).
8. Favism. Hemoglobin anomalies (hemoglobinopathies, thalassemia).
9. Congenital disorders of blood clotting. Hemophilia.
10. Congenital defects of blood lipoproteins.

### ***LESSON IV***

#### ***Molecular mechanisms of the tumor process and ischemic heart disease***

1. Biochemistry of malignant tumors. Carcinogenic factors: physicochemical factors, viral carcinogens.
2. Stages of carcinogenesis. Neoplastic transformation of the cell.
3. Autonomy and systemic effects of malignant tumors. Metastatic properties of malignant tumor cells.
4. Regulation of metabolic processes in tumor cells.
5. Biochemical bases of diagnosis, treatment and prevention of malignant tumors.

6. The role of lipoproteins in the development of atherosclerosis. Dyslipoproteinemia. Hyperlipoproteinemia.
7. Theories of the mechanism of development of atherosclerosis.
8. Basics of diagnosis, prevention, treatment and biochemistry of atherosclerosis.
9. Biochemical mechanisms of changes observed in muscle during myocardial infarction, cardiomyopathies.
10. The main principles of biochemical diagnosis of myocardial infarction.

## ***LESSON V***

### ***Biochemistry and pathobiochemistry of the endocrine system.***

1. Pathobiochemistry of the endocrine system. Mechanism of action, basic principles of synthesis and secretion of hormones.
2. Pituitary hormones. Basic principles of diagnosis of hypo- and hyperfunction.
3. Thyroid hormones: hypo- and hyperfunction and their diagnosis.
4. Parathormone-calcitonin-calcitriol. Role in calcium and phosphorus metabolism.
5. Endocrine function of the pancreas: disorders, diagnosis.
6. Hormones of the adrenal cortex: metabolism, hypo- and hyper-function, diagnosis.
7. Hormones of the adrenal cortex: metabolism, hypo- and hyperfunction, diagnosis.
8. Male sex hormones, their endocrine dysfunction, diagnosis.
9. Female sex hormones, their endocrine dysfunction, diagnosis.
10. Hormones of the thymus and pineal gland, their functional disorders, diagnosis.

## **IN THE 2021-2022 ACADEMIC YEAR FOR VI YEAR STUDENTS OF THE MEDICAL FACULTY LIST OF TOPICS OF FREE WORK FROM CLINICAL BIOCHEMISTRY**

1. Clinical examination of blood. Shaped elements of blood. EÇS. Chemical composition of blood in normal and pathology: plasma proteins, blood plasma enzymes, inorganic components.
2. Respiratory function of blood in normal and pathology. Mechanisms of regulation of acid-base balance in the body. Blood buffer systems. Acid-base balance disorders: metabolic and respiratory acidosis and alkalosis.
3. Blood coagulation and reverse coagulation systems. Coagulopathies. Vascular-platelet and

- coagulation hemostasis. Research methods of the hemostasis system (coagulation time, PT, TT, APTT, INR, fibrinogen).
4. Morphofunctional features of the kidneys. Renal circulation, filtration, reabsorption, secretion. Regulation of renal function. The role of the kidneys in the regulation of water-salt metabolism and acid-base balance.
  5. Physicochemical properties, normal and pathological components of urine. Microscopy of urine sediment. Biochemical diagnosis of kidney disease. Reberg test. Azotemias.
  6. Acute renal failure (prerenal, intrarenal, postrenal): biochemical properties, principles of diagnosis and treatment.
  7. Chronic renal failure: etiopathogenesis, metabolic features, principles of diagnosis and treatment.
  8. Proteinuria and nephrotic syndrome: symptoms, mechanisms, etiopathogenesis, principles of diagnosis and treatment.
  9. Fanconi syndrome: clinical signs, mechanisms of formation, etiopathogenesis, principles of diagnosis and treatment.
  10. Kidney disease: mechanisms of formation, clinical signs, methods of biochemical research.
  11. The main components and norms of food. Irreplaceable components of food.
  12. Digestion and absorption of nutrients (oral cavity, stomach, intestines). Nutritional pathologies.
  13. Features and disorders of the digestive process in the stomach (gastritis, ulcers, gastric cancer, etc.). Pancreatic function and disorders (pancreatitis and cystic fibrosis).
  14. Disorders of digestion and absorption in the intestines (syndromes).
  15. The role of the liver in pigment metabolism. Jaundice.
  16. Neutral function of the liver and its disorders. Clinical and biochemical syndromes of the liver and their biochemical diagnosis.
  17. The role of the liver in lipid metabolism. Fatty dystrophy of the liver. Gallstone disease.
  18. Alcoholic cirrhosis: etiopathogenesis, principles of diagnosis, prevention and treatment.
  19. Methods of biochemical research of liver diseases. Hereditary jaundice: types, etiopathogenesis, principles of diagnosis and treatment.
  20. Biochemistry of malignant tumors. Carcinogenic factors: physicochemical factors, viral carcinogens. Stages of carcinogenesis. Neoplastic transformation of the cell.
  21. Regulation of metabolic processes in tumor cells. Autonomy and systemic effects of malignant tumors. Metastatic properties of malignant tumor cells.
  22. Biochemical bases of diagnosis, treatment and prevention of malignant tumors. Tumor markers.
  23. The role of lipoproteins in the development of atherosclerosis. Dyslipoproteinemia.

- Hyperlipoproteinemia. Theories of the mechanism of development of atherosclerosis.  
Biochemical bases of diagnosis, treatment and prevention of atherosclerosis.
24. Biochemical mechanisms of changes in muscle during myocardial infarction, cardiomyopathies.  
Basic principles of biochemical diagnosis of myocardial infarction.
  25. Pituitary hormones: hypo- and hyperfunction and their diagnosis.
  26. Thyroid hormones: hypo- and hyperfunction and their diagnosis. Parathormone- calcitonin-  
calcistyrol. Role in calcium and phosphorus metabolism.
  27. Endocrine function of the pancreas: disorders and diagnosis.
  28. Hormones of the brain and cortex of the adrenal glands: metabolism, hypo- and hyperfunction,  
diagnosis.
  29. Male sex hormones, their endocrine dysfunction, diagnosis.
  30. Female sex hormones, their endocrine dysfunction, diagnosis.

### **EVALUATION:**

Collecting the required 100 points for a credit on the subject is carried out as follows:

- 10 points – attendance
- 10 points – freelance work
- 30 points – daily assessment
- 50 points – collected in the exam

The exam will be held by test method, students will be given 50 test assignments.

### **NOTE:**

The points earned in the exam are added to the points earned during the semester. A student who scores 51 out of 100 points (note: the student must score a minimum of 17 points on the exam) is considered to have passed the exam. The end result is as follows:

- “A” – "Excellent" – 91-100
- “B” – "Very good" – 81-90
- “C” – "Good" – 71-80
- “D” – "Sufficient" – 61-70
- “E” – "Satisfactory" – 51-60
- “F” – "Insufficient" – less than 51 points



## **FREE WORK:**

During the semester, the student is given 2 free work assignments (written) with a maximum of 5 points or 1 free work assignment (presentation) with a maximum of 10 points, and this work is presented to the group students visually. Presentations are given to the teacher on disk or sent to the e-mail of the department. The topic of free work is given to the student individually by each teacher.

Sample tests on all subjects are prepared in electronic form and posted on the official website of the university [www.amu.edu.az](http://www.amu.edu.az).

## **COURSE WORK:**

Course work on this subject is not provided.

## **EXPERIENCE:**

Production experience in this subject is not provided.

## **REFERENCES**

1. Islamzade F.I., Efendiyev AM, Islamzade F.Q. Fundamentals of human biochemistry (textbook, Volume I). Baku, 2015.
2. Islamzade F.I., Islamzade F.Q., Efendiyev AM. Fundamentals of human biochemistry (textbook, volume II). Baku, 2015.
3. Efendiyev AM, Islamzade FQ, Garayev AN, Eyyubova AA "Laboratory classes on biological chemistry" (textbook). Baku, 2015.
4. Efendiyev AM, Eyyubova AA, Garayev AN "Pathological and clinical biochemistry" (textbook). Baku, 2019.