MEDICAL UNIVERSITY OF ŁÓDŹ

PREMEDICAL PREPARATORY COURSE

(SYLABUS)

1. **Name of the department providing the course: Department of Clinical Chemistry and Biochemistry**
2. **Course title: Chemistry**
3. **Course language: English**
4. **Type of course unit**: compulsory
5. **Course aims**: As a result of the implementation of the curriculum course the student obtains basic information about the inorganic and organic chemistry and applies knowledge of the chemical principles and processes. Students will acquire scientific knowledge and will understand the scientific chemical theories as well as develop a range of experimental skills during the practical tasks.
6. **Types of educational activities and number of hours allocated**:

	Lecture	Seminar	Laboratory classes	classes	Total
stationary		96	32		**128**
on-line (in the real time scheduled in the timetable)					
e-learning (on the e-learning platform)	32				**32**
Total	**32**	**96**	**32**		**160**

7. **Names of course unit's faculty**: dr Wioletta Rozpędek-Kamińska, dr Anna Gajda
8. **Prerequisites:** none
9. **Learning activities and teaching methods**: Lecture-based learning, group learning, presentations, quizzes, debates, panel discussion, reflection journals, laboratory experiments, worked examples, multiple-choice items, solving a problem, concept mapping activities, process worksheets, analyze data sets, review and critique research studies, work in groups/teams to solve a specific open-ended problem, group work/team project
10. **Course unit content:**

Lectures:

Lecture 1: Chemistry in Our Lives

1.1 Chemistry and Chemicals

1.2 Scientific Method: Thinking Like a Scientist

1.3 Studying and Learning Chemistry

1.4 Key Math Skills for Chemistry

1.5 Writing Numbers in Scientific Notation

Lecture 2: Chemistry and Measurements

2.1 Units of Measurement

2.2 Measured Numbers and Significant

2.3 Significant Figures in Calculations

2.4 Prefixes and Equalities

2.5 Writing Conversion Factors

2.6 Problem Solving Using Unit Conversion

2.7 Density

Lecture 3: Matter and Energy

3.1 Classification of Matter

3.2 States and Properties of Matter

3.3 Temperature

3.4 Energy

3.5 Energy and Nutrition

3.6 Specific Heat

3.7 Changes of State

Lecture 4: Atoms and Elements

4.1 Elements and Symbols

4.2 The Periodic Table

4.3 The Atom

4.4 Atomic Number and Mass Number

4.5 Isotopes and Atomic Mass

4.6 Electron Energy Levels

4.7 Trends in Periodic Properties

Lecture 5: Nuclear Chemistry

5.1 Natural Radioactivity

5.2 Nuclear Reactions

5.3 Radiation Measurement

5.4 Half-Life of a Radioisotope

5.5 Medical Applications Using Radioactivity

5.6 Nuclear Fission and Fusion

Lecture 6: Ionic and Molecular Compounds - part I

6.1 Ions: Transfer of Electrons

6.2 Ionic Compounds

6.3 Naming and Writing Ionic Formulas

6.4 Polyatomic Ions

6.5 Molecular Compounds: Sharing Electrons

Lecture 7: Ionic and Molecular Compounds - part II

7.1 Lewis Structures for Molecules

7.2 Electronegativity and Bond Polarity

7.3 Shapes of Molecules

7.4 Polarity of Molecules and Intermolecular Forces

Lecture 8: Chemical Quantities and Reactions

8.1 The Mole

8.2 Molar Mass

8.3 Calculations Using Molar Mass

8.4 Equations for Chemical Reactions

8.5 Types of Chemical Reactions

8.6 Oxidation–Reduction Reactions

8.7 Mole Relationships in Chemical Equations

8.8 Mass Calculations for Chemical Reactions

8.9 Energy in Chemical Reactions

Lecture 9: Gases

9.1 Properties of Gases

9.2 Pressure and Volume (Boyle's Law)

9.3 Temperature and Volume (Charles's Law)

9.4 Temperature and Pressure (Gay-Lussac's Law)

9.5 The Combined Gas Law

9.6 Volume and Moles (Avogadro's Law)

9.7 Partial Pressures (Dalton's Law)

Lecture 10: Solutions

10.1 Solutions

10.2 Electrolytes and Nonelectrolytes

10.3 Solubility

10.4 Solution Concentrations

10.5 Dilution of Solutions

10.6 Properties of Solutions

Lecture 11: Acids and Bases and Equilibrium

11.1 Acids and Bases

11.2 Brønsted–Lowry Acids and Bases

11.3 Strengths of Acids and Bases

11.4 Acid–Base Equilibrium

11.5 Dissociation of Water

11.6 The pH Scale

11.7 Reactions of Acids and Bases

11.8 Buffers

Lecture 12: Introduction to Organic Chemistry: Hydrocarbons

12.1 Organic Compounds

12.2 Alkanes

12.3 Alkanes with Substituents

12.4 Properties of Alkanes

12.5 Alkenes and Alkynes

12.6 Cis–Trans Isomers

12.7 Addition Reactions for Alkenes

12.8 Aromatic Compounds

Seminars

Seminar topics are consistent with lecture topics and involve solving practical tasks based on acquired practical knowledge. There are also tests to check students' knowledge during the seminars.

