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PROFESSIONAL ENGLISH

MEDICINE AND DIAGNOSTICS

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Навчальний посібник

Рекомендовано до друку вченою радою Національного авіаційного університету (протокол № 11 від 17.12.2014 р.).

Навчальний посібник містить професійно орієнтовані текстові матеріали з різних розділів біомедичної інженерії, наукового та професійного спілкування, відповідні лексичні та граматичні вправи і списки термінів згідно з навчальною програмою.

Для студентів напрямів підготовки 0910 «Електронні апарати», 6.051402 «Біомедична інженерія».

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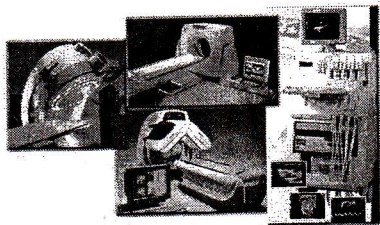
ВСТУП

Навчальний посібник укладений для студентів I–IV курсів напряму підготовки 6.051402 «Біомедична інженерія». Навчальними програмами дисципліни «Іноземна мова (за професійним спрямуванням)» передбачено вивчення студентами напряму «Біомедична інженерія» десяти модулів, що визначає структуру посібника і характер викладення навчального матеріалу. Принципи побудови посібника відповідають також формату Програми з англійської мови для студентів немовних спеціальностей, завданням курсу ESP та вимогам Болонського процесу.

Основна мета навчального посібника – навчити майбутніх фахівців з біомедичної інженерії основам професійного спілкування англійською мовою. Автори також ставили перед собою завдання розвинути у студентів стійкі навички читання, перекладу, реферування технічної літератури з метою отримання і використання інформації, необхідної для професійної діяльності.

Посібник уміщує тексти для читання, що дає можливість проведення дискусій та максимального залучення студентів до навчального процесу. Система вправ дозволяє викладачеві обирати завдання з урахуванням індивідуальних здібностей студентів (написання рефератів, підготовка доповідей, виконання різноманітних комунікаційних вправ). Творчі види навчальної діяльності, що ґрунтуються на уривках з науково-технічних джерел, підвищують мотивацію студентів, а змістові індивідуальні завдання допомагають розвинути необхідні в реальному житті комунікативні навички та здатність до самовираження.

У посібнику викладено основи граматики англійської мови. Словник термінів до кожного розділу допомагає краще оволодіти лексичним матеріалом та дає змогу поповнити словниковий запас.

Засвоєння лексичного та граматичного матеріалу допоможе студентові орієнтуватися в англомовній літературі фахового спрямування, брати участь у міжнародних конференціях.

MODULE 1.
THE AIRCRAFT HISTORY. CYBERNETICS.

Exercise 1. Study the key words and word-combinations.
mythology – міфологія;
feathers – крила;
successful flight – вдалий політ;
the principle of thrust – принцип тяги;
dynamic interlinked principles – динамічні взаємозв'язані принципи;
glider – дельтаплан;
a helicopter – вертоліт;
balloon – повітряна куля;
the dirigible – дирижаблі;
wings – крила;
drag – опір;
gravity – тяжіння;
pilot – пілот;
the solar power – сонячна енергія;
remote control – дистанційне управління.

Exercise 2. Read and translate the text. Find out the meaning of the words you don't understand. Fill in the blanks with the words from the box to complete the text.

There is a myth from Greek mythology about Daedalus and Icarus, father and son, who were prisoned on the island of Crete. Daedalus

studied birds' flight and made for himself and his son pairs of wings. He used framework of wood covered with cloth, and with melted wax he attached feathers. In their escape Icarus flew too close to the sea, got his feathers wet, and barely remained airborne. He then flew too high; the sun melted the wax, he lost his feathers, and fell to his death in the sea…

For ages, humanity admired birds and their freedom from the ground, but had no idea how they managed to keep airborne. The evolution of

the airplane 1)_____ step for step with our understanding of the physics of flight.

The Greeks developed a steam powered toy bird that took flight during the golden 2)_____ of Greece around 600 BC. The Chinese were among the first to achieve human flight by the use of tethered kites of many designs. Later, great minds such as Leonardo Da Vinci put their minds to the enigma of bird flight. It was Leonardo that some thought who developed human powered flight. If he did, it was likely with a device that was something like a hang glider. He also had ideas for parachutes and a helicopter like device. All of these exploited the principle of lift. Being passive machines, none exploited the principle of thrust. All of the inventions, by those developing flight were 3)_____ by gravity.

The next step in flight was the lighter than air balloon that relied on an altogether different force – buoyancy. Whether they were lifted by hot air, such as in the original design by Montgolfier or by hydrogen or helium that later became popular, the principle of lift through bouncy was the active principle. Among the later designs, some of which survived well into the 20th century, is the form of the dirigible.

With the successful flight of the Wright Brothers the 4)_____ of heavier than air aircraft began. In their design, these airplanes relied totally upon four dynamic interlinked principles: lift, thrust, drag and gravity. This was achieved through lightness of materials, design of the wings, the method used to 5)_____ thrust and ways to reduce drag and the influence of gravity.

Most of early designs failed miserably, but the basic design of the wings improved on the successful models. On such models thrust was needed to create the lift necessary to attain flight. Thrust alone was not enough. A means to deliver thrust was necessary, so the idea of the wing was turned on its side to create the propellerand eventually the jet turbine or turbofan.

Initially, human power was tried, but materials in the early days were just too heavy and drag due to the density of the atmosphere was too great. Gravity and drag won the day. The Wright Brothers used an early internal combustion engine coupled with a propeller, which was barely

6)_____ to create enough lift for a short flight, but the result was so encouraging that improvements were pursued with vigor.

Over the years, more powerful, lighter and reliable engines were created as well as airplane design. From the early bi-winged and tri-winged planes came the single wing design and the efficient and light rotary internal combustion engine. Speed and distance flights increased dramatically. Smother exteriors helped to decrease drag and allow for greater speed. Greater speed meant that fewer and smaller wings were possible for the same end result. Efficiency increased leading to better and better designs.

A dramatic change in delivering thrust came with the advent of the jet engine. Initially 7)_____ and developed in 1928 by the British RAF cadet, Frank Whittle, between WWI and WWII. After WWII, the jet engine became standard for the military and commercial flying. Planes then could fly faster, over the sound barrier. They have minimal surfaces incorporating new materials and small wings, reducing drag.

In any aircraft design, the four principles hold: lift, thrust, drag and gravity. All of these must be considered in the design. As we learn more about flying, we develop ever more efficient designs. In the modern era, materials are now designed to allow for human powered flight, such as in the flight of the Albatross, a human powered aircraft that was powered by a bicycle configuration operated by the pilot.

Superior lightweight materials allowed a human being to create enough thrust to lift the aircraft for a substantial flight. The drag eventually tired the pilot enough that the craft eventually crash landed in open water; but the speed was so low, about the speed of a fast walk, that little injury resulted. This is due to the fact of the extra large lightweight wings providing more lift. The same basic design was then incorporated into a solar power aircraft that flew without a pilot for months on end, while it was used to study weather from a great height. The solar powered aircraft broke all distance and duration records, surpassed only by satellites in low Earth orbit.

Aircraft are still going through 8)_____ in design. Modern types include robot planes that can fly great distances by remote control with no pilot on board.

age (x2), sufficient, evolution, invented, generate, influenced, developed

Exercise 3. For each word 1-7 choose corresponding explanation (a-g).

1) combustion
2) step for step
3) steam
4) thrust
5) glider
6) framework
7) airbone

a) the parts of a building or an object that support its weight and give it shepe
b) the hot gas that water changes into when it boils
c) in the air
d) a situation where things happen at the same time or change at the same rate
e) a light aircraft that flies without an engine
f) the process of burning
g) to push something, to move quickly and suddenly in a particular directio

Exercise 4. Answer the questions.
1. What is the Greek myth in the text about? What were human first attempts to fly?
2. What was the physical phenomenon that lighter than air aircraft depended on?
3. What did heavier than air aircraft rely on?
4. Who was the first jet engine invented by? When did it happen?
5. Did jet engines introduce any changes in delivering thrust?
6. Have the aircraft reached its final destination in development?

Exercise 5. Read the article about the newest developments in aviation industry. Put questions to the underlined words. For example,
What is the energy resource of the HB-SIA?
Solar Impulse HB-S

Powered by solar batteries, Solar Impulse HB-SIA made a successful flight lastingmore then 26 hours. The aircraft reached a height of 28,500 feet and flew over night after collecting solar energy at day light.

ESA CRYO-SAT 2

The function of Cryo-Sat 2 satellite is to study the unprecedented data about the polar ice caps and also to track the thickness of the ice caps in the polar regions of Earth. The satellite has interferometric radar range-finder and twin antennas which will study the ice burgs floating in the sea.

Masten Space Systems Xombie

Masten Space Systems is an aerospace startup company that has successfully developed a line of Vertical Take-Off and Landing (VTOL) spacecraft initially for unmanned research flights.

Airbus Military A400M

The Airbus A400M is a multi-national four-engine turboprop military transport aircraft. It was designed by Airbus Military as a tactical airlifter with strategic capabilities.

Atacama Large Millimeter Array

Atacama Large Millimeter Array is the most powerful radio-telescope array on the planet. It will allow the scientists to observe the gravitational collapse that initiates the birth of stars and the red-shifted radiation emitted 10 billion years ago from the far reaches of the universe.

Spacex Falcon-9

As the shuttles are near retirement, NASA is planning for back up options to send man into space to continue space exploration and maintain crew cycle in the International Space Station (ISS). Space X Falcon-9 rocket will be used to send astronauts into orbit in the Dragon capsule.

Eads Astrium Tandem-X Satellite

TanDEM-X an Earth observation satellite, which, together with the almost identical TerraSAR-X radar satellite, will form a high-precision radar interferometer system. The satellite formation can generate images similar to stereoscopic pictures. It will be possible to measure all the Earth's land surface a period of less than three years.

Boeing X-37

X-37 was built by Boeing's Phantom Works Division and looks just like a space shuttle i.e. having two wings and twin 'V' shape vertical

stabilizers with a payload back of a size of small truck payload bay and also have black thermal tiles on the belly of the craft. It's a highly classified project which nobody knows about the function or mission except for the official authorities.

Boeing A160 Hummingbird

The Boeing A160 Hummingbird is an unmanned aerial vehicle (UAV) helicopter. Its design incorporates many new technologies never before used in helicopters, allowing for greater endurance and altitude than any helicopter currently in operation.

Exercise 6. Study the key words and word-combinations.
a military aircraft – військовий літак;
combat aircraft – бойовий літак;
fighters – винищувач;
maritime patrol aircraft - морський патрульний літак;
attack aircraft – штурмовий літак;
military transport aircraft – військово-транспортний літак;
reconnaissance aircraft – літак-розвідник;
civil aviation – цивільна авіація;
airlines – авіакомпанія;
private aviation – приватна авіація;
commercial licensing – комерційне
ліцензування.

Exercise 7.Read and translate the text. Find out the meaning of the words you don't understand.

Aircraft can be classified into military and commercial.

A military aircraft aircraft that is operated by armed service of any type. Military aircraft can be either combat or non-combat.

