Azerbaijan Medical University

"CONFİRM"

WORKING TRAINING PROGRAM
(SYLLABUS)
on General chemıstry

"Head of General and Toxicological Chemistry Department" prof. Garayev E.A

Signature _____

SUBJECT CODE:	02.00.04
SUBJECT TYPE:	Compulsory
TRAINING SEMESTER:	I semester
CREDİT:	6 credit
TRAINING FORM:	full time
TRAINING LANGUAGE:	Azerbaijan, Russian, English
SUBJECT TEACHERS:	doc. Ajalova G.İ. doc. Ahmadov E.L. ass.prof. Guliyeva Sh.İ
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PREREQUISITES:

There is no subject that must be taught in advance in order to be taught..

COREQUISITES:

After teaching this subject, it is necessary to teach other subjects: organic chemistry, analytical chemistry.

TRAINING PROGRAM:

The curriculum on "General chemistry" for bachelor's degree in pharmacy was approved by the decision of the section "Chemistry and chemical technology" of the Scientific-Methodical Council of the Ministry of Education of the Azerbaijan Republic on April 18, 2005 (protocol № 14).

TRAINING PLAN:

According to the curriculum approved by the rector of the Azerbaijan Medical University, prof. G.Ch.Garaybeyli, general chemistry on the pharmacy faculty, taught on the credit system as a compulsory and consistent subject for 1 semester: 30 hours lecture, 60 hours practical trainings. The duration of training for the semester is 15 weeks.

COURSE DESCRIPTION:

Detailed information about basic concepts and laws of chemistry, classical and modern theories on the nature of solutions, the structure of the atom, the characterization of the energy state of electrons in the atom by quantum numbers, classical and modern theories on the nature of chemical bonds, types of chemical bonds, classical and modern theories of complex compounds, spectroscopy and chromatography, electrochemistry, chemical kinetics, adsorption, instrumental methods of analysis and their essence, rules for their performance, necessary equipment, working rules, statistics are given in the teaching of this subject.

Necessary information is provided on the concept of analysis and determination of substances, physical and chemical properties of the substance, sampling rules and dissolution of the analyte (solubility in water, acid, alkali and other solvents).

Extensive and detailed information is given about the methods of electrochemical analysis and their application in medicine. Broad materials on potentiometry, voltammetry, polyarography, and their application in medical research take place.

The theoretical foundations of general chemistry are being taught at lecture lessons

COURSE OBJECTIVE:

To teach students a set of knowledge and practical skills in the theoretical foundations of physicochemical analysis, as well as to build a basis for better and easier mastering by students of future specialties (pharmaceutical chemistry, toxicological chemistry, pharmacognosy, technology of medicines) as a major subject.

COURSE RESULTS:

Upon completion of general chemistry, students must be able to carry out the study of any substance on the basis of chemical analysis methods, in other words, be trained as a chemist-pharmacist.

NOTE:

If a minimum of 17 points is not scored in the exam, the points earned before the exam will not be counted with the exam score. 17 or more points on the exam are added to the points scored before the exam, and the final score is evaluated as follows:

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

Independent study:

During the semester 10 independent work assignments are given. Completion of each task is marked with 1 point.

Independent study should be written as a text file, 2-3 pages in length (font 12). It may also be written in easy-to-read handwriting. Plagiarism is unacceptable because every independent task is a collection of individual ideas

INDEPENDENT STUDİES AND DEADLİNE DATES (fall semester)

№	Topic	deadline
1	Distribution of chemical elements in living organisms. The structure of the atom. Models about the structure of the atom.	5 th week
2	Types of chemical bonds and their characteristics. Types of intermolecular interactions, polarity and dipole moment of chemical bonds.	6 th week
3	Classical laws of thermodynamics (I, II, III). Enthalpy and entropy	7 th week
4	Different theories about solutions.The phenomena of equilibrium and displacement in solutions. Thermodynamics of chemical equilibrium. Transition of phases. Gibbs phase rule. Phase diagram for water.	8 th week

5	Buffer systems. Buffer capacity. PH and its determination.	9 th week
6	Electrochemistry. Electrical conductivity of solutions. Electrical conductivity, electrode potential and double electric layer formed at the metal-solution boundary. Classification of electrodes	10 th week
7	Enzymes and their mechanism of action. Kinetics of enzymatic reactions. Photochemical and radiation reactions.	11th week
8	Surface events, surface tension. Sorption. Types and theories of adsorption. Chromatography and its types.	12 th week
9	Chemical kinetics. Kinetics of enzymatic reactions.	13 th week
10	Dispersed systems and their properties. Kinetics and mechanism of coagulation.	14th week

The independent study provided after the deadline will be ignored regardless of the reason. The results of the independent studies are recorded in the journal.

Thematic plan of lectures in general chemistry for I course pharmacy students

№	Topic	hour
1	General chemistry, content and connection with medical science. Distribution of chemical elements in living organisms. The structure of the atom. Models about the structure of the atom.	2
2	Quantum numbers and laws that determine the sequence of electron distribution at energy levels. De Broglie waves and Haisenberg's uncertainty principle. Hybridization of atomic orbitals and geometric shape of molecules.	2
3	The periodic system of elements and their classification. Changes in the physical parameters of the elements depending on their order number.	2
4	Theories about the nature of chemical bond. Schrödinger equation.	2
5	Oxidation-reduction reactions	2
6	Types of chemical bonds and their characteristics. Types of intermolecular interactions (orientation, induction, dispersion interactions), polarity and dipole moment of chemical bonds.	2
7	Complex compounds and their role in living organisms.	2
8	Chemical thermodynamics and bioenergetics. Zerowth and I laws of thermodynamics and its application to biological systems. Thermochemistry and its laws. Consequences of Hess's law.	2

9	II and III laws of thermodynamics. Entropy and its change in various processes. The Nernst equation. Entropy and probability. Thermodynamic potentials. Gibbs-Helmholtz free energies.	2
10	Various theories about solutions. The phenomena of equilibrium and displacement in solutions. Thermodynamics of chemical equilibrium. The transition of phases. Gibbs phase rule. Phase diagram for water.	2
11	Weak and strong electrolytes. pH and biological systems. Buffer systems. Buffer effect and capacity. Alkaline-acid balance in the body.	2
12	Electrochemistry. Electrochemistry of biological systems. Electrical conductivity, electrode potential and double electric layer formed at the metal-solution interface. Classification of electrodes. Redox systems and biological oxidation. Membrane potential and the nature of biopotentials.	2
13	Enzymes and their mechanism of action. Kinetics of enzymatic reactions. Photochemical and radiation reactions.	2
14	Surface events, surface tension. Sorption. Types and theories of adsorption. Chromatography and its types.	2
15	Dispersed systems and their properties. Kinetics and mechanism of coagulation. High molecular compounds (HMC) and their application in medicine. Stability and swelling of HMC solutions.	2

Thematic and calendar plan of practical lessons in general chemistry for I course pharmacy students

№	Topic	hour
1	Introduction to laboratory equipment. Stoichiometric laws. Concentration of solutions and methods of its expression. Transition from one concentration to another. Problem solving.	4
2	Periodic Table of Elements. Classification of elements and the dependence of their physical and chemical parameters on the order number. Redox reactions.	4
3	The structure of the atom. De Broglie waves, Heisenberg's uncertainty principle. Spectral series corresponding to the hydrogen atom.	4
4	Quantum numbers. Rules that determine the sequence of electron distribution in orbitals. Hybridization of nitrogen orbitals and geometric shape of molecules.	4
5	Types of chemical bond. Classical and modern theories about the nature of chemical bond. Schrödinger equation. **Colloqvium.**	2 2

6	Complex compounds. Organogenic and biogenic elements.	4
7	The first law of thermodynamics. Internal energy, enthalpy. Application of the first law to biological systems. Respiration rate and caloric equivalent of oxygen. Basic laws of thermochemistry. Problem solving.	4
8	Solutions. The role of water in living organisms and its regular models. Mechanism and thermodynamics of dissolution. Dissolution of gases in liquids and liquids in each other. Law of distribution and extraction.	4
9	Colligative properties of solutions. Raoult's law Cryoscopy and ebulioscopy. Electrolyte solutions. Hydrogen indicator. Buffer systems and their mechanism of action. Blood buffer systems.	4
10	Electrochemistry. Electrical conductivity of solutions. Conductometry. Electrochemical elements. Classification of electrodes. Electrode potential. Methods of electrochemical analysis. **Colloqvium.**	2 2
11	Kinetics and basic concepts of biochemical reactions. The effect of temperature on the reaction rate. Arrenius equation. Catalysis and catalysts. Enzymatic catalysis and its properties. Laboratory work: Study of the decomposition reaction of hydrogen peroxide.	4
12	Surface events. Surface tension. Adsorption at the solid surface boundary with gas and liquid. Chromatography. Laboratory work.	4
13	Classification,obtaining, purification and electrical properties of dispersed systems. Electrophoresis and its application in medicine. The structure of colloidal particles and its micellar theory. Chemical structure of micelles. Experiments on obtaining sols in different ways.	4
14	Stability and coagulation factors of disperse systems. Coagulation phase of blood clotting, colloidal preservation and peptization.	4
15	Emulsions, powders, aerosols and suspensions. Their properties and application in pharmacy. Laboratory work. **Colloqvium.**	2 2

Tests for all subjects are prepared in electronic form and are posted on the official website of the university www.amu.edu.az.

CALENDAR-THEMATİC PLAN:

The calendar-thematic plan of lectures and seminar classes in the subject area is prepared, handed out to the subject teachers, and one copy is kept in the department's documents.

EVALUATION:

To score the required 100 points for credit in this course will be as follows:

50 point – until the exam

Including:

10 point – attendance

10 point – independent study

30 point – from seminar lessons.

Colloquium will be performed 3 times during the semester. Students who do not participate in the colloquium get 0 (zero) points in the journal.

50 points - will be scored on the exam.

The exam will take place in a virtual testing center. The test will consist of 25 questions. Each question is two points. Incorrectly answered questions will have the points of correctly answered questions removed.

References:

1. Acalova G.İ., Həsənov X.İ. "Termodinamika və bioenergetika", Bakı, 2021
2. İskəndərov Q.B., Acalova G.İ. və başqaları, "Xromatoqrafiya üsullarının kimyəvi və əczaçılıq analizində tətbiqi", Bakı, 2017
3. Süleymanov Ə.S. Tibbi elektrokimya, Bakı, 2015
4. Y. Çimen, D. Hür, H. Berber. Genel kimya, Anadolu, 2011
5. Tağıyev D.B. Bioüzvi və biofiziki kimya, Bakı, 2010.
6. D.B.Tağıyev, Ə.S.Süleymanov, "Biofiziki kimya olan laboratoriya işlərinə rəhbərlik" Bakı, "Təbib", 2009

COURSE WORK

Course work on this subject is not provided.

EXPERIENCE

There is no production experience in this subject.