Laboratory classes

Laboratory 1: Measurements, conversions, and manipulations

Laboratory 2: Kinds of matter

Laboratory 3: Exploring acids and bases

Laboratory 4: An investigating of chemical reactions

Laboratory 5: Investigating solutions

Laboratory 6: Carbohydrates

Laboratory 7: Thin layer chromatography (TLC)

Laboratory 8: Synthesis of aspirin

11. **Course objectives**:

- ***Knowledge:***

  Student gains knowledge about measurements in chemistry as well as inorganic and organic chemistry: units of measurements used in chemistry, significant figures in chemical calculations, prefixes and equalities and conversion factors, matter and energy, atoms and elements, nuclear chemistry, ionic and molecular compounds, chemical quantities and reactions, all states of matter (solid, liquid, gas), solutions, acids and bases and equilibrium, all organic compounds including alkanes, alkenes and alkynes, alcohols, thiols, ethers, aldehydes and ketones, carbohydrates, carboxylic acids, esters, amines and amides, lipids, amino acids, proteins and enzymes, nucleic acids. Students will also gain information about biochemical process such as protein synthesis, metabolic pathways and ATP production.

- ***Skills:***

  Student:
  acquires scientific knowledge and understands of scientific theories and practice;
  develops a range of experimental skills, including handling variables and working safely;
  uses scientific data and evidence to solve problems and discuss the limitations of scientific methods;
  communicates effectively and clearly, using scientific terminology, notation and conventions;
  understands that the application of scientific knowledge can benefit people and the environment.

- ***Attitudes and transferrable (generic) competencies:***

  Student:
  is aware of the need for a permanent, lifelong learning,

Lecture 13: Alcohols, Thiols, Ethers, Aldehydes and Ketones

13.1 Alcohols, Phenols, Thiols, and Ethers

13.2 Properties of Alcohols

13.3 Aldehydes and Ketones

13.4 Reactions of Alcohols, Thiols, Aldehydes and Ketones

Lecture 14: Carbohydrates

14.1 Carbohydrates

14.2 Chiral Molecules

14.3 Fischer Projections of Monosaccharides

14.4 Haworth Structures of Monosaccharides

14.5 Chemical Properties of Monosaccharides

14.6 Disaccharides

14.7 Polysaccharides

Lecture 15: Carboxylic Acids, Esters, Amines, and Amides

15.1 Carboxylic Acids

15.2 Properties of Carboxylic Acids

15.3 Esters

15.4 Hydrolysis of Esters

15.5 Amines

15.6 Amides

Lecture 16: Lipids

16.1 Lipids

16.2 Fatty Acids

16.3 Waxes and Triacylglycerols

16.4 Chemical Properties of Triacylglycerols

16.5 Phospholipids 555

16.6 Steroids: Cholesterol, Bile Salts, and

16.7 Cell Membranes

demonstrates active role in the pursuit of their professional development and feels responsible for his actions,
systematically enriches professional knowledge and improves skills, with a view to professionalism,
respects the values, moral duties and skills in interpersonal relations,
develops the ability to active listening,
communicates effectively,
controls errors and barriers in the communication process,
uses the technique of verbal and non-verbal communication

12. **Required and recommended learning resources (readings):**
    - *Required: Modified Mastering Chemistry for Chemistry: An Introduction to General, Organic, and Biological Chemistry 13th Edition, Timberlake, Karen*
    - *Recommended: General Chemistry for Engineers and Biological Scientists Dixon Brian, Noble Lori, Cognella Academic Publishing*
13. **Assessment methods and criteria:** Online tasks on the remote learning platform in the form of a quiz/test. Developing a presentation based on the materials provided and presenting it. Preparing laboratory reports based on the previously conducted experiments.
14. **Additional information:** During the whole chemistry course 5 absences ale allowed. More than 5 absences require a sick note. If a class in which the student is absent has an assignment/test, student must ask the teaches to set a new date.

Statement and signature of the course leader: I hereby state that the content of the curriculum included in the syllabus below is the result of my individual work completed as part of work contract/cooperation resulting from a civil law contract, and that author rights to this title are not the property of a third party.

Dean's signature:
Data: