

Навчальне видання

АНГЛІЙСЬКА МОВА

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**МІНІСТЕРСТВО ОСВІТИ І НАУКИ УКРАЇНИ
МИКОЛАЇВСЬКИЙ НАЦІОНАЛЬНИЙ АГРАРНИЙ
УНІВЕРСИТЕТ**

Факультет культури й виховання
Кафедра іноземних мов

АНГЛІЙСЬКА МОВА

**Методичні рекомендації та навчальний матеріал для
аудиторної роботи здобувачів вищої освіти ступеня
«бакалавр» спеціальності 162 „Біотехнологія” денної форми
навчання**

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Англійська мова : методичні рекомендації та навчальний матеріал для аудиторної роботи здобувачів вищої освіти ступеня «бакалавр» спеціальності 162 „Біотехнологія” денної форми навчання” / Т. А. Ганніченко – Миколаїв : МНАУ, 2017. – 57 с.

Мета посібника забезпечити розвиток навичок професійного спілкування, роботи з фаховою літературою та усного мовлення на теми, передбачені програмою з англійської мови для студентів спеціальності «Біотехнологія». Складається з 9 розділів. Призначений для студентів біотехнологічних спеціальностей.

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LITERATURE:

1. Волынский В. Н. Краткий лесотехнический словарь (англо – русский, русско – английский) / В. Н. Волынский. – Архангельск: Изд-во АГТУ, 2007. – 204 с.
2. The Oxford Russian Dictionary. Russian-English / edited by Marcus Wheeler and Boris Unbegaun]. English-Russian. [edited by Paul Falla.] – Oxford, 1997. – 1340 p.

chemolithotrophy. He was responsible for the first isolation and description of nitrogen-fixing bacteria.

15. *Speak on the facts you found in the text. What information was new for you?*

16. *Write down 5 questions based on this text.*

17. *Fill up the table about the famous scientist. Add there scientists not mentioned in the text.*

18. *Choose the scientist whose impact you appreciate most and enlarge the information from the text with your own. Tell your report to the class.*

19. *Translate the text into English. You can use a dictionary if necessary.*

Люди здавна мали уявлення про мікробіологічних процесах, однак не знали про

причини, що викликають їх. Це не заважало робити спостереження і навіть використовувати ці процеси в побуті. Багато філософи робили умоглядні (speculative) висновки про причини тих або інших явищ. При цьому найбільш близько до відкриття мікросвіту ще в 14 столітті підійшов Фракасторо, зазначивши, що інфекції викликають маленькі тільця, що передаються при контакті і зберігаються на речах хворого. Однак у той час неможливо було впевнитися в правильності його ідей.

20. *Take one theme and create a presentation to present to the other students:*

- Food microbiology
- Environmental microbiology
- Eukaryote
- Bacteria
- Prokaryote
- Virology
- Viruses
- Archaea
- Escherichia coli

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ПЕРЕДМОВА

Євроінтеграційні процеси спонукають до оновлення змісту вищої освіти, вихід її на новий якісний рівень потребує створення нових методичних напрацювань для підготовки фахівців різних галузей народного господарства, зокрема це стосується й фахівців аграрного профілю, зокрема майбутніх біотехнологів. Володіння англійською мовою професійного спрямування є вимогою часу і потребою особистості для її успішної самореалізації у фаховій сфері.

Методичні рекомендації та навчальний матеріал з англійської мови призначені для аудиторної роботи здобувачів ступеня вищої освіти «бакалавр» II курсу денної форми навчання за напрямом „Біотехнологія”. Методичні рекомендації розроблені згідно з Типовою програмою Міністерства освіти і науки України, програмою «English for Specific Purposes» на засадах компетентнісного, комунікативного та системного підходів. Професійно спрямовані тексти є важливим джерелом спеціальної лексики з фаху, матеріалом для створення проблемних ситуацій, анотування й реферування. Граматичні вправи спрямовані на закріплення знань і контроль вироблення граматичних умінь і навичок. Усні розмовні теми, що пропонуються до вивчення, сприятимуть вдосконаленню навичок усної комунікації і підвищення рівня мовної культури студентів.

14. Read the text about Antonie van Leeuwenhoek (Антони ванн Левенгук) and other pioneers of microbiology, translate and title it and add the facts you know about these famous scientists.

Antonie van Leeuwenhoek was the first to observe microorganisms using a microscope. In 1676 he observed bacteria and other microorganisms, using a single-lens microscope of his own design.

The field of bacteriology was founded in the 19th century by Ferdinand Cohn, a botanist who describes several bacteria. Cohn was also the first to formulate the taxonomic classification of bacteria and discover spores. Louis Pasteur and Robert Koch were contemporaries of Cohn's and are often considered to be the father of Microbiology and medical microbiology.

Pasteur is most famous for his experiments designed to disprove the theory of spontaneous generation. Pasteur also designed methods for food preservation (pasteurization) and vaccines against several diseases such as fowl cholera and rabies. Koch is best known for his contributions to the germ theory of disease, proving that specific diseases were caused by specific pathogenic microorganisms. He developed a series of criteria that have become known as the Koch's postulates. Koch was one of the first scientists to focus on the isolation of bacteria in pure culture resulting in his description of several novel bacteria including *Mycobacterium tuberculosis*, the causative agent of tuberculosis.

Martinus Beijerinck and Sergei Winogradsky are considered to be the founders of general microbiology. Beijerinck made two major contributions to microbiology: the discovery of viruses and the development of enrichment culture techniques. While his work on the Tobacco Mosaic Virus established the basic principles of virology, it was his development of enrichment culturing that had the most immediate impact on microbiology by allowing for the cultivation of a wide range of microbes. Winogradsky was the first to develop the concept of

- contaminant
- the digestive system
- to promote
- treatment

12. Remember Passive Voice. Change the sentences into Passive wherever it is necessary.

Example: They gave her a clock. She was given a clock.

1) Students are doing a lot of the work. 2) We have already washed the clothes. 3) He expected us to offer him the job. 4) They showed her the easiest way to do it. 5) Lightning struck the old oak. 6) Titian couldn't have painted it as people didn't wear that style of dress till after his death. 7) Did the idea interest you? 8) The lawyer gave him the details of his uncle's will. 9) They used to start these engines by hand. Now they start them by electricity. 10) Who wrote it? 11) The Prime Minister opened the new school. 12) We will not admit children under sixteen.

13. Translate into English using the Passive Voice.

1) На жаль, на конференції такі питання не порушувалися (touch upon). 2) Хто вам сказав, що угода (agreement) підписано? 3) Тут говорять тільки англійською. 4) Їй дозволили займатися спортом. 5) приймають Відвідувачів щодня. 6) Бетті не дозволяють приходити сюди. 7) У лікарні за ним доглядали погано. 8) За ним вже послано? - Так, йому зателефонували і попросили прийти у вісім. 9) На нашій вулиці будують новий кінотеатр. 10) Не кажи, а то (otherwise) над тобою будуть сміятися. 11) Мені ще нічого про це не говорили. 12) Ми поїдемо завтра за місто, якщо буде дощ? - Так, ми повинні ту-так поїхати, нас там будуть чекати. 13) Ця будівля була тільки що побудовано, коли ми приїхали сюди. 14) До вечора робота була закінчена. 15) Коли ми повернулися, вони розповіли багато цікавих новин.

Навчальній посібник складається з 9 розділів, кожен з яких містить фахові тексти, різноманітні вправи та завдання на знання фахової лексики.

Мета навчального посібника – розвиток умінь та навичок фахової усної та письмової комунікації, засвоєння нових лексичних одиниць за професійним спрямуванням, повторення та закріплення граматичних конструкцій у поєднанні з фаховою лексикою. Дібрані тексти, вправи та тести допоможуть студентам розширити свій активний і пасивний словниковий запас з англійської мови в професійній сфері, удосконалити навички читання, перекладу та спілкування, що загалом сприятиме досягненню поставленої мети.

На опрацювання кожного розділу відводиться по 2 години аудиторної та 4 години самостійної роботи.

Unit 1

Our nutrition

Do you like to eat in restaurants? How often do you eat out? Is price a consideration when you go out? Have you ever eaten in a restaurant alone? Did you enjoy it?

1. Read the text about different types of restaurants and translate it.

You are what you eat

All living things need food to sustain life. Plants can make their own food from soil, water, and sunshine. Animals eat either other animals or plants. Human beings eat all kinds of different foods from animal and plant sources, depending on what is available where they live and sometimes, too, on the restrictions of religious customs. Food supplies nutrients, the substances needed by the body for life and growth. They are proteins, fats, carbohydrates, vitamins, minerals, and water. A healthy balanced diet must consist of all six. In prehistoric times people ate what they could find by hunting and gathering wild plants. Later they learned to keep animals and grow cereals and vegetables. Settled communities then became established. The plants that were cultivated were the plants that grew naturally in any particular climate.

Nutrition is the process by which plants and animals take in and use food. Food is needed to keep the body running smoothly. It provides energy for work and play, for breathing, and for the heart's beating. The building material for muscles, bones, and blood comes from food. You cannot have a healthy body without healthy eating and drinking. Not enough of some foods, or too much of others, can lead to illness. Experts on nutrition are called nutritionists. The food and drink you take in are called your diet. (This word is sometimes used in another way, to mean eating less food than normal in order to lose weight, as in "going on a diet".) A person's diet is so important because growth and health depend on it. Dieticians are people with knowledge of special diets (dietetics), such as those used for sick

5. Read the text attentively again and say which statements are true to the fact or false.

- a) Microbiology is the study of microorganisms.
- b) Microbiology typically includes the study of the immune system.
- c) A virologist is a specialist in microbiology.
- d) Microbiology is researched passively.
- e) Bacteria can be used for the industrial production of all acids.
- f) The ability of each microorganism to degrade toxic waste depends on the nature of each contaminant.
- g) Probiotics are the substances consumed to promote the growth of probiotic microorganisms.

6. Write a summary of the text in your own words. Add key words in it if necessary.

7. Retell this text using your plan.

8. Find the appropriate definitions to the following words:

9. Find the words from the previous exercise in the following table.

10. Spend one minute writing down all of the different words you associate with the word 'microbiology'. Share your words with your partner/group and talk about them.

11. Look at the words below. Try to recall exactly how these were used in the text:

- pathogenic microbes
- beneficial processes
- amino acids
- polyamides
- high-value medical application
- domestic

8) У еукаріотів є нуклеотидний склад окремих послідовностей ДНК.

9) Штам - эчистая культура першого виду, у якого однакові морфологічні і фізіологічні особливості.

10) Хімічне руйнування матеріалів під дією факторів навколишнього середовища є биоразлагаемостью.

3. Fill in the gaps in these sentences:

1) Microbiology is the study of _____, which are microscopic and unicellular organisms.

2) Viruses, though not classed as _____, are also studied.

3) Many microbes are responsible for _____ such as industrial fermentation, antibiotic production and others.

4) _____ are beneficial for microbial biodegradation of domestic, agricultural and industrial wastes.

5) Recent research has suggested that microorganisms could be useful in the _____ of cancer.

6) Microorganisms are used for the _____ of biopolymers with tailored properties suitable for high-value medical application.

4. Give the full answers to these questions:

1) What is microbiology?

2) Is microbiology connected with immunology? How?

3) Which branches of microbiology do you know?

4) Where are microbes used?

5) What do you know about *Corynebacterium glutamicum*?

6) What is produced by microorganisms?

7) What is probiotic? What is prebiotic? What is the difference between them?

8) How can we biodegrade different wastes?

9) Could microorganisms be useful in the treatment of cancer?

people in hospital. We should never forget that across the world 40 million people die each year from starvation and the diseases it brings. Fifteen million of them are babies and young children. For the millions more who suffer from malnutrition (not enough of the right foods), healthy eating is out of the question. It is hard enough just to stay alive.

The body needs many different nutrients. These are various substances necessary to provide energy and the materials for growth, body-building, and body maintenance. Every day millions of cells in the body die and must be replaced by new ones. Not all foods contain all nutrients. So it is not just the quantity of food eaten that is important, but also the variety. People who have enough food available may still become ill because they are eating too much of one kind of food and not enough of another. To stay healthy, we need to eat a balanced diet. This means a diet containing the right proportions of the main nutrients: carbohydrates, proteins, fats, fiber, minerals, vitamins, and fluids. Many foods are a mixture of these basic nutrients. A balanced diet also contains enough energy (in the form of food) to power the chemical reactions of living.

Some people worry that a vegetarian diet will be short of protein, but this is not the case. Plenty of protein can be obtained from the great variety of nuts, seeds, pulses, cereals, and soy products (such as tofu) which are now widely available, and from eggs and milk products. It was once thought that plant proteins were inferior to animal proteins, being deficient in some amino acids. It is now known that a mixture of plant proteins complement one another. For example, a shortage of an amino acid in one plant food, such as pulses, is counterbalanced by an excess of that amino acid in a different plant food, such as a cereal. Protein combinations such as beans on toast, rice and lentils, bean stew with pot barley, oats and nuts (as in muesli), provide very high quality protein. All other nutrients are present in adequate quantities in the lactovegetarian diet. If dairy products are not eaten, a supplement of vitamin B12 becomes essential. Many vegetarian foods are fortified with this vitamin (yeast extracts, some soy milks, some breakfast cereals, and so on).

Vegetarians obtain iron from dried fruit, leafy green vegetables, wholemeal flour, pulses, oats, nuts, and brown rice. They obtain calcium from cheese, nuts, sesame seeds, leafy green vegetables, and soy. Vegetarians have been responsible for the invention of foods such as peanut butter; cornflakes, muesli, and high-protein vegetable foods made to taste like meat.

Vocabulary

<i>amino acids</i> – амінокислоти	<i>nutrition</i> - харчування
<i>available</i> – доступний	<i>oat</i> - овес
<i>bone</i> – кістка	<i>proteins</i> - білки
<i>carbohydrates</i> - вуглеводи	<i>pulses</i> - бобові
<i>cereals</i> – зернові	<i>responsible</i> - відповідальний
<i>dairy products</i> – молочні продукти	<i>seeds</i> - насіння
<i>diet</i> – дієта, раціон	<i>shortage</i> - нестача
<i>diseases</i> – захворювання	<i>soil</i> - ґрунт
<i>dried fruit</i> – сухофрукти	<i>source</i> - джерело
<i>fats</i> – жири	<i>soy products</i> – соєві продукти
<i>fiber</i> – волокно	<i>starvation</i> - голодування
<i>fluids</i> – рідини	<i>substance</i> - речовина
<i>maintenance</i> – підтримка організму	<i>complement (v)</i> - доповнити
<i>malnutrition</i> – недоїдання	<i>smoothly</i> - плавно
<i>minerals</i> – мінерали	<i>sustain (v)</i> - підтримувати
<i>nutrients</i> – поживні речовини	<i>vitamins</i> - вітаміни
<i>keep the body running</i> – тримати тіло в формі	

2. Give Ukraine equivalents for the following words:

to sustain life, restriction, supply, nutrients, proteins, fats, carbohydrates, vitamins, minerals, consist of, cereals, nutrition,

light microscope – світловий мікроскоп
 microbial – мікробний
 microorganism – мікроорганізм
 pathogenic – патогенний
 petri dish – чашки Петрі
 prebiotics – пребіотики
 probiotics – пробіотики
 prokaryotes – прокаріоти
 protists – протисти
 running test – виконання тесту
 stain – пляма
 tissue engineering – тканинна інженерія
 toxic waste – токсичні відходи
 virus – вірус

2. Translate these sentences

- 1) Мікроорганізми складно побачити неозброєним оком (naked eye).
- 2) Вірус несе в собі спадкову інформацію.
- 3) Інфекція - складний біологічний процес, що виникає в результаті проникнення патогенних мікробів у організм та порушення сталості його внутрішнього середовища.
- 4) Прокаріоти використовуються в медицині.
- 5) Експлуатаційні випробування приладів виробляються у відповідності з державними стандартами.
- 6) Токсичні відходи можна розбити на декілька груп: миш'як містять неорганічні тверді відходи; ртуть містять відходи і ін.
- 7) Біохімічні тести застосовуються для скринінгу - виявлення хвороби на до клінічної стадії.

bacterial species with an annual production of more than two million tons of amino acids.

A variety of biopolymers, such as polysaccharides, polyesters, and polyamides, are produced by microorganisms. Microorganisms are used for the biotechnological production of biopolymers with tailored properties suitable for high-value medical application such as tissue engineering and drug delivery.

Microorganisms are beneficial for microbial biodegradation of domestic, agricultural and industrial wastes. The ability of each microorganism to degrade toxic waste depends on the nature of each contaminant.

There are also various claims concerning the contributions to human and animal health by consuming probiotics (bacteria potentially beneficial to the digestive system) and/or prebiotics (substances consumed to promote the growth of probiotic microorganisms). Recent research has suggested that microorganisms could be useful in the treatment of cancer.

Vocabulary

agar plate – агарова пластина

amino acids – амінокислоти

antibiotic – антибіотик

biodegradation – біодеградація

biopolymers – біополімери

class (v) – класифікувати (v)

contaminant – забруднюючі речовини

degrade (v) – зменшуватися, вироджуватися (v)

depend on (v) – залежить від (v)

drug delivery – доставка ліків, спосіб застосування ліків

dye – барвник

enzymes – ферменти

eukaryotes – еукаріоти

growth conditions – умови зростання

include (v) – включати

interact (v) – взаємодіяти (v)

take in, to keep the body running smoothly, muscles, bones, blood, illness, starvation, substance, to provide, body maintenance, replace, fiber, minerals, vitamins, fluids, chemical reaction, inferior, deficient, mixture, complement, counterbalance, excess, supplement, essential.

3. Translate the sentences into English using the words you learned.

1) *Амінокислоти* – органічні сполуки, в молекулі яких одночасно містяться карбоксильні і амінні групи.

2) У добовому раціоні людини і тварин переважають *вуглеводи*.

3) *Хлібні зернові* культури вирощують на всіх континентах нашої планети.

4) Соя – одна з найбільш містких білком рослинних продуктів харчування.

5) *Голодування* – стан організму, який викликаний недостатнім надходженням речовин, необхідних для підтримки гомеостазу.

6) Концентрація *вітамінів* в тканинах і добова потреба в них невелика, але при недостатньому надходженні вітамінів в організм наступають характерні і небезпечні патологічні зміни.

7) При *недоїданні* спостерігається дефіцит енергетичної цінності їжі (кількості калорій), також людині може бракувати білків, вітамінів, мікроелементів.

8) *Дієти* різних культур можуть мати істотні відмінності і включати або виключати конкретні продукти харчування.

9) *Молочні продукти* - продукти харчування, які виготовлені з молока (зазвичай коров'ячого, козячого).

10) Деякі *поживні речовини* здійснюють безліч функцій в організмі. Наприклад, вода і мінеральні речовини регулюють різноманітні функції, але не є джерелами енергії.

4. Are the following statements true or false? Correct the false ones.

- 1) Human beings eat all kinds of different food from animal and plant sources.
- 2) In prehistoric times people ate what they could find in the shop.
- 3) Nutrition is the process by which plants and animals take in and use food.
- 4) The building material for muscles, bones, and blood comes from fluid.
- 5) Experts on nutrition are called dieticians.
- 6) Every day millions of cells in the body die and must be replaced by new ones.
- 7) People who have enough food available may still become ill because they are eating too much different kind of food.
- 8) Plenty of protein can be obtained from the meat.
- 9) If dairy products are not eaten, a supplement of vitamin B12 becomes essential.
- 10) Vegetarians have been responsible for the invention of foods such as milk, sugar, butter.

5. Make conclusion about the amount of food, its variety and quality. Retell the text "You are what you eat".

6. Make a special diet for 3 types of people. Work out from the checklist the things you can and you can't eat. Take care about all necessary vitamins and elements.

- a) Vegan. You strongly disagree with people eating meat, fish, eggs, cheese or milk.
- b) Vegetarian. You do not eat fish or meat but see nothing wrong in eating dairy products.
- c) Gourmet. You love good food, including meat, fish and dairy products.

5) Bacteria and viruses work in the same way.

6) A vaccine is a form of a disease.

8. Make a plan of this text. Add key words in it if necessary.

Unit 9 **Microbiology**

Say in your words what microbiology is.

How many areas of microbiology do you know?

What is the main subject of microbiological research?

1) Read this text.

The fantastic world

Microbiology is the study of microorganisms, which are microscopic and unicellular organisms. This includes eukaryotes such as fungi and protists, and prokaryotes. Viruses, though not classed as living organisms, are also studied. Microbiology typically includes the study of the immune system, or Immunology. And immune systems obviously interact with pathogenic microbes.

Microbiology includes virology, mycology, parasitology, bacteriology and other branches. Microbiological procedures usually must be aseptic, and use a variety of tools such as light microscopes with a combination of stains and dyes, agar plates in petri dishes, biochemical test and running tests against particular growth conditions.

Microbiology is researched actively. Many microbes are responsible for beneficial processes such as industrial fermentation, antibiotic production and others. Bacteria can be used for the industrial production of amino acids. *Corynebacterium glutamicum* is one of the most important

10) These diseases either _____ quickly or have so many different strains in the wild.

5. *Answer the questions about this text.*

1) What is the immune system? What is the basic function of the immune system?

2) How can we understand the power of the immune system?

3) What happens when somebody dies?

4) What are the synonyms of the word “virus”?

5) What happens when the germ invades one’s body?

6) What are benign bacteria?

7) How many ways of the immune system protection can you name?

8) Are there the diseases which you catch once and then never again?

9) What is a vaccine? How does it work?

10) Are there any vaccines unable to be cured by vaccines?

11) What happens each time you get flu?

6. *Speak on the new facts you found in the text. What wondered you or what information was new for you? Can you add any other information about the immune system?*

7. *Do you agree with the following statements? Choose one of them, explain and expand your idea and create a small report.*

1) The strep throat bacteria (Streptococcus) releases a toxin that causes inflammation in your throat.

2) The Immune system doesn’t work against viruses. It deals only with cells.

3) Bacteria have no nucleus.

4) Erythrocytes are not the part of immune system.

7. *Divide the following words into two columns: countable and uncountable nouns (you must get 25 uncountable nouns).*

furniture, coffee, leaf, food, computer, list, blood, job, work, language, country, advice, information, money, progress, permit, permission, baggage, luggage, beach, traffic, weather, window, knowledge, air, water, holiday, damage, accommodation, scenery, scene, pigeon, bread, mountain, kick, news, accident, laugh, flour, laughter.

8. *Quantifiers. Fill in the spaces with much, many, few, a few, little, a little, lot of, plenty of, a great number of, a great amount of, a great deal of (you may get several variants).*

1) The living conditions in the district were very poor and there were only __ doctors available. 2) He is a very intelligent man. Do you know that he speaks __ foreign languages? 3) The situation was becoming worse and worse. __ projects had to be postponed. 4) The show was poor. There was __ applause. 5) There were __ people at the meeting, but most of them left early so there aren't __ left now. 6) Have you finished the chromatography of that protein solution? There is __ solution in the fridge if you need more. 7) We haven't had __ rain this summer. The garden needs watering. 8) The party was a failure. Unfortunately, they invited __ interesting people. 9) He didn't know __ facts about genetic engineering. 10) Did the storm make __ damage to the crops?

Unit 2

Chemistry and its branches

Do you like chemistry? What was your mark on chemistry at school? What do you know about the history of chemistry? Do you know the branches of chemistry? What branches of chemistry do you prefer?

1. Read the text and translate.

Ancient science

Chemistry is the science of matter and the changes it undergoes. Chemistry is concerned with the composition, behavior (or reaction), structure, and properties of matter, as well as the changes it undergoes during chemical reactions.

Ancient Egyptians pioneered the art of synthetic wet chemistry 4,000 years ago. Wet chemistry is a term used to refer to chemistry generally done in the liquid phase. By 1000 BC civilizations were using more complex forms of chemistry such as using plants for medicine, extracting metal from ores, fermenting wine and making cosmetics.

The genesis of chemistry can be traced to the widely observed phenomenon of burning that led to metallurgy – the art and science of processing ores to get metals. The greed for gold led to the discovery of the process for its purification.

The earliest pioneers of chemistry, and inventors of the modern scientific method, were medieval Arab and Persian scholars. They introduced precise observation and controlled experimentation into the field and discovered numerous chemical substances. The emergence of chemistry in Europe was primarily due to the recurrent incidence of the plague and blights there during the so called Dark Ages. This gave rise to a need for medicines.

Chemistry indeed came of age when Antoine Lavoisier, developed the theory of Conservation of mass in 1783; and the development of the Atomic Theory by John Dalton around

5) Ще в дитинстві вам повинні були поставити вакцину проти цієї хвороби. Якщо ви проходили вакцинацію, вас виключають з групи ризику.

6) Вірус грипу швидко мутує.

7) Понад 30 років тому були відкриті антитіла, і доведено, що вони сприяють прискоренню імунної відповіді при повторному контакті з антигеном.

8) Селезінка теж є частиною імунної системи.

3. *Give the definitions to at least three of the following terms:*

Adenoids, bone marrow, large intestine, lymph nodes, lymphatic duct, Payer's patches, small intestine, spleen, subclavian vein, thoracic duct, throat, thymus.

4. *Fill in the gaps in these sentences:*

1) Inside your body there is an amazing _____ called the immune system.

2) Obviously your immune system is doing something amazing to keep all of that _____ from happening when you are alive.

3) When _____ or _____ invades your body and reproduces, it normally causes problems.

4) The strep throat bacteria releases a _____ that causes inflammation in your throat.

5) The job of your immune system is to protect your body from these _____.

6) If a bacteria or virus does get into the body, the immune system tries to _____ and _____ it before it can make itself at home and reproduce.

7) _____ recognize the virus and produce antibodies for it.

8) A vaccine is a weakened form of a _____.

9) Many diseases cannot be _____ by vaccines.

cure (v) – вилікувати
 defend (v) – захищати
 defended – захистив
 defense – оборонити
 detect (v) – виявити
 digest (v) – дайджест
 dismantle (v) – демонтаж
 flu – грип
 germ – зародок
 harmful – шкідливий
 infection – інфекція
 inflammation – запалення
 influenza – грип
 invade (v) – вторгнутися
 large intestine – товста кишка
 lymph nodes – лімфатичні вузли
 lymphatic duct – лімфатична протока
 make smb sick – зробив ??? хворим

mutate (v) – мутувати
 payer's patches – патчі платника
 prevent (v) – запобігти
 protection – захист
 release (v) – реаліз
 reproduce (v) – відтворити
 shut down (v) – закрити
 small intestine – тонка кишка
 spleen – селезінка
 subclavian vein – підключична вена
 thoracic duct – грудна протока
 throat – горло
 thymus – тимус
 tonsil – мигдалина
 vaccine[væksi:n] – вакцина
 virulentstrain – штам
 wide – широкий

2. Translate the following sentences from Russian into English using the words from vocabulary.

1) Вчені вважають, що виникнення шкідливих ракових пухлин - це наслідок багатоклітинної будови організму.

2) При попаданні в організм бактерії починають активно розмножуватися, а продуктами їх життєдіяльності є токсини, несучи величезну шкоду.

3) У пацієнта піднялася температура, всі симптоми говорили про запалення, викликаному інфекцією.

4) Доктор, у мене є ризик захворіти на поліомієліт?

1800. The discovery of the chemical elements has a long history from the days of alchemy and culminating in the discovery of the periodic table of the chemical elements by Dmitri Mendeleev and later discoveries of some synthetic elements.

Modern disciplines within chemistry are traditionally grouped by the type of matter being studied or the kind of study. These include inorganic chemistry - the study of inorganic matter, organic chemistry – the study of carbon based matter, biochemistry-the study of substances found in biological organisms, physical chemistry - the study of chemical processes using physical concepts and analytical chemistry - the analysis of material samples to gain an understanding of their chemical composition and structure.

Many more specialized disciplines have emerged in recent years, e.g. neurochemistry the chemical study of the nervous system.

Vocabulary

<i>analytical chemistry</i>	аналітична хімія
<i>behavior (reaction)</i>	поведінка (реакція)
<i>biochemistry</i>	біохімія
<i>biological organisms</i>	біологічні організми
<i>burning</i>	спалювання
<i>changes</i>	зміни
<i>chemical processes</i>	хімічні процеси
<i>complex forms</i>	складні форми
<i>composition</i>	склад
<i>emerge (v)</i>	з'являються (v)
<i>extract (v)</i>	витягати, добувати (v)
<i>gain (v)</i>	отримувати (v)
<i>give rise to</i>	породжувати
<i>group (v)</i>	групувати (v)
<i>inorganic chemistry</i>	неорганічна хімія
<i>matter</i>	матеріал
<i>organic chemistry</i>	органічна хімія

<i>physical chemistry</i>	<i>фізична хімія</i>
<i>precise observation</i>	<i>точне спостереження</i>
<i>property</i>	<i>властивість</i>
<i>purification</i>	<i>очистка</i>
<i>sample</i>	<i>зразок</i>
<i>substance</i>	<i>речовина</i>
<i>undergo (v)</i>	<i>пройти (v)</i>
<i>wet chemistry</i>	<i>волога хімія</i>

2. Translate the sentences into English.

- 1) Хімія вивчає речовини, їх властивості, будову і перетворення, що відбуваються в результаті хімічних реакцій.
- 2) За ознакою досліджуваних речовин хімію прийнято ділити на неорганічну і органічну.
- 3) Багато хімічних речовин при трансформації можуть приймати досить складні форми.
- 4) Ці зразки можна розглянути під мікроскопом.
- 5) З'явилася серія статей, присвячених результатам 3 років точних спостережень космічного мікрохвильового фону на супутнику WMAP.
- 6) Хімія як наука виникла досить давно.
- 7) Сіль сильної кислоти і сильного основи не підлягає гідролізу.
- 8) Як і всі органічні речовини пінополістирол при горінні виділяє від 1000 до 3000 МДж / кг.

3. Give Russian equivalent for the following word combinations. Use them in the sentences of your own.

The science of matter, liquid phase, complex forms of chemistry, fermenting wine, the genesis of chemistry, widely observed phenomenon, the greed for gold, the modern scientific method, numerous chemical substances, due to the recurrent incidence, a

or virus does get into the body, the immune system tries to detect and eliminate it before it can make itself at home and reproduce. Thirdly, when the virus or bacteria is able to reproduce and start causing problems, your immune system is in charge of eliminating it.

There are many diseases that, if you catch them once, you will never catch again. Measles is a good example, as is chicken pox. What happens with these diseases is that they make it into your body and start reproducing. The immune system gears up to eliminate them. Cells recognize the virus and produce antibodies for it. This process takes time, but the disease runs its course and is eventually eliminated.

A vaccine is a weakened form of a disease. It is either a killed form of the disease, or it is a similar but less virulent strain. Once inside your body your immune system mounts the same defense, but because the disease is different or weaker you get few or no symptoms of the disease. Now, when the real disease invades your body, your body is able to eliminate it immediately.

Many diseases cannot be cured by vaccines, however. The common cold and influenza are two good examples. These diseases either mutate so quickly or have so many different strains in the wild that it is impossible to inject all of them into your body. Each time you get the flu, for example, you are getting a different strain of the same disease. Thus, it's only our immune system which helps us to be defended.

Vocabulary

a matter of hours – за кілька годин	benign – доброякісний
adenoids – аденоїди	beneficial – вигідний
amazing – дивовижний	bloodstream – кровотік
antibody – антитіло	bone marrow – кістковий мозок
appendix – додаток	catch a disease – заразитися хворобою
be in charge of – бути відповідальним за	cold – холодно

1. *Read the text and translate it properly.*

A magnificent protector

Inside your body there is an amazing protection mechanism called the immune system. It is designed to defend you against millions of bacteria, microbes, viruses, toxins and parasites that would love to invade your body. To understand the power of the immune system, all that you have to do is to have a look at one's death. That sounds gross, but it will show you important things about your immune system.

When something dies, its immune system (along with everything else) shuts down. In a matter of hours, the body is invaded by all sorts of bacteria, microbes, parasites... None of these things are able to get in when your immune system is working, but the moment your immune system stops the door is wide open. Once you die it only takes a few weeks for these organisms to completely dismantle your body and carry it away, until all that's left is a skeleton. Obviously your immune system is doing something amazing to keep all of that dismantling from happening when you are alive.

When a virus or bacteria (also known generically as a germ) invades your body and reproduces, it normally causes problems. Generally the germ's presence produces some side effect that makes you sick. For example, the strep throat bacteria (*Streptococcus*) releases a toxin that causes inflammation in your throat. The polio virus releases toxins that destroy nerve cells (often leading to paralysis). Some bacteria are benign or beneficial (for example, we all have millions of bacteria in our intestines and they help digest food), but many are harmful ones; they get into the body or the bloodstream.

The job of your immune system is to protect your body from these infections. The immune system protects you in three different ways. First and foremost, it creates a barrier that prevents bacteria and viruses from entering your body. Then, if a bacteria

need for medicines, the theory of Conservation of mass, the days of alchemy, the discovery of the periodic table of the chemical elements, the kind of study, carbon based matter, physical concepts, an understanding of chemical composition and structure.

4. *Answer the questions to the text:*

- 1) What phenomena are studied by chemistry?
- 2) Who pioneered chemistry?
- 3) What is "wet chemistry"?
- 4) What forms of chemistry did civilizations use by 1000 BC? Give examples.
- 5) When was the genesis of chemistry?
- 6) What did the greed for gold lead to?
- 7) Who were the earliest inventors of the modern scientific methods of chemistry? What did they do?
- 8) How did chemistry emerge in Europe?
- 9) When did chemistry indeed come of age?
- 10) Who discovered the periodic table of the chemical elements?
- 11) How are disciplines within chemistry traditionally grouped?
- 12) What is studied by inorganic chemistry, organic chemistry?
- 13) What is studied by biochemistry, physical chemistry?

5. *Read the sentences and say if they are true to the text or false. Correct the mistakes.*

- 1) Chemistry is the science about immune system.
- 2) Chemistry is concerned with the changes matter undergoes during chemical reactions.
- 3) Ancient Egyptians pioneered the art of dry chemistry 4,000 years ago.
- 4) Wet chemistry means that chemistry is done in the solid phase.
- 5) The genesis of chemistry can be traced to the widely observed phenomenon of cooling.
- 6) Starving led to the discovery of the process of purification.
- 7) In the XXI century an epidemic of plague gave rise to a need for medicines.

- 8) Gregor Mendel developed the theory of Conservation of mass.
 9) Dmitri Mendeleev discovered the periodic table of the chemical elements.
 10) Inorganic chemistry is the study of carbon based matter.
 11) Analytical chemistry is the analysis of material samples.

6. *Match the book-names of chemistry sub disciplines and their definitions.*

- | | |
|-------------------------|---|
| 1) Analytical chemistry | a) is the study of the structure, properties, composition, mechanisms, and reactions of organic compounds. |
| 2) Biochemistry | b) is the study of the properties and reactions of inorganic compounds. |
| 3) Inorganic chemistry | c) is the study of the physical and fundamental basis of chemical systems and processes. |
| 4) Materials chemistry | d) is the analysis of material samples to gain an understanding of their chemical composition and structure. |
| 5) Neurochemistry | e) is the study of the chemicals, chemical reactions and chemical interactions that take place in living organisms. |
| 6) Nuclear chemistry | f) is the study of how subatomic particles come together |
| 7) Organic chemistry | g) is the preparation, characterization, and understanding of substances with a useful function. |
| 8) Physical chemistry | h) is the study of neurochemicals; including transmitters, peptides, proteins, lipids, sugars, and nucleic acids. |

Another type of instrument one might have is a gas chromatography (GC) system. This unit separates volatile compounds. A protein biochemistry laboratory may have a fast-pressure liquid chromatography (FPLC) system to purify large amounts of protein to study. It would have a variety of gel matrices, with differing chemical properties to use with the FPLC to separate the proteins. There would be glass columns of varying proportions to hold the matrices. Protein biochemistry laboratories generally have a cold room, so that proteins can be isolated and purified at cold temperatures to keep them stable. The techniques of genetic engineering involve manipulating DNA or RNA in microorganisms, so sterile conditions are required. Such a lab would have a sterile hood that can be wiped down with ethanol and has a germicidal lamp. It blows sterile air across its work surface. The lab would have agar, which forms a gel that the microorganisms grow on. There would be a variety of other supplies for media, and antibiotics for growing up the genetically-altered microorganisms. It would have incubators and shakers that could be warmed up to grow bacteria or yeast. Also necessary is access to an autoclave, to sterilize the supplies for growth and RNA manipulation, and to destroy the recombinant material after the experiments are finished. A medical biochemistry laboratory would have many of the items of other biochemistry labs, depending on its specialty. The difference would be in the source of the material for study.

Unit 8
Immune System. Immunology

Why do we need an immune system?

Nowadays we have many supplements (БАД) on the market. Can all they replace our immune system?

In what context have you heard about immune system in your everyday life?

6) They had hoped to get the summit but Travers fell ill at base camp.

7) When we got home last night, we found that somebody had been breaking into the flat.

8) At eight in the morning we had been driving for six hours.

8. Read this text and translate it.

What Is a Biochemistry Laboratory?

A biochemistry laboratory is an area in which a biochemist studies the chemical processes within living organisms. Traditional biochemistry examines the chemistry of reactions catalyzed by enzymes, but biochemical research has expanded to cover topics of signal transduction, transport within cells, and molecular interactions. All biochemistry labs have the basic components of science research labs, such a pH meter, a balance for weighing out chemicals, a variety of buffers and other chemicals, and refrigerators and freezers for storing supplies. They also have a special freezer kept at -94° F (-70° C) for the long-term storage of proteins and tissues. Such facilities have centrifuges and access to an ultracentrifuge. An ice machine is generally essential for generating ice to keep enzymes and reagents chilled and stable. Virtually all biochemistry labs have gel electrophoresis supplies for examining proteins, along with the equipment for running Western blots.

For biochemistry research, a spectrophotometer is frequently necessary to measure protein concentrations or enzyme reactions. Usually, a UV-Vis spectrophotometer suffices, but some labs require a fluorescence spectrophotometer for more specialized applications. Other biochemistry labs may have more specialized equipment, like particular chromatography equipment. This type of technology separates molecules. For instance, the lab may have a high-pressure liquid chromatography (HPLC) system to separate peptides or conduct enzyme assays on small molecules.

Unit 3 Biology

How does biology refer to biotechnology? Why should biotechnologists study biology?

1. Read the first abstract of the text and try to answer the questions given there.
2. Read the whole text about biology and translate.

The Science of Life

How can there be seedless grapes, and how do they reproduce? Why is carbon monoxide extremely poisonous? Why can't you tickle yourself? What causes the smell after rain? How do vitamins work? What's all this fuss about stem cells? What's make us yawn? Why are frogs growing extra legs out of their legs? Which came first, the chicken or the egg?

Biology is the study of living things and their vital processes. Because biology covers such a broad area, it has been traditional to separate the study of plants (botany) from that of animals (zoology), and the study of structure of organisms (morphology) from that of function (physiology). Despite their apparent differences, all the subdivisions are interrelated by basic principles, so current practice investigate those biological phenomena that all living things have in common. The advancement of knowledge and technology has resulted in further categorizations that include: cell biology, population biology, ecology, genetics, biochemistry, molecular biology, microbiology, physical anthropology, etc.

The foundations of modern biology include four components: cell theory; that life is made of fundamental units called cells; evolution, that life is not deliberately designed by rather evolves incrementally through random mutations and natural selection; genettheory, that tiny molecular sequences of DNA dictate the entire structure of an organism and are passed

from parents to offspring; and homeostasis, that each organism's body includes a complex suite of processes designed to preserve its biochemistry from the entropic effects of the external environment.

It is not known when the study of biology originated, but it can be safely assumed that early humanoids had some experimental knowledge of the animals and plants around them. One's very survival relied on the recognition of poisonous plants and on the basic understanding of the habits of predators. Many of the earliest records of biology come from the bas-reliefs left behind by the Assyrians and Babylonians. There is growing evidence from China and India as early as 2500 BC that there were general practices of therapeutic healing, silkworm use to produce silk, biological control of crops, and agricultural cultivation.

With the arrival of Greek civilization, the study of biology shifted dramatically to a belief that every event has a cause and that a particular cause produces a particular effect. These philosophers of science assumed the existence of a natural law governing the universe. Although they established the science of biology, their greatest contribution to science was the idea of rational thought.

The basic picture in biology has stayed roughly the same since DNA was first imaged using xray crystallography in the 1950s, although there are constant refinements to the details, and life is so complex that it could be centuries or even millennia before we begin to understand it in its entirety. But it should be made clear that we are moving towards complete understanding: life, while complex, consists of a finite amount of complexity that only appreciably increases on relatively long timescales of hundreds of thousands or millions of years. Evolution, while creative, operates slowly.

In recent years, much excitement in biology has centered on the sequencing of genomes and their comparison, called genomics, and the creation of life with custom-written DNA

4. *Write out the sentences expressing the main ideas of each logical part of the text.*

5. *Write a summary of the text in your own words making use of plan and the sentences you've written out.*

6. *Choose the type of instrumental analysis and make a detailed presentation about it.*

7. *Past Perfect and Past Perfect Progressive.*

Choose the correct sentence from each pair.

- 1) I knew the facts of the case because I had read / had been reading the report.
- 2) My eyes ached because I had read / had been reading for three hours.
- 3) The children were filthy. They had played / had been playing in the garden, and they were covered in mud.
- 4) I was very nervous at the beginning of the match. I had never played/ had never been playing her before, and I didn't know how good she was.
- 5) Donald excelled himself as a cook. He had cooked / had been cooking a wonderful Spanish dish.
- 6) Donald was very cross. He had worked/ had been working in the kitchen all morning, and none had offered to help.

8. *Define if the verb tenses in these sentences are correct.*

- 1) He had been sitting here for 40 minutes when the telephone rang.
- 2) I had tried to get him on the phone all day.
- 3) When Sarah arrived at the party, Paul had been already going home.
- 4) When we got back the babysitter had gone home.
- 5) Tom had done his homework for an hour when his friend came to see him.

single molecule – однієї молекули
 solve (v) – вирішити (v)
 ultraviolet-visible spectroscopy – УФ-видимої спектроскопії
 voltammetry – Вольтамперометрії
 x-ray fluorescence – Флюорографія

2. Translate the sentences with the words from vocabulary after the text.

- 1) Флюоресценція - світіння деяких тіл під впливом освітлення, припинення якого світіння не спостерігається.
- 2) Чистий розчинник не має запаху і не токсичний.
- 3) Достатньо знати хімічний склад речовини і його щільність, щоб передбачити і всі інші його властивості.
- 4) Вченим необхідно виміряти оптичні ліній одиночних молекул.
- 5) Спектроскопія виявляє і визначає речовини за допомогою вимірювання їх характеристичних спектрів.
- 6) Після вивчення теорії вчені почали досліджувати новий матеріал.
- 7) У цьому експерименті необхідно знизити рівень абсорбції

3. Fill in the gaps in this sentences:

- 1) Physicochemical methods of _____ have wider application.
- 2) Spectroscopy measures the interaction of the molecules with _____.
- 3) From the raw data the relative placement of _____ in space may be determined.
- 4) Separation processes are used to decrease the complexity of _____.
- 5) The visualization of single molecules, single biological cells, biological tissues and nonmaterial's is very important and attractive approach in _____.
- 6) Microscopy can be categorized into three different fields: _____, _____, and scanning probe microscopy.

programming, called synthetic biology. These fields are sure to continue grabbing the headlines in the near future.

Vocabulary

botany – ботаніка	cause – причина
cell theory – клітинна теорія	complex – комплекс
complex suite – складний набір	consist of (v) – складається з
constant – постійний, сталий	contribution – внесок
dictate (v) – диктувати	establish (v) – встановлювати
evolution – еволюція	evolve (v) – розвиватися
finite amount – обмежена кількість	foundation – основа
fundamental unit – основна одиниця	gene theory – теорія гену
homeostasis – гомеостаз	in common – спільно
morphology – морфологія	natural selection – природній відбір
offspring – нащадок	operate (v) – працювати
physiology – фізіологія	preserve (v) – зберігати
recognition – визнання	refinement – покращення
rely on (v) – покластися на	separate(v) – розділяти
shift (v) – змінювати, переміщувати	subdivision – підрозділ
survival – вільний	vital processes – життєві процеси
x-ray crystallography – рентгенівська кристалографія	zoology – зоологія

3. Give Russian equivalents:

A broad area, apparent differences, biological phenomena, the foundations of modern biology, random mutations, tiny molecular sequences of DNA, a complex suite of processes, early humanoids, poisonous plants, the habits of predators, growing

evidence, therapeutic healing, every event has a cause, a natural law, greatest contribution, rational thought, constant refinements to the details, complete understanding, finite amount of complexity, sequencing of genomes, custom-written DNA programming.

4. *Translate these sentences using your vocabulary.*

5. *Write all your associations with the words:*

- 1) Botany
- 2) Zoology
- 3) Morphology
- 4) Physiology

6. *Answer the following questions according to the ideas of the text.*

- 1) What is biology?
- 2) How is biology traditionally separated?
- 3) How are the subdivisions of biology interrelated?
- 4) What components do the foundations of modern biology include?
- 5) When did the study of biology originate?
- 6) Who were the first people having biological knowledge?
- 7) Where did the first records about biology come from?
- 8) What practiced in China in 2500 BC?
- 9) What did Greek civilization bring to biological knowledge?
- 10) When did the picture in biology become stable?
- 11) When will we probably understand the biological entity?
- 12) What is the most developing modern area of biology?

7. *Say if these statements true or false according to the text.*

Correct if you find any mistakes.

- 1) Biology is the study of living things and their vital processes.

analytical chemistry – аналітична хімія
atomic absorption spectroscopy – атомно-абсорбційної спектроскопії
atomic emission spectroscopy – атомно-емісійна спектроскопія
biological tissues – біологічних тканин
calibration curve – калібрувальної Кривої
calorimetry – калориметрія
chemical structure – хімічна структура
color intensity – інтенсивність кольору
coulometry – кулонометрія
crystallography – кристалографія
decrease (v) – зменшення (v)
electric current – електричний струм
electric potential – електричний потенціал
electroanalytical – електроаналітичний
method – метод
electromagnetic radiation – електромагнітне випромінювання
electrospray – електророзпилювач
fast atom bombardment – бомбардування швидкими атомами
fluorescence – флуоресценція
hybridization – гібридизація
ionization methods – методи іонізації
infrared spectroscopy – ІЧ-спектроскопія
instrumental analyse – інструментальний аналіз
investigate (v) – дослідити (v)
mass spectrometry – мас -спекторметрія
mass-to-charge ratio – маси до заряду
microscopy – мікроскопія
resonance spectroscopy – резонансної спектроскопії
photoemission spectroscopy – фотоемісії спектроскопії
property – власності
potentiometry – потенціометрія
production processes – виробничих процесів
pure solvent – чистого розчинника
separation processes – поділ процесів

cell's current is measured over time), and voltammetry (the cell's current is measured while actively altering the cell's potential).

Calorimetry and thermogravimetric analysis measure the interaction of a material and heat.

Separation processes are used to decrease the complexity of material mixtures. Chromatography and electrophoresis are representative of this field. Microscopy. The visualization of single molecules, single biological cells, biological tissues and nanomaterials is very important and attractive approach in analytical science. Also, hybridization with other traditional analytical tools is revolutionizing analytical science. Microscopy can be categorized into three different fields: optical microscopy, electron microscopy, and scanning probe microscopy. Recently, this field is rapidly progressing because of the rapid development of the computer and camera industries. Combinations of the above techniques produce a "hybrid" or "hyphenated" technique. Several examples are in popular use today and new hybrid techniques are under development, for example, gas chromatography-mass spectrometry, gas chromatography-infrared spectroscopy, liquid chromatography- mass spectrometry and so on. A general method for analysis of concentration involves the creation of a calibration curve. This allows for determination of the amount of a chemical in a material by comparing the results of unknown sample to those of a series known standards. If the concentration of element or compound in a sample is too high for the detection range of the technique, it can simply be diluted in a pure solvent. If the amount in the sample is below an instrument's range of measurement, the method of addition can be used. In this method a known quantity of the element or compound under study is added, and the difference between the concentration added, and the concentration observed is the amount actually in the sample.

Vocabulary

Accompanied – супроводжується

- 2) All the subdivisions of biology are interrelated by chemical structures of organisms.
- 3) The foundations of modern biology include five components.
- 4) Cell theory says that life is not designed by mutations and natural selection.
- 5) Gene theory says that our genetic structure is passed from parents to offspring.
- 6) We definitely know when the study of biology originated.
- 7) The earliest records of biology come from China.
- 8) With the arrival of Greek civilization people started to believe in the idea of rational thought.
- 9) The basic picture in biology has stayed stable since x-ray crystallography was used in Russian hospitals.
- 10) Evolution operates fast.
- 11) Synthetic biology deals with new agricultural products.

Unit 4 ***Embryology***

*What does embryology study? How is an embryo developing?
What is a zygote?*

1. *Read this text and translate it.*

What is Embryology?

Embryology is the study of the formation of life, part of the studies with which developmental biology is concerned. Developmental biology examines how all forms of life begin, and how they develop into fully formed and functioning organisms.

Embryology looks at the very beginning of life from the one-celled organism, egg or sperm. Embryologists examine fertilization and track the development of the embryo until it bears

a resemblance to its progenitors. For example, in human conception, embryologists would be interested in both sperm and egg, and the meeting of the two, and then would follow egg implantation and the growth of an embryo until it reaches the fetal stage. So in humans, the study of an embryo would last until about the second month of a pregnancy.

Aristotle was one of the first to champion the theory of epigenesis, the concept that life forms develop into complex organisms from fertilization. This was not a popular concept and was largely discarded in favor of the theory of preformation, which suggested that each human sperm was already a person in waiting. In the mid 18th century, Caspar Friedrich Wolff again set forth the concept of epigenesis. Through his study of chick embryos, Wolff realized that the body of an organism has stages of development. Through vivisection, he observed the complexity of specific organs and contended that their development could not simply have occurred spontaneously, but must have developed over time.

Later scientists followed his studies, and with the development and subsequent improvements of the microscope, Wolff's theories were found to be quite accurate. Wolff is credited as the "Father of Embryology," even though he did not first conceptualize epigenesis. Today, the theories of embryology are easier to prove because of the accuracy with which we can examine DNA codes within a cell.

There are several practical applications of embryology in the modern world. Embryology has given doctors the tools to create fertilized eggs for in vitro implantation. Embryology can also identify risk factors for serious genetic conditions within the fertilized egg and select the most viable eggs for implantation. The study of embryology has led directly to the concept of cloning, either for a whole organism or parts of an organism.

methods of analysis solve the problems of chemical control and analysis; they constitute to one of the parts of analytical chemistry. The essence of the physical and chemical methods of analysis is to study relations between structure and properties of systems. For the analysis of substances chemical reactions are widely used. They are accompanied by changes in the physical properties of the analyzed system, for example, the color intensity of fluorescence, etc. So physicochemical methods of analysis is a field of analytical chemistry that investigates analyses using scientific instruments. There are several types of instrumental analyses.

Spectroscopy measures the interaction of the molecules with electromagnetic radiation. Spectroscopy consists of many different applications such as atomic absorption spectroscopy, atomic emission spectroscopy, ultraviolet-visible spectroscopy, x-ray fluorescence spectroscopy, infrared spectroscopy, Raman spectroscopy, nuclear magnetic resonance spectroscopy, photoemission spectroscopy and so on.

Mass spectrometry measures mass-to-charge ratio of molecules using electric and magnetic fields. There are several ionization methods: electron ionization, chemical ionization, electrospray, fast atom bombardment, matrix-assisted laser desorption/ionization, and others.

Crystallography is a technique that characterizes the chemical structure of materials at the atomic level by analyzing the diffraction patterns of electromagnetic radiation or particles that have been deflected by atoms in the material. X-rays are most commonly used. From the raw data the relative placement of atoms in space may be determined.

Electroanalytical methods measure the electric potential in volts and/or the electric current in amps in an electrochemical cell containing the analyte. These methods can be categorized according to which aspects of the cell are controlled and which are measured. The three main categories are potentiometry (the difference in electrode potentials is measured), coulometry (the

- 7) Вона встала, вмилася, одяглася і пішла в лабораторію.
- 8) Він прийшов в 12 вчора ввечері.
- 9) Він зателефонував мені.
- 10) Він вже подзвонив мені.
- 11) Вони отримали нову квартиру в цьому році.
- 12) Вони вже чули ці новини.
- 13) Я познайомився з його батьком.
- 14) Ви коли-небудь були за кордоном?
- 15) Він закінчив школу в минулому році.
- 16) Ви вже бачили нову статтю з мікробіології?
- 17) Ви вже випробували обладнання?
- 18) Коли я почув стукіт, я підійшов до дверей і відчинив їх.
- 19) Я вже провів дослідження.
- 20) Він збирав жуків, коли був дитиною.

Unit 7

Physicochemical methods of analysis

What are the physicochemical methods of analysis?

What kinds of physicochemical methods do you know?

What is the basis of physicochemical methods of analysis?

1. Read this text and translate it.

Physicochemical methods of analysis: What are these?

It seems that this term can be met only in Russian. In the English language literature, they usually speak and write about instrumental methods of analysis. The name instrumental is evidently not ideal; analytical balances or titrimeters used in classical chemical methods also belong to instruments. Physicochemical methods of analysis have wider application. Without them it is hard to control and manage production processes and research. It should be noted that physicochemical

Vocabulary

accuracy	точність
accurate	точний
application	застосування
bear (v)	нести (v)
complexity	складність
concern (v)	стосуватися (v)
developmental biology	біологія розвитку
doubt (v)	мати сумніви (v)
egg	яйце
embryo	ембріон
embryologist	ембріолог
embryology	ембріологія
examine (v)	вивчити (v)
fertilization	запліднення
fetal stage	етап плода
field	поле, область
formation	формування
growth	зростання
implantation	імплантація
in vitro	в пробірці
legislation	законодавство
microscope	мікроскоп
observe (v)	спостерігати (v)
occur (v)	відбуватися (v)
pregnancy	вагітність
progenitor	прабатько
reach (v)	досягати (v)
regard	увага
resemblance	схожість
sperm	сперма
theory of epigenesis	теорія епігенезу
theory of preformation	теорія преформації
tool	інструмент
track (v)	відслідковувати (v)

2. *Translate the sentences into English.*

3. *Read the text attentively again and say which statements are true to the fact or false.*

- 1) Cytology is the study of the formation of life.
- 2) Embryology looks at the very beginning of life from the multi-celled organism, egg or sperm.
- 3) Embryologists examine fertilization.
- 4) So in humans, the study of an embryo would last until about the first month of a pregnancy.
- 5) Caspar Fredriech Wolff was one of the first to champion the theory of epigenesis.
- 6) Wolff realized that the body of an organism has stages of development.
- 7) Aristotle is credited as the "Father of Embryology," even though he did not first conceptualize epigenesis.
- 8) Today, the theories of embryology are easier to prove because of the accuracy with which we can examine RNA codes within a cell.
- 9) Embryology has given doctors the tools to create fertilized eggs for in vivo implantation.

9. *Remember Present Perfect tense. Insert the following markers in the correct place.*

ever, never, for, since, already, just, yet

- 1) He's worked there many years, 1986, I believe.
- 2) I have loved anyone as much as I love you.
- 3) We've known Paul two years. Have you met him?
- 4) I've known him we went to school together, but I've met his parents.
- 5) We have sold two hundred tickets and there is still a month to go before the concert.
- 6) Have you thought of learning to fly?
- 7) I have received my exam result. It came ten minutes ago.

10. *Find the difference between Present Perfect and Past Simple.*

- 1) Barbara Lively _____ (write) a lot of books. She _____ (write) her first fifteen years ago.
- 2) _____ you ever _____ (try) Indian food?
- 3) I _____ never _____ (be) to Japan. When _____ you _____ (go) there?
- 4) I _____ (live) in London for eight years, and I don't want to move.
- 5) He _____ (live) in Oxford for two years, and then in 1995 he _____ (move) to London.
- 6) We _____ (meet) Tim and Maureen three years ago. How long _____ you _____ (know) them?

11. *Translate sentences into English.*

- 1) Я щойно зустрів його.
- 2) Я бачив твого брата вчора.
- 3) Я ще не розмовляв з ним.
- 4) Я вже пообідав.
- 5) Він жив в Сибіру в дитинстві.
- 6) Я не бачив його з дитинства.

- 8) What problems does modern society face?
- 9) Why does society need biofuel and bioelectricity?
- 10) Why does biophysics harness microorganisms?

6. *Correct the order of the ideas according to how they were mentioned in the text.*

- 1) Biophysics in the source of economical innovations.
- 2) Modern society faces many environmental problems.
- 3) Biophysics is the mixture of biology and physics.
- 4) Proteins' work is being discovered by biophysics.
- 5) Biofuel, bioelectricity, cleanup of water are the issues of biophysics.
- 6) Many life-saving tools are created by biophysics.

7. *Write a summary of the text in your own words. Orally enlarge this summary and retell the text.*

8. *As innovations come out of physics and biology labs, biophysicists find new areas to explore where they can apply their expertise, create new tools, and learn new things. Biophysicists ask questions, such as:*

How do protein machines work? Even though they are millions of times smaller than everyday machines, molecular machines work on the same principles. They use energy to do work. The kinesin machine shown here is carrying a load as it walks along a track. Biophysics reveals how each step is powered forward.

How do systems of nerve cells communicate? Biophysicists invented colored protein tags for the chemicals used by cells. Each cell takes on a different color as it uses the tagged chemicals, making it possible to trace its many pathways.

Answer the following questions from the point of view of biophysicist.

- How do proteins pack DNA into viruses?
- How do viruses invade cells?
- How do plants harness sunlight to make food?

Unit 5

Biochemistry

Do you know the subject of biochemistry? What is a biomolecule? What kind of biomolecules do you know? What is DNA?

1. Read the text about biochemistry and translate it.

Biological chemistry

Biochemistry, sometimes called biological chemistry, is the study of chemical processes in living organisms, including, but not limited to, living matter. Biochemistry governs all living organisms and living processes. By controlling information flow through biochemical signaling and the flow of chemical energy through metabolism, biochemical processes give rise to the incredible complexity of life. Much of biochemistry deals with the structures and functions of cellular components such as proteins, carbohydrates, lipids, nucleic acids and other biomolecules although increasingly processes rather than individual molecules are the main focus. Over the last 40 years biochemistry has become so successful at explaining living processes that now almost all areas of the life sciences from botany to medicine are engaged in biochemical research. Today the main focus of pure biochemistry is in understanding how biological molecules give rise to the processes that occur within living cells which in turn relates greatly to the study and understanding of whole organisms.

Among the vast number of different biomolecules, many are complex and large molecules (called biopolymers), which are composed of similar repeating subunits (called monomers). Each class of polymeric biomolecule has a different set of subunit types. For example, a protein is a polymer whose subunits are selected from a set of 20 or more amino acids. Biochemistry studies the chemical properties of important biological molecules, like

proteins, and in particular the chemistry of enzyme-catalyzed reactions.

The biochemistry of cell metabolism and the endocrine system has been extensively described. Other areas of biochemistry include the genetic code (DNA, RNA), protein synthesis, cell membrane transport, and signal transduction.

Researchers in biochemistry use specific techniques native to biochemistry, but increasingly combine these with techniques and ideas from genetics, molecular biology and biophysics. There has never been a hardline between these disciplines in terms of content and technique. Today the terms molecular biology and biochemistry are nearly interchangeable.

Vocabulary

amino acid – амінокислота
biopolymer – біополімер
cell membrane – клітинна мембрана
transport – транспорт
complex (adj) – комплексний, складний
endocrine system – ендокринна система
engage (v) – займатися
enzyme-catalyzed – фермент-каталізатор
reaction – реакція
give rise to (v) – призводить до
govern (v) – управляти
in terms of – з точки зору
interchangeable – взаємозамінний
lipids – жири
living matter – жива матерія
metabolism – обмін речовин
monomer – мономер
nucleic acid – нуклеїнова кислота
occur (v) – відбувається
protein – протеїн

2. Try to explain the following terms:

Kidney dialysis, radiation therapy, cardiac defibrillator, pacemaker.

3. Translate the sentences with the words from your vocabulary.

- 1) Найважливішим завданням будь-якої держави є задоволення потреб суспільства.
- 2) Лекція «Велич і простота законів Ньютона» була прочитана 19 вересня в Велткій демонстраційній аудиторії.
- 3) Білки регулюють ріст клітини.
- 4) Без збереження біологічного різноманіття неможливий сталий розвиток біосфери.
- 5) Існують проекти, спрямовані на отримання біопалива з целюлози (cellulose) і різного типу органічних відходів.
- 6) Нікотин посиляє в мозок хибні сигнали про ситість.
- 7) Передові інструменти, створені біофізиками, були застосовані для підвищення ефективності роботи.
- 8) Останнім часом людство частіше стало стикатися з екологічними проблемами, що здобувають глобальний характер.

4. Continue the associative chain:

Biophysics – atoms – proteins - ...

5. Answer the questions according to the text.

- 1) What does biology study?
- 2) What does physics study?
- 3) How does biophysics connect biology and physics?
- 4) What does biophysics discover about proteins?
- 5) Name the functions of proteins in our body.
- 6) What progress did biophysics make for society's needs in the 20th century?
- 7) What instruments or tool did biophysicists create?

Vocabulary

Advanced - просунутий
arrange (v) - організовувати
bioelectricity - біоелектрика
biofuel - біопаливо
biological diversity - біологічне різноманіття
challenge – виклик, проблема
complexity - складність
detailed predictions - докладні прогнози
detect (v) - виявити
DNA blueprint - проект ДНК
face (v) - особа
fire the signals - стріляти сигнали
force - сила
generation - покоління
image (v) - зображення
law - закон
lifesaving drugs - ліками, що рятує життя
manipulate (v) - маніпулювати
perform (v) - виконувати
preserve (v) - зберегти
pull (v) - тягнути
purify (v) - очистити
push (v) - натиснути
regulate (v) - регулювати
remediate (v) - усунення
repair (v) - ремонт
respond (v) - відповісти
secure (v) - забезпечити
simplicity - простота
society's needs - потребами суспільства
variety - різноманітність

subunit – підрозділ
transduction – трансдукція

2. Fill in the gaps in this sentences:

1) Biochemistry is the study of _____ in living organisms. 2) Much of biochemistry deals with _____ of cellular components such as _____. 3) Over the last _____ years biochemistry has become so successful at explaining living processes. 4) Today the main focus of pure biochemistry is in _____ how biological molecules give rise to the processes that _____ within living cells. 5) Each class of polymeric _____ has a different set of subunit types. 6) _____ is a polymer whose subunits are selected from a set of 20 or more amino acids. 7) The biochemistry of cell _____ and the _____ system has been extensively described. 8) Researchers in biochemistry use specific _____ native to biochemistry. 9) Today the terms _____ and biochemistry are nearly interchangeable.

3. Make sentences in English with words stated below:

a) govern, give rise to, engage, occur;
b) protein, amino acid, carbohydrates, lipid, amino acid, endocrine system.

4. Answer the questions to check your comprehension.

1) What is an object for this study?
2) When did biochemistry become so successful at explaining living processes?
3) What is the main focus of pure biochemistry?

5. Translate the sentences with the words from vocabulary after the text.

Unit 6

Biophysics

Have you studied biophysics? Say in your words what biophysics is. What do biophysicists study? How essential is biophysics to progress in biology and biotechnology? What are the applications of biophysics? Why is biophysics important right now?

1. *Read the text and find the answers to the mentioned above question.*

The bridge between biology and physics

Biology studies life in its variety and complexity. It describes how organisms go about getting food, communicating, sensing the environment, and reproducing. On the other hand, physics looks for mathematical laws of nature and makes detailed predictions about the forces that drive idealized systems. Spanning the distance between the complexity of life and the simplicity of physical laws is the challenge of biophysics. Biophysicists study life at every level, from atoms and molecules to cells, organisms, and environments.

Biophysics discovers such questions as how atoms are arranged to work in DNA and proteins. Protein molecules perform the body's chemical reactions. They push and pull in the muscles that move your limbs. Proteins make the parts of your eyes, ears, nose, and skin that sense your environment. They turn food into energy and light into vision. They are your immunity to illness. Proteins repair what is broken inside of cells, and regulate growth. They fire the electrical signals in your brain. They read the DNA blueprints in your body and copy the DNA for future generations. So, biophysicists discover how proteins work. Understanding these differences in people's respond to proteins opens new possibilities in drug design, diagnosis, and disease control.

Biophysics is a wellspring of innovation for our high-tech economy. The applications of biophysics depend on society's

needs. In the 20th century, great progress was made in treating disease. Biophysics helped to create powerful vaccines against infectious diseases. It described and controlled diseases of metabolism, such as diabetes. And biophysics provided both the tools and the understanding for treating the diseases of growth as cancers. Today we are learning more about the biology of health and society is deeply concerned about the health of our planet.

Advanced instruments created by biophysicists provide the life-saving treatment methods of kidney dialysis, radiation therapy, cardiac defibrillators, and pacemakers. Biophysicists invented instruments for detecting, purifying, imaging, and manipulating chemicals and materials.

Nowadays society is facing physical and biological problems of global proportions. How will we continue to get sufficient energy? How can we feed the world's population? How do we remediate global warming? How do we preserve biological diversity? How do we secure clean and plentiful water? Biophysics provides the insight and technologies for meeting these challenges, based on the principles of physics and the mechanisms of biology.

Biophysics discovers how to modify microorganisms for biofuel (replacing gasoline and diesel fuel) and bioelectricity (replacing petroleum products and coal for producing electricity). Biophysics discovers the biological cycles of heat, light, water, carbon, nitrogen, oxygen, heat, and organisms throughout our planet. Biophysics harnesses microorganisms to clean our water and to produce lifesaving drugs.