Combat aircraft are aircraft designed to destroy enemy equipment using their own armament. Combat aircraft are normally developed and procured only by military forces.

Combat aircraft are divided broadly into multi-role, fighters, bombers, and attackers, with several variations between them, including fighter-bombers, ground-attack aircraft. Also included among

combat aircraft are long-range maritime patrol aircraft that are often equipped to attack with anti-ship missiles and anti-submarine weapons.

Fighter aircraft

The main role of fighters is destroying enemy aircraft in air-to-air combat, offensive or defensive. Many are fast and highly maneuverable.

Bomber aircraft

Bombers are normally larger, heavier, and less maneuverable than fighter aircraft. They are capable of carrying large payloads of bombs.

Attack aircraft

Attack aircraft can be used to provide support for friendly ground troops. Some are able to carry conventional or nuclear weapons far behind enemy lines to strike priority ground targets.

Electronic warfare aircraft

An electronic warfare aircraft is a military aircraft equipped for electronic warfare (EW) - i.e. degrading the effectiveness of enemy radar and radio systems.

Non-combat aircraft are aircraft not designed for combat as their primary function, but may carry weapons for self-defense. These mainly operate in support roles, and may be developed by either military forces or civilian organizations.

Non-combat roles of military aircraft include search and rescue, reconnaissance, observation/surveillance, Airborne Early Warning and Control, transport, training, and aerial refueling.

Many civil aircraft, both fixed wing and rotary wing, have been produced in separate models for military use, such as the civilian Douglas DC-3 airliner, which became the military C-47 Skytrain, and British "Dakota" transport planes, and decades later, the USAF's AC-47 aerial gunships. Even the fabric-covered two-seat Piper J3 Cub had a military version.Gliders and balloons have also been used as military aircraft; for example, balloons were used for observation during the American Civil War and during World War I, and military gliders were used during World War II to deliver ground troops in airborne assaults.

5.   Are there any classifications of civil aircraft?
6.   What is the difference between commercial and private aircraft?
7.   Give examples of civil aircraft which have been produced in separate models for military use.

Exercise 9. Match corresponding words to form strong collocations. For example: civil aircraft. There are 2 choices in the right column you don't need to use.

1.	Ground-attack	a)	ranges
2.	Electronic	b)	aircraft
3.	Radio	c)	war
4.	Military	d)	forces
5.	Long	e)	warfare
		f)	calculations system

Exercise 10. Complete the classification table below, using the information from Exercise 1.
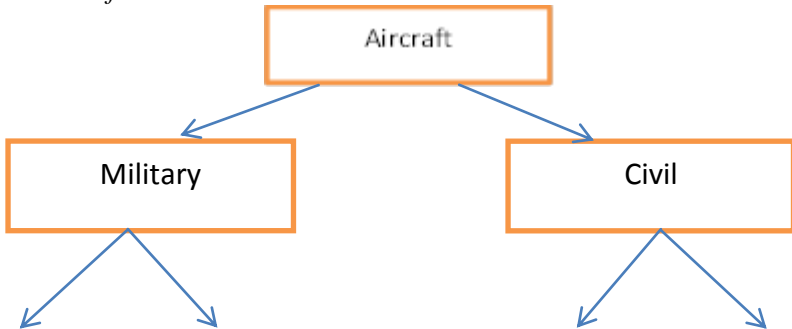
Exercise 11. Skim the article and fill in the blanks (1-6) with corresponding sentences (A-H) to complete the text. Find out the meaning of the words you don't understand.

Aviation medicine is type of medicine in which the patients/subjects are pilots, aircrews, or persons involved in spaceflight. Its specialty is to prevent conditions to which aircrews are particularly sensitive, to apply medical knowledge to the human factors in aviation. So it is a necessary component of aviation safety. A military practitioner of aviation

medicine may be called a flight surgeon and a civilian practitioner is an aviation medical examiner.

Problems range from life support measures for astronauts to recognizing an ear block in people, traveling on an airliner. Aeromedical certification of pilots, aircrew and patients is also part of Aviation Medicine.

A final subdivision is the AeroMedical Transportation Specially. These military and civilian specialists are concerned with protecting aircrew and patients who are transported by AirEvac aircraft (helicopters or fixed-wing airplanes).

Atmospheric physics potentially affect all air travelers regardless of the aircraft. Pressure and humidity also decline, and aircrew are affected by radiation, vibration and acceleration. Aircraft life support systems such as oxygen, heat and pressurization are the first line of defense against most of the aerospace environment. Higher performance aircraft will provide more sophisticated life support.

Every factor contributing to a safe flight has a failure rate. The crew of an aircraft is no different. Aviation medicine aims to keep this rate in the humans involved equal to or below a specified risk level. This standard of risk is also applied to airframe, avionics and systems associated with flights.

Exercise 12. Say whether the statements are true or false.
1. Aviation medicine is the type of medicine which takes care of people on the board of the aircraft of any type.
2. It is not the attribution of aviation medicine to prevent accidents to which aircrews are particularly sensitive.
3. A military practitioner of aviation medicine may be called a flight doctor and a civilian practitioner is a medical examiner.
4. The spectre of aviation medicine problems is quite small.
5. Oxygen, heat and pressurization systems are top life support systems on aircraft.
6. There is a specific failure rate which is controlled by aviation medicine.

Exercise 13. Explain the meaning of the given words in English.
• Classification
• Scheduled

- Patient
- Acceleration
- Defense
- Sophisticated

Exercise 14. Study the key words and word-combinations.
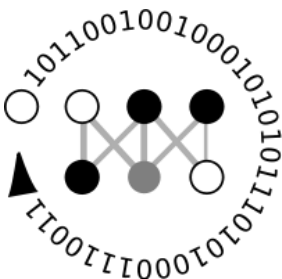cybernetics – кібернетика;
artificial systems- штучні системи;
circular causality - кругова причинність;
emerged – виникнення;
focusing – фокусування;
principles of regulation and communication –
принцип   регулювання та зв'язку;
epistemology – епістемологія;
measurable variables – вимірні величини;
medical cybernetics – медична кібернетика.

Exercise 15. Read and translate the text. Find out the meaning of the words you don't understand.

1.   Cybernetics is the theoretical study of communication and control processes in biological, mechanical, and electronic systems, especially the comparison of these processes in biological and artificial systems.

Cybernetics takes as its domain the design or discovery and application of principles of regulation and communication. Cybernetics treats not things but ways of behaving. It does not ask "what is this thing?" but "what does it do?" and "what can it do?" .

2. Several traditions in cybernetics have existed side by side since its beginning. One is concerned with circular causality, manifest in technological developments – notably in the design of computers and automata and finds its intellectual expression in theories of computation, regulation and control. Another tradition, which emerged from human and social concerns, emphasizes epistemology – how we come to know and explore theories of self-

reference to understand such phenomena as autonomy, identity, and purpose.

3. Some cyberneticians seek to create a more humane world, while others seek merely to understand how people and their environment have co-evolved. Some are interested in systems as we observe them, others in systems that do the observing. Some seek to develop methods for modeling the relationships among measurable variables. Others aim to understand the dialogue that occurs between models or theories and social systems. Early work sought to define and apply principles by which systems may be controlled. More recent work has attempted to understand how systems describe themselves, control themselves, and organize themselves. Despite its short history, cybernetics has developed a concern with a wide range of processes involving people as active organizers, as sharing communicators, and as autonomous, responsible individuals.

Among many others, cybernetics is subdivided into such fields as cybernetics in biology and medicine.

4. Cybernetics in biology studies cybernetic systems present in biological organisms, basically focusing on how animals adapt to their environment, and how information in the form of genes is passed from generation to generation. There is also a secondary focus on combining artificial systems with biological systems.

Cybernetics in biology is subdivided into such sciences as Bioengineering, Biocybernetics, Bionics, Synthetic Biology, Systems Biology, Medical Cybernetics and others. Medical Cybernetics is one of the most important and well-known of these.

5. Medical Cybernetics is a branch of cybernetics which has been heavily affected by the development of the computer, which applies the concepts of cybernetics to medical research and practice. It covers an emerging working program for the application of systems- and communication theory, connectionism and decision theory on biomedical research and health related questions.

It investigates intercausal networks in human biology, medical decision making and information processing structures in the living organism.

Topics in medical cybernetics:

Systems theory in medical sciences: The domain of systems theory in the medical sciences is searching for and modelling of physiological

dynamics in the uninjured and diseased organism to gain deeper penetration into the organizational principles of life and its disorders.

Medical information and communication theory: Motivated by the awareness of information as an essential principle of life the application of communication theory to biomedicine aims to mathematically describe signalling processes and information storage in different physiological layers.

Connectionism: Connectionistic models describe information processing in neural networks – thus forming a bridge between biological and technological research.

Medical decision theory (MDT): The Goal of MDT is to gather evidence based foundations for decision making in the clinical setting.

Exercise 16. For each paragraph (1-5) choose the corresponding heading (a,b,c,d,e,f, g or h). There are three choices you don't need to use.
   a)   Wide range of concerns
   b)   Medicine of the future
   c)   Cybernetics in biology
   d)   Application of computers to medicine
   e)   Cybernetics in computer science
   f)   Cybernetics' 'traditions'
   g)   What is Cybernetics?
   h)   Computers in our life

Exercise 17. Answer the questions.
   1.   What is cybernetics?
   2.   What traditions does cybernetics have? Describe them.
   3.   Different cyberneticians have different aims concerning cybernetics, don't they? What do they seek for?
   4.   What does cybernetics in biology study?
   5.   What are subdivisions of the cybernetics in biology?
   6.   What does Medical Cybernetics study?
   7.   From your point of view, is Medical Cybernetics important for humanity?
   8.   What are the topics of Medical Cybernetics?

Exercise 18. Try to guess what each subdivision of cybernetics study. Match choices.
1) Basic cybernetics
2) In engineering
3) In computer science
4) In management
5) In mathematics
6) In psychology

a) Cybernetics focuses on the factors of information, interaction of parts in systems, and the structure of systems.
b) is used to analyze failures and System Accidents, in which the small errors and imperfections in a system can generate disasters.
c) studies human behaviour and experience in complex systems.
d) Cybernetics studies systems of control as a concept, attempting to discover the basic principle
e) directly applies the concepts of cybernetics to the control of devices and the analysis of information.
f) the field of cybernetics concerned with management and organizations.

Exercise 19. Fill in the blanks with the words from the box to complete the text.
Norbert Wiener invented the field of cybernetics, _____ a generation of scientists to think of computer technology as a means to extend human capabilities.

Norbert Wiener was born on November 26, 1894, and _____his Ph.D. in Mathematics from Harvard University at the age of 18 for a thesis on mathematical logic. After working as a journalist, university teacher, engineer, and writer, Wiener he was hired by MIT (Massachusetts Institute of Technology) in 1919. In 1933, Wiener won the Bôcher Prize for his brilliant work on Tauberian theorems and generalized harmonic analysis.

During World War II, Wiener _____ on guided missile technology, and studied how sophisticated electronics used the feedback principle – as when a missile changes its flight in response to its current position and direction. He _____ that the feedback principle is also a key feature of life forms from the simplest plants to the most complex

animals, which change their actions in response to their environment. Wiener developed this concept into the field of cybernetics, concerning the combination of man and electronics, which he first published in 1948 in the book Cybernetics.

Wiener's vision of cybernetics had a powerful influence on later generations of scientists, and _____ research into the potential to extend human capabilities with interfaces to sophisticated electronics, such as the user interface studies. Wiener changed the way everyone thought about computer technology, influencing several later developers of the *Internet*.

In 1964, Norbert Wiener won the US National Medal of Science. In the same year, he published one of his last books called "God and Golem". Wiener was a core participant of the Macy conferences.

He died, aged 69, in Stockholm, Sweden.

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worked, won, noticed, inspired, received, inspiring

Exercise 20. Answer the questions

1. What is Norbert Wiener famous for?
2. What was he doing?
3. What was his contribution during WW II?
4. What interesting did he notice about the feedback principle of life forms?
5. Who did his vision of cybernetics influence most? How?
Did he have any awards during his life?

Exercise 21. Match English terms with Ukrainian equivalents. Then practice the vocabulary.

a) Comparison
b) Application
c) To treat
d) Automata
e) To observe
f) To emphasize
g) Emerging

h) Penetration
i) To extend
j) To adapt
k) Sophisticated

1) Пристосовуватися
2) Підкреслювати, наголошувати
3) Спостерігати, стежити
4) Робот
5) Ставитися
6) Витончений, позбавлений простоти
7) Застосування
8) Порівняння
9) Тей, що розвивається; перспективний
10) Проникнення
11) Розширяти

Exercise 23. Read and translate the text. Find out the meaning of the words you don't understand.

Industrial control system (ICS) is a general term that includes several types of control systems used in industrial production, including supervisory control and data acquisition (SCADA) systems, distributed control systems (DCS), and other smaller control system configurations such as programmable logic controllers (PLC).

ICSs are typically used in industries such as electrical, water, oil, gas and data. Based on information received from remote stations, automated or operator-driven supervisory commands can be pushed to remote station control devices. Field devices control local operations such as opening and closing valves and breakers, collecting data from sensor systems, and monitoring the local environment for alarm conditions. Industrial control system technology has evolved over the decades.

DCSs are used to control industrial processes such as electric power generation, oil and gas refineries, water and wastewater treatment, and chemical, food, and automotive production. DCSs are integrated as a control architecture containing a supervisory level of control – they

control integrated sub-systems that are responsible for controlling the details of a localized process.

Product and process control is usually achieved by providing feed back or feed forward control loops by which major product and/or process conditions are automatically controlled. To carry out the desired product and/or process permission around a specified set point, only specific programmable controllers are used.

PLCs provide Boolean logic operations, timers, and (in some models) continuous control. The proportional, integral, and/or differential gains of the PLC continuous control feature may be tuned to provide the desired permission as well as the rate of self-correction during process upsets. PLCs are computer-based solid-state devices that control industrial equipment and processes. While PLCs can control system components used throughout SCADA and DCS systems, they are often the primary components in smaller control system configurations. They are used to provide regulatory control of discrete processes such as automobile conveyors and are used extensively in almost all industrial processes.

SCADA's history is established in distribution applications, such as power, natural gas, and water pipelines, where there is a need to gather remote data through potentially unreliable or interruptive low-bandwidth/high-latency links. SCADA systems use open-loop control with sites that are widely separated geographically. A SCADA system uses RTUs (remote terminal units) to send supervisory data back to a control center. Most RTU systems always had some limited capacity to process local controls while the master station is not available. However, over the years RTU systems have grown more and more capable of applying local controls.

The boundaries between these system definitions are fading as time goes on. The technical limits that drove the designs of these various systems are no longer so noticeable. Many PLC platforms can now perform quite well as a small DCS, using remote input/output and are reliable enough. With the increasing speed of today's processors, many DCS products have a full line of PLC-like subsystems that weren't offered when they were initially developed.

This led to the concept of a PAC (process automation controller), that is a fusion of these three concepts. Another option is the use of

several small embedded controls attached to an industrial computer via a network.

Exercise 24. Answer the questions.
1. How do you understand the term 'Industrial control system'?
2. What types of control systems does ICS include?
3. What are ICSs are based on?
4. What are distributed control systems?
5. What does the abbreviation PLC mean? Describe this type of control systems.
6. What does the term 'supervisory control and data acquisition' stand for? Describe this type of control systems.
7. Is there any connection between DCS, PLC, SCDA control systems?
8. Are these control systems becoming a more and more separated idea or the boundaries between them are vanishing?
9. What causes such changes?
10. How is a 'mixture' of these three concepts called?

Exercise 25. Look at the table. Read the information given in boxes. Add more information to each of boxes using the text in

• Abbreviation ICS stands for…   • This term includes several types of…   • ICSs are usually used…   • Field devices control local operations such as…

• programmable logic controllers, shortly…   • … only specific programmable controllers are used.   • PLCs provide…   • PLCs can control…   • They are used to…

- SCADA's are used…
- A SCADA system uses RTUs (remote terminal units) to
- Most RTU used to be problematic because…
- …. became more reliable

- DCS is decoded as…, and is used to control
- … are under their supervision
- … usually achieved by providing feed back or feed forward…
- Only purpose programmable controllers are used….

Exercise 26. Form nouns using given verbs. Use dictionary if necessary. Which of the verbs can be both nouns and verbs? Find synonyms to the given verbs.

- To control
- To supervise
- To distribute
- To collect
- To provide
- To achieve
- To use
- To apply
- To define
- To permit
- To offer
- To interrupt

Exercise 27. Fill in the blanks with the words from the box to complete the text.

Information Theory and Diagnostic Testing

Diagnostic _____ are widely used in many areas. In particular, these tests have a huge importance in medicine sector. By courtesy of early and accurate diagnosis can decrease the morbidity and mortality of disease. It is often _____ to compare various diagnostics test with each other for specific clinical _____ in order to determine which one is the best to use. To evaluate the performance of a diagnostic test within a given _____, we ideally determine both the test result and the disease state for every individual in that population.

One of the approaches used to _____ the performance of diagnostic tests in recent years, information theory. This theory of knowledge and uncertainty for the measurement is based on a mathematical basis.

A fundamental concept of information theory, relative entropy and mutual information, is directly applicable to evaluation of diagnostic test performance. In this _____ the amount of information gained by performing a diagnostic test can be quantified by calculating the relative entropy between the posttest and pretest probability distributions. And also demonstrates that diagnostic test performance can be quantified as the _____ amount of information the test result provides about the disease state.

So, the application of information analysis to diagnostic testing in medicine derives from the recognition that all clinical tests are _____. This imperfection introduces uncertainty (or "noise") into the interpretation of the test. The information (and, conversely, the uncertainty existing before and after a diagnostic test) can be quantified if one knows its three determinants. These are the pretest probability of disease in the individual being tested (prevalence), the conditional probability of the test response observed in a diseased population (the true-positive rate), and the conditional probability of this same response in a non-diseased population (the
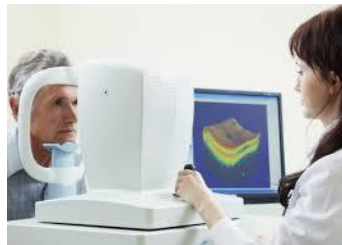
false-positive rate). The change in diagnostic uncertainty that occurs as a result of testing, then, is a _____ of the test's effectiveness.

conditions, important, average, imperfect, analyze, tests, population, study, measure

Exercise 28. Translate the article (Exercise 27) into Ukrainian.
Exercise 29. Read and translate the text. Find out the meaning of the words you don't understand.

Victor Glushkov was born on August 24 in Rostov-on-Don, Russian SFSR in the family of a mining engineer. He is supposed to be the founding father of information technology in the Soviet Union, and one of the founders of Cybernetics. He graduated from Rostov State University in 1948, and in 1952 proposed solutions to the Hilbert's fifth problem and defended his thesis in Moscow State University.

In 1956 he began working in computer science and worked in Kiev as a Director of the Computational Center of the Academy of Science of Ukraine.

He made contributions to the theory of automata. He and his

followers successfully applied that theory to enhance construction of computers. His book on that topic "Synthesis of Digital Automata" became well known and was awarded.

He greatly influenced many other fields of theoretical computer science (including the theory of programming and artificial intelligence) as well as its applications in USSR. He published nearly 800 printed works.

One of his great practical goals was the creation of a National Automatized System of Administration of Economy. That very ambitious and probably too early project started in 1962 and received great opposition from many communist leaders. He struggled for his ideas for years but the system won and the project stopped.

Glushkov founded a Kiev-based Chair of Theoretical Cybernetics and Methods of Optimal Control at the Moscow Institute of Physics and Technology in 1967 and a Chair of Theoretical Cybernetics at Kiev

State University in 1969. The Institute of Cybernetics of National Academy of Science of Ukraine, which he created, is named after him.

He died in Moscow, USSR in 1982.

The MIR series of early Soviet personal computers was developed from 1965 (MIR), 1968 (MIR-1) to 1969 (MIR-2) in a group headed by Victor Glushkov.

It was designed as a relatively small-scale computer for use in engineering and scientific applications. Among other innovations, it contained a hardware implementation of a high-level programming language capable of symbolic manipulations with fractions, polynomials, derivatives and integrals.

Another innovative feature for that time was the user interface combining a keyboard with a monitor and light pen used for correcting texts and drawing on screen. It could be considered one of the first personal computers.

Jay Wright Forrester is a pioneer American computer engineer, systems scientist and was a professor at the MIT Sloan School of Management. Forrester is known as the founder of System Dynamics, which deals with the simulation of interactions between objects in dynamic systems.

Forrester was born in 1918 in Nebraska, USA. While in high school, he built a wind-driven 12-volt electrical system using old car parts — it gave the ranch its first electric power. After finishing high school, he had received a scholarship to go to the Agricultural College. But in 1936 he enrolled in the Engineering College at the University of Nebraska to study electrical engineering. As it turns out this study was about the only academic field with a solid, central core of theoretical dynamics.

After finishing the University in 1939 he went to the Massachusetts Institute of Technology, to become a research assistant and eventually spend his entire career.

During WWII his work with Gordon Brown was in developing servomechanisms for the control of radar antennas and gun mounts.

This work was research toward a practical end that ran from mathematical theory to the operating field.

At the end of the war, at MIT, Forrester in 1944 began development of an advanced aircraft flight simulator. The simulator, originally conceived as an analog computer, evolved to become the Whirlwind digital computer for experimental development of military combat information systems.

In 1956, Forrester moved to the MIT Sloan School of Management. Application of his engineering view of electrical systems to the field of human systems would break new ground. Forrester focused on concrete experimental studies of organizational policy. He used computer simulations to analyze social systems and predict the implications of different models. This method came to be called "system dynamics," and Forrester came to be recognized as its creator.

In 1995 he was made a Fellow of the Computer History Museum "for his perfecting of magnetic core memory technology into a practical computer memory device and for fundamental contributions to early computer systems design and development."

In 2006, he was inducted into the Operational Research Hall of Fame.

Exercise 30. Answer the questions.
1. What is Victor Glushkov famous for?
2. What was one of his great practical goals?
3. What do you know about the MIR series of early Soviet personal computers?
4. What was the innovative feature of these computers?
5. What is Jay Forrester known for?
6. What was he developing while WWII?
7. What is system dynamics?
8. Did Forrester deal with aviation?

Exercise 31. Explain the meaning of the given words in English.
- Solution
- To influence
- To make contribution
- To struggle for
- Innovation
- To simulate
- user interface

- Keyboard

Exercise 32. Translate into English using modal verbs or their equivalents.
1. Нам слід поспішити, щоб не запізнитись на лекцію.
2. Мабуть, він розчарований результатом свого тесту.
3. Ми змогли прийти до фінішу першими!
4. Тобі не слід так зневажливо ставитись до завдань, що тобі доручили.
5. Краще б ти зробив це завдання вчора.
6. Не можу повірити, що це дійсно трапилось.
7. Ти, мабуть, жартуєш!
8. Не можна працювати з електрикою без гумових рукавиць.

Exercise 33. Find opposite words to the given.
1. __happy
2. __correct
3. __like
4. __agree
5. __lock
6. __visible
7. __polite
8. __patient
9. __regular
10. __friendly
11. __formal
12. __possible
13. __appear
14. __pack

Exercise 34. Complete the verbs in the sentences.
1. I dis___ with you on this subject.
2. The shop shuts for lunch but it should re___ at 3 p.m.
3. This lecture is very complicated. I completely mis___ it!
4. Don't forget that it's possible to re___ the exam.
5. The Gods of different ancient mythologies are typically described to be im____.
6. She always has bad mood when it rains. She seems to be un___

at such times.

7. I'm completely dis____ with this hotel! The receptionist is very un___ and the rooms are very un___.

8. Chameleons have the ability to become almost in___. This is how they protect themselves.

9. You should apologize for being so im___ while talking to your boss.

10. Are you going to come back? Yes, I'll re___ as soon as possible.

Exercise 35. Write all possible forms of participles for the following verbs:

- to put
- to begin
- to read
- to set
- to forgive
- to stay.

Exercise 36. Rewrite the sentences using the words in brackets. The meaning must stay the same.

1. I hate going shopping (can't stand)
2. I would prefer to go to the cinema (rather)
3. I don't really like that sort of thing (things)
4. I'm interested in archaeology (interesting)
5. I think this dress is OK (mind)
6. I don't find this movie interesting (interest)

MODUL 7
RADIOGRAPHY

Exercise 1. Study the key vocabulary and phrases:
pass through human tissue – проходити крізь тканини людського тіла;
discovery – відкриття;
cathode tube – електронно-променева трубка;
fluorescent screen – флуоресцентний екран;
to emit light – випромінювати світло;
to persist – тривати, зберігатися;
to attenuate – згасати, ослаблюватися;
to capture – тут: зафіксовати (на фото)
to establish the nature of – з'ясувати природу чогось;

Exercise 2. Read the text and translate it into Ukrainian.
On November 8, 1895, German physics professor Wilhelm Conrad Rontgen discovered the X-ray and noted that, while it could pass through human tissue, it could not pass through bone or metal. Rontgen referred to the radiation as "X", to indicate that it was an unknown type of radiation. He received the first Nobel Prize in Physics for his discovery.

X-rays were discovered by the scientist while he was experimenting with cathode tubes. In these experiments, he used fluorescent screens, which start glowing when struck by light emitted from the tube.

To Rontgen's surprise, this effect persisted even when the tube was placed in a carton box. He soon realized that the tube was emitting not only light, but also a new kind of radiation, which he called X-rays because of their mysterious nature.

This new kind of radiation could not only travel through the box. Rontgen found out that it was attenuated in a different way by various kinds of materials and that it could, like light, be captured on a photographic plate. This opened up the way for its use in medicine.

The first "Rontgen picture" of a hand was made soon after the discovery of X-rays. No more than a few months later, radiographs were already used in clinical practice. The nature of X-rays as short-wave electromagnetic radiation was established by Max von Laue in 1912.

Exercise 3. Scan the text again and find synonyms to complete the following word-groups.

Find, come across, bring to light, …

discharge, issue, emanate, …

mention, speak of, touch on, …

understand, comprehend, perceive, …

different, diverse, miscellaneous, …

prove, substantiate, demonstrate, …

Exercise 4. Look at the groups of words below. Cross out the noun or phrase which doesn't go with the verb in each group.

1. Use	**3. Maintain**	**5. Require**
properly	successfully	reasonably
deeply	indefinitely	eventually
efficiently	simultaneously	frequently
improperly	easily	urgently
sparingly	quickly	slowly

2. Apply	**4. Determine**	**6. Gain**
equally	luckily	enormously
early	exactly	financially
directly	precisely	quickly
evenly	definitely	rapidly
carefully	unambiguously	

Exercise 5. Complete each sentence with the appropriate word combination from the exercise 4.

1. _____ the glue to cut costs while _____ over both surfaces.

2. The industry will (*verb+adv.*) _____ from the new proposals.

3. His ideas (*adv.+verb*) _____ acceptance.

4. Never _____ the cleaning liquid _____ to the surface.

5. The company is looking (*adv.+verb*) _____-ing the existing level of service.

6. This paint is very expensive, so please _____ it (*adv.+verb*) _____.

7. Doctors need a detailed investigation (*verb+adv.*)_____ why these cancers are occurring.

8. He (*adv.+verb*) _____ the financial health of the company.

9. Many of the refugees (*adv.+verb*) _____ medical treatment.

10. These plans (*adv.+verb*) _____ shade.

Exercise 6. Study the active vocabulary and use it to complete the text.

an early developer – перший розробник;

his contributions were largely neglected – його внесок був великою мірою знехтуваний;

to do heavy research into – ретельно вивчати щось;

to recognize the potential – розпізнати потенціал;

in an obscure manner – туманно, нечітко;

obsolete terminology – застаріла термінологія;

to gain some recognition – здобути певне визнання.

Ivan Pavlovich Pulyui (2 February 1845 – 31 January 1918) was a Ukrainian-born physicist, inventor and patriot who has been championed as _____of the use of X-rays for medical imaging. His _____ until the end of the 20th century.

Pulyui did _____ cathode rays, publishing several papers about it between 1880 und 1882. As a result of experiments into what he called *cold light* Pulyui developed the *Pulyui lamp* which was mass-produced for a period. This device was also some kind of primitive X-ray tube, but it was not until Wilhelm Röntgen discovered the X-rays and published his experiments, that Puluj _____of his own device. He was nevertheless among the first who worked with X

Rays and used them for medical diagnostics.

Pulyui published his results in a scientific paper, *Luminous Electrical Matter and the Fourth State of Matter* in the *Notes of the Austrian Imperial Academy of Sciences* (1880–1883), but

expressed his ideas _____ using obsolete terminology. Pulyui did _____ when the work was translated and published as a book by the Royal Society in the UK.

Ukrainian Postal stamp. 150 years born Ivan Pulyui, 1995

Exercise 7. Summarize the information you have got to know about Roentgen and Pulyui's studies in a concise Power Point presentation. Make use of the basic vocabulary from the unit.

Exercise 8. Consult a dictionary and find the Ukrainian equivalents to the following pieces of terminology.

velocity	discrete frequencies
to collide	spectral lines
crack-resistant alloy	characteristic lines
application	upper shells
crystallography	scatter
incident electron	Bremsstrahlung
electron shell	continuous spectrum
X-ray fluorescence	increase
emission spectrum	decreasing frequency

Exercise 9. Read the text and translate it into Ukrainian.

X-rays

Since X-rays are emitted by electrons, they can be generated by an X-ray tube, a vacuum tube that uses a high voltage to accelerate the electrons released by a hot cathode to a high velocity. The high velocity electrons collide with a metal target, the anode, creating the X-rays. In medical X-ray tubes the target is

usually tungsten or a more crack-resistant alloy of rhenium (5%) and tungsten (95%), but sometimes molybdenum for more specialized applications, such as when softer X-rays are needed as in mammography. In crystallography, a copper target is most common, with cobalt often being used when fluorescence fromiron content in the sample might otherwise present a problem.

The maximum energy of the produced X-ray photon is limited by the energy of the incident electron, which is equal to the voltage on the tube times the electron charge, so an 80 kV tube cannot create X-rays with an energy greater than 80 keV. When the electrons hit the target, X-rays are created by two different atomic processes:

1. X-ray fluorescence: If the electron has enough energy it can knock an orbital electron out of the inner electron shell of a metal atom, and as a result electrons from higher energy levels then fill up the vacancy and X-ray photons are emitted. This process produces an emission spectrum of X-rays at a few discrete frequencies, sometimes referred to as the spectral lines. The spectral lines generated depend on the target (anode) element used and thus are called characteristic lines. Usually these are transitions from upper shells into K shell (called K lines), into L shell (called L lines) and so on.

2. Bremsstrahlung: This is radiation given off by the electrons as they are scattered by the strong electric field near the high-Z (proton number) nuclei. These X-rays have a continuous spectrum. The intensity of the X-rays increases linearly with decreasing frequency, from zero at the energy of the incident electrons, the voltage on the X-ray tube.

Exercise 10. Use the following words and word combination to fill in the gaps:

voltage, expressed, incident, typically, upper limit, range, consequently, cathode current, hitting, parameters, *multiplied, degraded, transmitted, energy, examinations.*

The important_____of an X-ray source are the following:

• the amount of electrons_____the anode and, consequently, the amount of emitted photons controlled by the cathode current_____by the time the current is on (typically expressed in mA s). Typical values_____from 1 to 100 mAs;

• the energy of the electrons hitting the anodes and, _____, the energy of the emitted photons (_____ expressed in keV), controlled by the _____ between cathode and anode (typically _____ in

kV). For most _____ the values vary from 50 to 125 kV. For mammography the voltage is 22-34 kV. The energy of the atom defines the _____ of the photon energy;

• the total _____ (typically expressed in joules, 1 J = 1 kV mAs) at the anode, defined by the product of the voltage, the _____ and the time the current is on. Note that almost all of this energy is _____ to heat within the tube. Less than 1% is _____ into X-rays.

Exercise 11. Rearrange the sentences which are give in a random order to make a text.

X-ray visions – from diagnosing disease to detecting forgeries

(1) A. A while back, the Science Museum in London held a public vote to celebrate its centenary.

Hand with Rings): a print of one of the first X-rays by Wilhelm Röntgen (1845–1923) of the left hand of his wife Anna Bertha Ludwig. It was presented to Professor Ludwig Zehnder of the Physik Institut, University of Freiburg, on 1 January 1896.

B. From a list that included the Model T Ford, the V2 rocket engine and penicillin, voters plumped for the X-ray machine.

C. From the moment the iconic image of Anna Bertha Rontgen's hand was taken by her husband, Wilhelm Rontgen n, in 1895, it was clear that X-rays would be useful in medicine, allowing doctors to see into bodies without having to cut people open.

D. Having said that, this very property is used every day in radiotherapy, to treat cancers.

E. It wanted to know which object in its vast collections people thought had done most to shape the future.

F. X-rays are not entirely benign, of course – the high-energy beams can damage living tissue.

G. In the century since their discovery, X-rays (Rontgen's working name for what he had found) have been a mainstay of medical diagnostics and research, used in everything from crystallography, to quality control in manufacturing, to detecting forgeries in art.

Exercise 12. Match the English phrases with their Ukrainian equivalents:

exposing them to daylight	вийняті з великими зусиллями;
individual coins	унікальна співпраця;
dramatically speed up	експонувати при денному світлі
to raise funds	велика вага, значення;
painstakingly extracted	окремі монети;
originally developed	значно пришвидшити;
visible to the naked eye	оцінювати і вивчати;
a unique collaboration	видимий неозброєним оком;
the initial results	збирати кошти;
profound implications	первісно розроблений;
assess and study	першір результати

Exercise 13. Read the newspaper article and fill in the gaps with the key phrases from Ex.

X-rays reveal secrets of Roman coins

Maev Kennedy
theguardian.com, Monday 9 July 2012

Scientists have used a new x-ray technique to produce spectacular 3D images of Roman coins that were corroded inside pots or blocks of soil.

The rotating images built up from thousands of two-dimensional scans are so clear that individual coins can be identified and dated, being _____. The advantage of the new method – developed by archaeologists and scientists at the British Museum and Southampton University – is that it means coins can be identified and even dated much more quickly and without risking damage to them.

Roger Bland, a coins expert from the British Museum, said: "_____ are very encouraging and in some cases remarkable. The techniques could have _____ for the way we _____ in the future, producing results in a few hours that would take a conservator weeks or even months."

The pottery cup full of coins was found by an amateur with a metal detector in a field near Selby, Yorkshire.

The coins have since been _____ from the pot and cleaned, and have gone on display in the British Museum's new Money gallery.

The technique could _____ assessing the significance of archaeological discoveries. With treasure finds under the present system finders and landowners, and museums which might want to acquire them, all have to wait months or years.

As the method evolves it should be possible to fully study some objects without ever _____.

The x-ray technology at Southampton was _____ to scan Rolls Royce turbine blades for flaws. It gives archaeologists and conservators around the world the opportunity to virtually examine, excavate, and 'clean' objects.

Exercise 14. Read the article again and compile a short summary, use as many key phrases as possible.

Exercise 15. Consult a dictionary and find the Ukrainian equivalents to the following pieces of terminology.

ionizing waves	photoelectric absorption
to release	to deviate
eject an electron from its atom	Compton scattering
excitation	pair production
ionizing photons	antiparticle
rayleigh scattering	annihilate each other
coherent scattering	nuclear reaction
scattering angle	

Interaction of photons with matter

X-rays and y-rays are ionizing waves. Such photons are able to ionize an atom, i.e., to release an electron from the atom. Photons with energy less than 13.6 eV are nonionizing. These photons cannot eject an electron from its atom, but are only able to raise it to a higher energy shell, a process called *excitation.* Ionizing photons can interact with matter in different ways.

• The energy of X-ray photons can be absorbed by an atom and immediately released again in the form of a new photon with the same energy but traveling in a different direction. This nonionizing process is called *Rayleigh scattering* or *coherent scattering* and occurs mainly at low energies (<30 keV). The lower the energy the higher is the scattering angle.

• A photon can be. absorbed by an atom while its energy excites an electron. The electron then escapes from its nucleus in the same direction as the incoming photon was traveling. This mechanism is called *photoelectric absorption.*

• A second possibility is that the photon transfers only part of its energy to eject an electron with a certain kinetic energy. In that case, a photon of the remaining lower energy is emitted and its direction deviates from the direction of the incoming photon. The electron then escapes in another direction. This process is called *Compton scattering.*

• A third mechanism is *pair production.* If the energy of a photon is at least 1.02 MeV, the photon can be transformed into an electron and a positron (electron-positron pair). A positron is the antiparticle of an electron, with equal mass but opposite charge. Soon after its formation, however, the positron will meet another electron, and they will annihilate each other while creating two photons of energy 511 keV that fly off in opposite directions. This process finds its application in nuclear medicine.

• At still higher energies, photons may cause nuclear reactions. These interactions are not used for medical applications.

Exercise 16. Translate into Ukrainian, use a dictionary if you need.

1. Рентгенівське випромінювання або Х-промені – короткохвильове електромагнітне випромінювання з довжиною хвилі від 10 нм до 0.01 нм.

2. В електромагнітному спектрі діапазон частот рентгенівського випромінювання лежить між ультрафіолетом та гамма-променями.

3. Рентгенівське випромінювання виникає від різкого гальмування руху швидких електронів у речовині, при енергетичних переходах внутрішніх електронів атома.

4. Воно використовується у науці, техніці, медицині. Рентгенівське випромінювання змінює деякі характеристики гірських порід, наприклад, підвищує їх електропровідність. 5.

Короткочасне опромінення кристалів кам'яної солі знижує їхнє внутрішнє тертя.

6. Рентгенівське випромінювання використовуються для флюорографії, рентгенофлюоресцентного аналізу і в кристалографії для визначення атомної структури кристалів. Методи дослідження речовини за допомогою рентгенівських променів об'єднує термін рентгенівська спектроскопія.

Exercise 17. Study the following words and word-combinations.
to captured – фіксувати;
to convert to image information – перетворити на зображення;
relatively recent developments – порівняно недавні розробки;
image intensifier – підсилювач зображення;
inefficient – неефективний;
absorption efficiency – ефективність поглинання;
yield prohibitively large patient doses – піддавати пацієнта опроміненню у недопустимо великих дозах;
initial state – початковий стан;
scintillation – мерехтіння, сцинтиляція;
consequently – отже, тому;
the exposure of the film – експозиція плівки;
light spot – зайчик, відблиск;
image blurring – розмитість зображення;
luminescence – люмінесценція.
film – плівка;
silver halide crystals – кристали галогеніду срібла;
undergo a change – зазнавати зміни;
development centers – осередки проявлення;
to precipitate – осаджувати;
grain size – крупність;
final output image – остаточне вихідне зображення.
grainines – зернистість;

Exercise 18. Read and translate the text.
X-ray detectors
To produce an image from the attenuated X-ray beam, the X-rays need to be captured and converted to image information. Some detectors for

digital radiography are relatively recent developments. Older but still in use are the screen-film detector and the image intensifier.

Screen-film detector

Screen. Photographic film is very inefficient for capturing X-rays. Only 2% of the incoming X-ray photons contribute to the output image on a film. This percentage of contributing photons corresponds to the probability that an X-ray photon (quantum) is absorbed by the detector. It is known as the *absorption efficiency*. The low sensitivity of film for X-rays would yield prohibitively large patient doses.

Therefore, an intensifying screen is used in front of the film. This type of screen contains a heavy chemical element that absorbs most of the X-ray photons. When an X-ray photon is absorbed, the kinetic energy of the released electron raises many other electrons to a higher energy state. When returning to their initial state they produce a flash of visible light, called a *scintillation*. Note that these light photons are scattered in all directions.

Consequently, two intensifying screens can be used, i.e., one in front and one behind the film, to increase the absorption efficiency further. The portion of the light that is directed toward the film contributes to the exposure of the film. In this way, the absorption efficiency can be increased to more than 50% instead of the 2% for film. Because the light is emitted in all directions, a smooth light spot instead of a sharp peak hits the film and causes image blurring.

X-ray intensifying screens consist of scintillating substances that exhibit luminescence. *Luminescence* is the ability of a material to emit light after excitation, either immediately or delayed.

Film. The film contains an emulsion with silver halide crystals (e.g., AgBr). When exposed to light, the silver halide grains absorb optical energy and undergo a complex physical change. Each grain that absorbs a sufficient amount of photons contains dark, tiny patches of metallic silver called development centers. It is important to note that the amount of photons required is independent of the grain size. When the film is developed, the development centers precipitate the change of the entire grain to metallic silver. The more light reaching a given area of the film, the more grains are involved and the darker the area after development. In this way a negative is formed. After development, the film is fixed by chemically removing the remaining silver halide crystals.

In radiography, the negative image is the final output image. In photography, the same procedure has to be repeated to produce a positive image. The negative is then projected onto a sensitive paper carrying silver halide emulsion similar to that used in the photographic film.

Typical characteristics of a film are its *graininess, speed,* and *contrast.*

• *Graininess* The image derived from the silver crystals is not continuous but grainy. This effect is most prominent in fast films. Indeed, because the amount of photons needed to change a grain into metallic silver upon development is independent of the grain size, the larger the grains, the faster the film becomes dark.

Speed The speed of a film is inversely proportional to the amount of light needed to produce a given amount of metallic silver on development. The speed is mainly determined by the silver halide grain size. The larger the grain size the higher the speed because the number of photons needed to change the grain into metallic silver upon development is independent of the grain size.

For X-ray imaging with a screen-film combination, it makes more sense to speak about the speed of the screen-film combination: how many X-ray photons are needed to produce a certain density on the film. The speed then depends on the properties of the intensifying screen and the film, but also on the quality of film-screen contact, and on a good match between the emission spectrum of the screen and the spectral sensitivity of the film used.

Contrast The most widely used description of the photosensitive properties of a film is the plot of the *optical density D* versus the logarithm of the *exposure E.* This curve is called the *sensitometric curve.* The exposure is the product of incident light intensity and its duration.

Exercise 19. Consult a dictionary to make a list of Ukrainian equivalents to the following terms:

radiography, radiation protection, dosimeters, X-ray spectra, photographic film, ionization chamber, radiation dose, wavelength dispersive spectrometers, digital detector, flat panel detectors.

Exercise 20. Choose an ending (a – f) for each beginning (1 – 6) to complete the text on X-ray detectors.
1. *X-ray detectors vary in shape and…*

2. *Imaging detectors such as those used for radiography were originally based…*
3. *They are now mostly replaced…*
4. *For radiation protection direct exposure hazard is…*
5. *Meanwhile dosimeters are used…*
6. *X-ray spectra can be measured either by energy dispersive…*
a. *...on photographic plates and later photographic film.*
b. *… often evaluated using ionization chambers.*
c. *...to measure the radiation dose a person has been exposed to.*
d. *… or wavelength dispersive spectrometers.*
e. *...function depending on their purpose.*
f. *… by various digital detector types such as image plates or flat panel detectors.*

Image Intensifier

<u>An</u> image intensifier works as follows. __ fluorescent screen converts __ X-rays into __ visible light. __ emitted light hits __ photocathode, and __ energy of __ photons releases electrons from this cathode. __ large potential difference between __ cathode and __ output accelerates __ ejected electrons. __ resulting electron beam is directed onto __ small fluorescent screen by __electrostatic or magnetic focusing and converted to light photons again. This focusing makes __ system suitable to be coupled to __ camera without any loss of light. __ main advantage of __ image intensifier system is that it is capable of producing dynamic image sequences in __real time at video rate, __ process known as fluoroscopy. However, when compared with film-screen systems, __ images are degraded in three ways.

• __ spatial resolution will generally be less than that of __ film-screen system because of __ limited camera resolution.

• Because of __ additional conversions (light — electrons — light), __ noise increases slightly.

• Geometric distortion occurs, called pin-cushion distortion, particularly toward __ borders of __ image.

*Exercise 21. Look through the text in **ex.** for specific terminology, consult a dictionary to find the Ukrainian equivalents and take notes to enrich your active vocabulary.*

Exercise 22. Summarize the text **Image Intensifier** *in a 50 word text, use as many pieces of active vocabulary as possible.*

Exercise 23. Translate into Ukrainian, use a dictionary if you need.

1. Рентгенівське проміння виникає при бомбардуванні швидкими електронами пластинки анода в електронно-променевій трубці.

2. Розрізняють суцільний та характеристичний спектри випромінювання.

3. Якщо енергія електронів, які падають на анод, менша за певну властиву матеріалу анода величину, то спостерігається тільки гальмівне випромінювання.

4. Спектр цього випромінювання суцільний, починається на певній частоті, яка залежить лише від прикладеної напруги, й не залежить від матеріалу анода.

5. Спочатку його інтенсивність росте за частотою, досягає максимуму й потім зменшується.

6. Характеристичне випромінювання виникає при більших прикладених напругах.

7. Свою назву воно отримало завдяки тому факту, що воно характеризує матеріал анода.

8. Характеристичне випромінювання має лінійчатий спектр.

9. Воно відповідає квантовомеханічним переходам між різними орбіталями атомів.

Exercise 24. Study the active vocabulary and read the text.
Detectors for Digital Radiography.
Storage Phosphors
phosphorescence – фосфоресценція;
released – вивільнений;
luminescence – люмінесценція;
digital radiography – цифрова рентгенографія;
phosphor – люмінофор;
coated with – покритий чимось;
impurities – домішки;
for a considerable period – протягом тривалого часу;
to decrease (by) – зменшити, знизити (на);
pixelwise scanning – попіксельне сканування;
a beam – промінь;

a photomultiplier – фотопомножувач;

residual – залишковий;

to erase – стирати;

contrast reduction – зниження контрастності;

overexposure – перетримування, переопромінення;

underexposure – недодержка, недоекспонування;

image enhancement – поліпшення зображення;

the digital network – цифрова мережа;

on the order of a minute – приблизно хвилину.

A special case of phosphorescence is when part of the absorbed energy is not released immediately in the form of light. The temporarily stored energy can be released upon stimulation by other forms of energy such as laser light. This phenomenon is called photostimulated luminescence and is used in digital radiography.

This type of scintillator is called a storage phosphor or photostimulable phosphor. The screen-film combination is then replaced by a screen coated with such a scintillator. When X-rays are absorbed by the phosphor, electrons are pumped up from the valence band to the conduction band.

In a classical scintillator plate such an electron falls back to the valence band while releasing its energy in the form of a light photon. In a storage phosphor, however, these electrons are trapped by electron traps, which are impurities in the scintillator.

In this way, the incident X-ray energy is converted into stored energy. After exposure a latent image is trapped in the scintillator. The latent image can be stored in the phosphor plate for a considerable period after exposure. It takes 8 hours to decrease the stored energy by about 25%.

The stored energy can be extracted by pixelwise scanning with a laser beam. This way the trapped electrons receive a new energy shot that allows them to escape from their trap and fall back into the valence band. The latent image information is thereby released as visible light, which is captured by an optic array and transmitted to a photomultiplier.

The photomultiplier converts the detected light into an analog electrical signal. This analog signal is then converted in an A/D converter to a digital bit stream. The residual information on the scintillator screen is erased by a strong light source, after which the screen can be reused for new X-ray.

Storage phosphor screens provide a much wider useful exposure range than conventional film-screen systems. Moreover, the storage phosphor is a linear detector. This means there is no contrast reduction in the low- and high-density areas of the image, as is the case with the S-shaped sensitometric curve.

Consequently, the system is much more tolerant to overexposure and underexposure, and retakes caused by suboptimal exposure settings (mA s, kV) are reduced. Often, the greed for diagnostic detail slightly increases the dose rather than reducing it.

A second advantage of digital radiography is that the image is available for computer postprocessing such as image enhancement and quantification.

Moreover, the image can easily be stored and transported in digital form, making the images more accessible and making large film archives unnecessary. Today, digital picture archiving and communication systems (PACS) are part of hospital information systems, making the medical images immediately available through the digital network in the same way as the other patient information.

Active matrix flat panel detectors. Newer detector technologies for digital radiography are flat panel detectors with fast-imaging capability. These systems produce nearly real time images, as opposed to storage phosphor systems which require a readout scan on the order of a minute and a workflow similar to that for screen-film systems.

Exsercise25. Put different types of questions to the following sentences.

1. Storage phosphor screens provide a much wider useful exposure range than conventional film-screen systems.

2. The image can easily be stored and transported in digital form, making the images more accessible and making large film archives unnecessary.

3. Newer detector technologies for digital radiography are flat panel detectors with fast-imaging capability.

Exercise 26. Translate into Ukrainian, use a dictionary if you need.

1. Рентгенівські промені слабо взаємодіють із речовиною, тому мають велику проникність.

2. Вони поглинаються в тому випадку, коли їхня енергія вища за енергію внутрішніх електронів атомів.

3. На відміну від лінійчатих спектрів випромінювання спектр характеристичного поглинання складається зі смуг.

4. Оскільки електрон, вибитий із внутрішньої оболонки, покидає атом, він може мати будь-яку енергію.

5. Крім поглинання рентгенівські промені також розсіюються в речовині, змінюючи напрям розповсюдження.

Exercise 27. Look at the groups of words below. Cross out the adjective, verb or phrase which doesn't go with <u>technology</u> *in each group.*

Adj.+technology	verb+technology	technology+verb	Phrases
current	adopt	advance	advances in ~
bunting	apply	develop	the impact of (a)
existing	assemble	escape	~
the latest	introduce	evolve	science and ~
emerging	take advantage of	enable smth.	a word of ~

Exercise 28. Complete each sentence with the appropriate word combination from the Exercise 27.

1. We demand the FIFA to _____ technology in football and Help the referee, players and ourselves! 2. _____ Technology can make a difference, why re-Invent the Wheel? 3. Attend the seminar and Take _____ of technology to create two-way, family-friendly communication. 4. How has technology _____ over the years? Technology has made so many lives live easier, safer, longer, and better.

5. In the history of technology, _____ technologies are contemporary advances and innovation in various fields of technology. 6. A few years ago, at the beginning of the popularity of computers, I read a story about one potential _____ of technology on our society. 7. As technology _____, deep reading suffers. 8. As _____ and technology becomes more complex, it impacts our lives to a greater extent.

Exercise 29. Look through the article and add appropriate forms of the verbs from each set to each sentence:

are not receiving / show*;* has to be considered / is growing; detect / are regarded; said / would be; warned / are showing; is / have been; sees / to meet; must work / to produce.

National Healthcare System waiting times increase for diagnostic tests by Denis Campbell and James Ball**,**

The Guardian, Wednesday 5 October 2011

1. A growing number of patients _____ a diagnostic test such as an x-ray or ultrasound scan within the NHS's recommended six-week waiting time, official figures _____. 2. The tests, which _____ conditions such as cancer and heart problems, _____as vital by doctors. 3. The British Medical Association _____ longer waits <u>would be</u> difficult for patients.

4. It <u>is</u> concerning that there _____ a noticeable increase in the number of patients waiting beyond the recommended six weeks for a diagnostic test.

5. Managers _____closely with healthcare professionals _____ innovative ways of maintaining high quality care while delivering services efficiently. 6. The Royal College of Radiologists recently _____ that waiting times for diagnostic imaging tests _____ a worrying trend upward. 7. However, this _____ in the context of an annual increase in demand for imaging, which _____at 5% per annum with a total growth over the last 10 years of 140%. 8. A spokesman said: "The RCR _____ little realistic prospect of increasing the radiology workforce _____rising demand over the next few years."

Exercise 30. Study the active vocabulary.
calcifications – кальцифікація, звапнування;
soft tissue – м'які тканини;
proper image processing – належна обробка зображення;
to obtaine an image – здобути зображення;
promising – перспективний, багатообіцяючий;
immature – тут: недосконалий, що потребує доопрацювання;
absorption efficiency – поглинальна здатність;
DQE (detective quantum efficiency) – квантова ефективність детектування.

Exercise 31. Read the text and complete it with a, an, the or no article (-). Explain your choice.

Dual-energy imaging

By taking two radiographic images, each capturing ___ different energy spectrum, ___ image of substances with ___ high atomic number (e.g., bone, calcifications, stents) can be separated from that of ___ soft tissue by proper ___image processing. This way two different selective images are obtained, for example, ___ soft-tissue image and ___ bone image. Several methods have been proposed to calculate ___tissue selective images. ___ method explained here is also used in ___computed tomography.

___ two system configurations have been used. ___ first captures two radiographic images in ___ short time interval (e.g., 200 ms) and at different X-ray tube voltages (e.g., peaks at 110-150 kV and at 60-80 kV). ___ second configuration contains two layers of scintillator detectors and acquires ___ images in ___ single exposure. ___ top layer detects and filters most low-energy photons, while ___ bottom layer detects primarily high-energy photons. ___ third configuration is promising but immature, it uses ___photon counting detectors.

___commercial mammography systems exist that are able to count ___ individual X-ray photons with ___ very high absorption efficiency. To obtain their unsurpassed DQE they make use of crystalline silicon strip detectors in combination with ___ slit-scanning technology.

Exercise 32. Scan the text again and write a 50 word summary.

MODULE 8
VISUALIZATION. DEFIBRILLATORS

Exsercise 1. Study the key words and word-combinations.
Visualization– візуалізація;
computer graphics – комп'ютерна графіка;
image processing – обробка зображення;
processing – обробка;
exploration – дослідження;
simulation – моделювання;
diagnosis – діагностика;
measurements – вимірювання;
pathologic structure – патологічна структура;
clinical data – клінічні дані.

Exercise 2. Read and translate the text.
Visualization in medicine, or, for short, medical visualization, is a special area of scientific visualization that established itself as a research area in the late 1980s. The roots of scientific visualization are manifold; on one hand, the long tradition of scientists who illustrate their work with carefully crafted graphics laid the foundation for scientific visualization. Anatomical illustration, starting with da Vinci's work, is a prominent example. On the other hand, scientific visualization is based on computer graphics, which provide representations to store 3D geometry and efficient algorithms to render such representations.

Additional influence comes from image processing, which basically defined the field of medical image analysis (MIA). MIA, however, is was originally the processing of 2D images, while its 3D extension was traditionally usually credited to medical visualization.

VISUALIZATION IN MEDICINE AS A SPECIALTY OF SCIENTIFIC VISUALIZATION

Scientific visualization deals primarily with the visualization, exploration, and analysis of datasets arising from measurements or simulation of real world phenomena. The investigation of air flow around planes and cars is a well-known application area. The underlying data of scientific visualizations are often very large, which makes it necessary to consider the efficiency and hence the time and space complexity of algorithms.

Important goals and research scenarios of scientific visualization are:

• To explore data (undirected search without a specific hypothesis)

• To test a hypothesis based on measurements or simulations and their visualization

• The presentation of results

Many relevant examples in medical visualization address these general visualization goals. Whether or not a patient is suffering from a certain disease is a hypothesis to be tested through clinical investigations and medical imaging. If a physician cannot sufficiently assess a disease based on the symptoms described by the patient and by clinical examinations, radiological image data might be acquired without a particular hypothesis. Computer support—in particular image processing, quantitative image analysis and visualization—may improve the radiologist's diagnosis.

Finally, if a radiologist has performed a diagnosis specifying the stage and severity of a disease, certain visualizations are generated to present the diagnosis to the referring physician. Such visualizations might include measurements (extent of a pathologic structure) and annotations (encircled regions or arrows) to enhance their interpretation. The ultimate goal of such visualizations and the attached report is to support treatment decisions. The presentation goal is also relevant for medical visualizations; visualizations are generated to be discussed among colleagues, to employ them for educational purposes or as being part of a publication.

COMPUTERIZED MEDICAL IMAGING

Medical visualization deals with the analysis, visualization, and exploration of medical image data. Main application areas are:

• Educational purposes. Visualization techniques are the core of anatomy and surgery education systems. As an example, the

VOXELMAN, an advanced anatomy education system, combines high-quality surface and volume rendering with 3D interaction facilities and a knowledge base to support anatomy education.

While anatomy education relies on static models, surgery training requires deformable models which simulate the behavior of tissue if force is applied. In particular, minimally invasive surgical procedures require extensive training, for which interactive 3D visualization plays an essential role.

• Diagnosis. The diagnosis of radiological data benefits from interactive 2D and 3D visualizations. In particular, if the situation of a particular patient is very unusual (complex fractures, defective positions), 3D visualizations are a very useful way to get an overview of the morphology. More and more, functional and dynamic image data are employed to assess effects such as blood perfusion or contrast agent enhancement and metabolism. Various measures are derived from these image data. Appropriate visualizations depict the spatial correlation between these measurements.

• Treatment planning. Interactive 3D visualizations of the relevant anatomical and pathologic structures may enhance the planning of surgical interventions, radiation treatment, and minimally invasive interventions. The spatial relations between pathologic lesions and life-critical structures at risk may be evaluated better with 3D visualizations. Since the early work on craniofacial surgery planning, the visualization of anatomical structures has been steadily improving due to the progress in image acquisition, graphics, and computing hardware, and better rendering. Visualizations may also include information that is not present in radiological data, such as the simulated dose distribution for radiation treatment planning or simulated vascular territories. Treatment planning systems have found their way to many applications in, for example, orthopedic surgery, neurosurgery, abdominal surgery, and craniofacial surgery.

• Intraoperative support. Medical visualization based on 3D data is, more and more often, entering the operating room (OR). Preoperatively acquired images and intraoperative images are integrated to provide support during an intervention. Flexible and smart displays are needed for such applications.

It is essential to note that the computer support described above is not intended to replace medical doctors. Instead, physicians should be

supported and assisted to perform their tasks more efficiently and/or in a higher quality.

2D AND 3D VISUALIZATIONS

Medical imaging started with X-ray imaging at the end of the 19th century. Since that time, diagnosis has been carried out by inspecting X-ray films or, more recently, digital X-ray images. With the advent of computed tomography, many slices showing X-ray absorption in a particular region of the body have to be inspected. Slice-by-slice inspection of medical volume data is still a common practice. Despite all the efforts to accelerate volume rendering, employing high-quality reconstruction filters, and to ease the adjustment of the necessary parameters, the inspection of 2D slices is still dominant. A typical explanation of this phenomenon is the assumed ability of a radiologist to mentally fuse the 2D slices in a 3D representation. This ability, however, is not generally accepted and is disputed even between radiologists.

Another aspect seems to be a tradition in radiology: well-established techniques are preferred despite their obvious disadvantages when compared to more recent techniques. A thorough analysis of the radiologic workflow, however, reveals that there are still real benefits to using slice-by-slice inspection. In 2D views of the slices, each and every voxel can be seen and selected (for example, to inquire the density value). 2D slice views support precise exploration and analysis of the data. This is probably the reason radiologists are legally obliged to inspect every slice. Volume rendering or other 3D visualization, on the other hand, provides an overview. Radiologists use such overviews if for example, very unfamiliar spatial relations occur, such as judging branching patterns of vascular structures or assessing complex fractures. While radiologists rarely rely on 3D visualizations, physicians who carry out interventions (radiation therapy, surgery) strongly benefit from interactive and dynamic 3D visualizations. On the one hand, they do not have the radiological training to mentally imagine complex structures based on a stack of cross-sectional views. On the other hand, they have to understand the 3D spatial relations better than radiologists. While radiologists "only" describe the data; the surgeon actually intervenes in the spatial relations—with all the consequences that might have. In summary, 2Dand3D visualization techniques are needed and should be connected closely. While 3D techniques provide often a more comprehensible

overall picture, 2D slice-oriented techniques typically allow a more accurate examination and, hence, processing.

Exercise 3. Make a vocabulary list of the unknown words from the text.

Exercise 4. What are the main points discussed in this text? What new did you learn from the text?

Exercise 5. Write 20 special questions to the text. Exchange them with your colleagues. Discuss the answers in the class.

Exercise 6. Retell the text.

Exercise 7. Perform the dialogue. A Physical Examination
Doctor: When did you last come in for a physical exam?
Patient: I had my last physical two years ago.
Doctor: Have you had any other exams recently? Blood work, an EKG or an ultra-sound?
Patient: Well, I had a few X-rays at the dentist's.
Doctor: How have you been feeling in general?
Patient: Pretty well. No complaints, really.
Doctor: Could you roll up your left sleeve? I'd like to take your blood pressure.
Patient: Certainly.
Doctor: 120 over 80. That's fine. You don't seem to be overweight, that's good. Do you exercise regularly?
Patient: No, not really. If I run up a flight of stairs, it takes me a while to get my breath back. I need to get out more.
Doctor: That would be a good idea. How about your diet?
Patient: I think I eat a pretty balanced diet. You know, I'll have a hamburger from time to time, but generally I have well-balanced meals.
Doctor: That's good. Now, I'm going to listen to your heart.
Patient: Ooh, that's cold!
Doctor: Don't worry it's just my stethoscope. Now, breathe in and hold your breath. Please pull up your shirt, and breathe deeply... Everything sounds good. Let's take a look at your throat. Please open wide and say 'ah'.

Patient: 'ah'

Doctor: OK. Everything looks ship shape. I'm going to order some blood work and that's about it. Take this slip to the front desk and they'll arrange an appointment for the tests.

Patient: Thank you doctor. Have a nice day.

Exercise 8. Make sure that you know the Key Vocabulary from the dialogue.

physical examination (exam), blood work, EKG, ultra-sound, x-rays, to roll up sleeves, overweight – underweight, to exercise regularly, balanced diet, well-balanced meals, stethoscope, to breath in , to hold one's breath, to pull on one's shirt, to breathe deeply, to open wide, to look ship shape, slip, front desk, to arrange an appointment

Exercise 9. Check your comprehension of the dialogue.

Q: When did the patient have his last physical exam?
a) He doesn't remember.
b) Two years ago
c) Last year
Q: Has the patient had any other exams recently?
a) No
b) Yes, for dental work
c) Yes, for a broken bone
Q: How has the patient's health been in general?
a) Poor
b) Fine
Q: Which might be a problem for the patient according to the physical exam?
a) Weight
b) Lack of exercise
c) High blood pressure
Q: Which action bothers the patient a little?
a) The use of the stethoscope
b) Taking his blood pressure
c) Taking a look at his throat
Q: What does the doctor ask him to do?
a) Lose weight
b) Take a ship

c) Have some blood work done

Exercise 10. Read and translate the text.
TYPES OF DEFIBRILLATORS
The heart contains four chambers separated by one-way valves that allow blood to flow through the heart to and from the lungs and out into the body. A group of specialized cells, known as the sinus node, produce electrical impulses that trigger the heart to contract rhythmically. Arrhythmia, or abnormal heart rhythm, causes the heart to pump either too quickly or too slowly. Defibrillation describes a process in which a device, known as a defibrillator, delivers electric shocks to the heart to help regain normal contraction rhythms during arrhythmia or heart attack, according to the American Heart Association.

There are four major categories of defibrillators:

Advanced Life Support (ALS) Units

ALS defibrillators, used by healthcare professionals in hospitals and ambulances, allow professionals to monitor the patient rhythm and manually intervene if it is determined that a shock is required. In addition, most of these units offer an Advisory or AED function, in which waveform analysis and shock recommendations are made based upon sophisticated algorithms contained within the device.

ALS units can be used with either paddles or electrodes, though the trend today is to use the defibrillation electrode as it is much safer for the rescuer and delivers the shock more uniformly and effectively.

Parameters

Beyond the ability to deliver a shock, ALS defibrillators are often outfitted with a number of parameters to aid rescuers.

Most in-hospital ALS units will have an external pacing capability to allow external pacing of bradycardias.

Many will also offer SPO2, a means to monitor the oxygenation level of the patient via an external sensor.

Other options available on ALS defibrillators include:

EtCO2 to monitor carbon dioxide levels.

Non-Invasive Blood Pressure (NIBP) units to automatically measure the patient's blood pressure via a cuff.

Invasive Blood Pressure (IBP) used mainly with advanced transport units where patients with invasive lines can be managed during transport, either within the hospital or via ambulance or aircraft.

Temperature to monitor patient temperature.

Widely used by paramedics in the field is 12-lead EKG, which allows for rapid identification and classification of myocardial infarction. The EKG reading can be transmitted to receiving hospitals and alert cardiology teams that a patient requiring intervention is on the way.

CPR support:

A growing number of ALS defibrillators now also provide support for cardiac compressions. It has become exceedingly clear that good CPR is vital to improving resuscitation outcomes; it has also been determined that delivering good consistent CPR is difficult – even for highly trained professionals. Therefore, there is growing acceptance of the need for defibrillation products to not only be capable of delivering a shock, but also capable of assisting with delivery of optimal circulatory support.

Automatic External Defibrillators (AEDs)

These units are designed for use by laypersons and basic life support-trained personnel. They are widely available in airports, schools, casinos and other public areas. They guide users through the application of the electrodes and automatically analyze the patient's rhythm and either tell the rescuer to deliver a shock, or actually deliver the shock automatically. Many will also tell bystanders to start CPR, but only one AED, the ZOLL AED Plus currently coaches rescuers to deliver the correct rate and depth of compressions via the use of an accelerometer built into the electrode pad. As the importance of CPR delivery is increasingly realized to be a critical part of a successful rescue, this capability will most likely expand to other manufacturers.

Implantable Cardioverter Defibrillators (ICDs)

These units are implanted directly into the patient's chest and designed to protect those patients at high risk of sudden death. Generally, these are patients who have either a known medical condition that puts them at risk, or have actually experienced an episode of VF/VT. These products are beyond the scope of this website, and an in-depth discussion

of these products can be found at the manufacturers' websites highlighted in the links to the right.

Wearable Defibrillators

These are an intermediate care option for patients with a short-term known risk of sudden death or who are not candidates for an implantable device. They are discussed more fully in the wearable defibrillator section of this website.

Exercise 11. Make a vocabulary list of the unknown words from the text.

Exercise 12. What are the main points discussed in this text?
What new did you learn from the text?

Exercise 13. Write 15 special questions to the text. Exchange them with your colleagues. Discuss the answers in the class.

Exercise 14. Retell the text.

Exercise 15. Study the usage of "the" with the toponyms.

You have to be careful about the use of 'the' with features of the environment.

	use with the?	example
Countries	No	France
countries which are in a plural form	Yes	The USA
countries when limited by time	Yes	The Spain of today
individual mountains	No	Mount Everest
mountains in the Bernese Oberland	Yes	The Jungfrau
mountain chains	Yes	The Rockies
Islands	No	Sicily
groups of islands	Yes	The West Indies
Rivers	Yes	The Volga
Oceans	Yes	The Pacific

Seas	Yes	The Mediterranean
gulfs, bays and straits	Yes	The Gulf of Mexico
		The Bay of Biscay
Lakes	No	Lake Erie
Current	Yes	The Gulf Stream

Exercise 16. Read and study the new vocabulary.

The environment

There are many different words referring to features of the environment. Here are some arranged on small to large scales.

brook —» stream —» river   hillock —» hill —» mountain

  cove —> bay —» gulf

copse —> wood —> forest   puddle —> pond —»lake

  footpath —> lane —> road

Look at this encyclopaedia entry about Iceland and note any words that refer to particular features of the environment.

Iceland An island republic in the North Atlantic. The landscape consists largely of barren plains and mountains, with large ice fields particularly in the south west. The island has active volcanoes and is known for its thermal springs and geysers. With less than 1% of the land suitable for growing crops, the nation's economy is based on fishing, and fish products account for 80% of the exports.

Area: 103,000 km2. Population: 227,000. Capital: Reykjavik.

Here are some other nouns which are useful when talking about the environment. Check their meanings with a dictionary if necessary.

Where land meets sea: coast shore beach estuary cliff cape peninsula

Words connected with rivers: source tributary waterfall mouth valley gorge

Words connected with mountains: foot   ridge   peak   summit glacier

There are many environmental problems in the world today. Check with a dictionary if you do not know any of the terms below.

air, river and sea pollution   overfishing   the
greenhouse effect   the destruction of the ozone layer
                    destruction of the rainforests   battery   farming
              waste disposal   overpopulation

Exercise 17. In the paragraph below all the instances of the have been omitted. Insert them wherever they are necessary

Brazil is fifth largest country in world. In north densely forested basin of River Amazon covers half country. In east country is washed by Atlantic. Highest mountain chain in South America, Andes, does not lie in Brazil. Brazil's most famous city is Rio de Janeiro, former capital. Capital of Brazil today is Brasilia.

Exercise 18. Can you answer the following general knowledge questions about the environment?

1 What is the highest mountain in Africa?
2 What is the longest river in Europe?
3 Where is the highest waterfall in the world?
4 Name another country, apart from Iceland, which has geysers and hot springs.
5 What is a delta and which famous river has one?
6 Where are the Straits of Gibraltar and the Cape of Good Hope?

Exercise 19. Complete the paragraph below about your own country, or any other country that interests you. Remember to use 'the' whenever it is necessary.

_____ (1) is a _____ (2) in _____ (3). The countryside is _____ (4) in the north and _____ (5) in the south. The country's economy is based on _____ (6). The best-known river in _____ (7) is _____ (8). The most famous chain of mountains is _____ (9) _____ and the highest mountain in that chain is _____ (10) _____ (11) is a major environmental problem in _____ (12) today.

Exercise 20. Give two nouns from the text above to go with the adjectives below. Try not to repeat any of the nouns you choose.

Example: sandy beach/shore

1 sandy 2 steep 3 shallow 4 rocky 5 turbulent 6 dangerous

Exercise 21. Discussion

Why do environmentalists say we should avoid spray cans, practise organic farming and use unleaded petrol, recycled paper and bottle banks? What else are they in favour of?

Exercise 22. Read and translate the text.

Pollution and the environment

A Important definitions

People are more worried about the **environment** (= the air, water, and land around us) as a result of the **harmful** (= dangerous/**damaging**) effects of human activity. Some of these activities cause **pollution** (= dirty air, land and water) and some are **destroying** the environment (= damaging it so badly that soon parts will not exist). Here are some of the problems:

the ozone layer: a layer of gases which stop harmful radiation from the sun reaching the earth; recent research shows that there is now a hole in parts of the ozone layer,

global warming: an increase in world temperature caused by an increase in carbon dioxide,

acid rain: rain that contains dangerous chemicals; this is caused by smoke from factories.

B The 'greens'

Because of these problems, there are many groups of people whose aim is **conservation** (= the **protection** of natural things, e.g. plants and animals). They are often referred to as **greens**, e.g. 'Greenpeace' and 'Friends of the Earth'.

C. Common causes of damage

Smoke from **factories**

Car **exhaust fumes**

Dumping (= throwing away) industrial **waste** (= unwanted material) in seas and rivers

Aerosol cans (usually called sprays). Some of these contain CFCs (= a chemical) which can damage the ozone layer.

Cutting down tropical rainforests (e.g. The Amazon/.

This increases carbon dioxide in the atmosphere.

D. How can we help?

• Don't **throw away** bottles, newspapers, etc. Take them to a **bottle bank** or newspaper bank, and then they can be **recycled** (= used again).

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- **Plant** more trees.
- Don't **waste** (= use badly) **resources**, e.g. water, gas. Try to **save** (not waste) them.

Note: a resource is a valuable possession. There are **natural resources**, e.g. water or gold; and **human resources**, e.g. knowledge and skills. The word is usually plural

Exercise 23. Fill the gaps to form a compound noun or phrase from the text above.

1 the _____ layer   5 _____ warming
2 _____ rain   6 _____ fumes
3 _____ waste   7 _____ rainforests
4 a bottle _____   8 natural or human ___

Exercise 24. Complete these word-building tables. If necessary, use a dictionary to help you.

Noun	Verb
Waste	
	_____
_____	protect
_____	destroy
Pollution	
	_____
Damage	
	_____

Noun	Adjective
Damage	_____
Environment	_____
Harm	_____
Danger	_____
_____	Safe

Exercise 25. Complete the definitions.

1 Conservation is the protection of natural things, e.g _____ and _____.

2 Acid rain is rain that contains dangerous chemicals. It is caused by _____.

3 The ozone layer is a layer of gases that stop dangerous radiation from the sun from reaching _____.

4 Global warming is an increase in world temperature caused by an increase in _____.

5 CFC (chlorofluorocarbon) is a chemical which _____ _____.

Exercise 26. If we want to look after the environment, there are certain things we should and shouldn't do. Complete these two lists in suitable ways.

We should:
_____ paper, bottles and clothes.
_____ tropical rainforests.
_____ more trees.
_____ water and energy.
We shouldn't:
_____ paper, bottles and clothes.
_____ the ozone layer.
_____ water and energy.
_____ tropical rainforests.

Exercise 27. Test your knowledge of words from the text above and 'green' issues. Are these statements true or false?
1 CFCs protect the ozone layer.
2 'Greens' believe in conservation.
3 A hole in the ozone layer could increase skin cancer.
4 Cutting down tropical rainforests increases the amount of carbon dioxide in the atmosphere.
5 Plastic cannot be recycled.
Exercise 28. Read and translate the text.
Threats and potential threats to the environment

Shrinking habitats[1] are a threat to both plants and animals, and **endangered species**[2] need legal protection if they are to survive. Meanwhile, **global warming**[3] will produce rising sea levels and **climatic changes**[4], and **carbon dioxide emissions**[5] from the burning of **fossil fuels**[6] are contributing to the **greenhouse effect**[7]. In addition, population growth **exerts severe pressure on**[8] **finite resources**[9], and the **ecological balance**[10] may be upset by uncontrolled **deforestation**[11]. **Demographic projections**[12] suggest the world population will grow before it begins to stabilize. One of **the worst case scenarios**[13] is that there will be no tropical forests left by the year 2050. Our only hope is that **pristine environments**[14] such as Antarctica can be protected from development and damage

 1 places where animals live and breed which are decreasing in size
 2 types of animals/plants which are in danger of no longer existing
 3 steady rise in average world temperatures
 4 changes in the weather/climate
 5 carbon dioxide gas from factories, cars, etc.
 6 coal, oil, etc.
 7 warming of the Earth's surface caused by pollution
 8 formal: puts pressure on
 9 limited resources
10 balance of natural relationships in the environment
11 destruction/clearing of forests
12 forecasts about the population
13 the worst possibilities for the future
14 perfectly clean/untouched/unspoilt areas

Exercise 29. Make these sentences formal by using words and phrases from the text above instead of the underlined words. Make any other necessary changes to produce a correct sentence.

1 <u>All that carbon-what's it-called gas put out</u> by cars and factories is a major problem.

2 These flowers here are <u>a type there's not many left of</u>. so it's illegal to pick them.

3 A lot of wild animals have to survive in <u>smaller and smaller areas where they can live</u>.

4 Most of Patagonia is a <u>completely spotless area that's never been touched</u>.

5 We have to look after <u>the things we use on this planet because they won't last forever</u>.

6 If <u>the cutting down of trees</u> continues, there will be no forest left ten years from now.

7 Burning <u>coal and oil and stuff like that</u> causes a lot of pollution.

8 <u>The sea will get higher if this heating up of the world</u> continues.

9 Increasing population <u>puts really big pressure on</u> economic resources.

10 <u>The way things all balance one another in nature</u> is very delicate.

Exercise 30. Read and translate the texts.

Did you know?

• Did you know each time you see a full moon you always see the same side

• Did you know the longest possible eclipse of the sun is 7.31 minutes

• Did you know Halley's comet passes the Earth every 76 years (the next time it will return will be 2062)

• Did you know there is no sound in space

• Did you know Mars appears red because it's covered in rust

• Did you know Earth is the only planet not named after a god

• Did you know if your DNA was stretched out it would reach to the moon 6,000 times

• Did you know during a total solar eclipse the temperature can drop by 6°C (20°F)

• Did you know a full moon is 9 times brighter than a half moon

• Did you know the moon orbits the Earth every 27.32 days

• Did you know the Moons diameter is 3,476km

• Did you know Venus is the only planet that rotates clockwise

• Did you know the sun is 330,330 times larger than the Earth

• Did you know every year the sun loses 360 million tons

• Did you know fleas can accelerate 50 times faster than a space shuttle

• Did you know over 500 meteorites hit the Earth each year

• Did you know the Sun has a diameter of 1,390,176km (864,000miles)

• Did you know 45% of Americans don't know that the sun is a star

- Did you know all the planets in our solar system could fit inside Jupiter
- Did you know an area of the Suns surface to the equivalent of a postage stamp would shine with the brightness of over 1,500,000 candles
- Did you know more than 1,000,000 Earths could fit inside the Sun
- Did you know the Moon weighs 81 billion tons
- Did you know the diameter of Jupiter is 152,800km (88 700 miles)
- Did you know from space the brightest man made place is Las Vegas
- Did you know due to gravitational effects you weigh is slightly less when the moon is directly overhead
- Did you know If you could drive to the sun at a speed of 88.5 km/h (55 mp/h) it would take around 193 years
- Did you know hydrogen is the most abundant element in the Universe (75%)
- Did you know the moon is 27% the size of the Earth
- Did you know the center of the Sun is approximately 15 million °C (27 million °F)
- Did you know an astronaut can be up to 2 inches taller returning from space (the cartilage disks in the spine expand in the absence of gravity)

10 amazing and interesting facts about space:

1. Core is the central part of the sun. Due to high temperature and pressure in the core, it produces hydrogen gas to fuse helium. This process produces a large amount of energy from sun which is almost equivalent to a 100 billion nuclear bombs.

Facts about space stars

2. Moon has no weather, no wind and no air. If luckily, you get chance to visit moon, your footprints and presence will remain there forever.

3. There is a planet in the universe which is full of diamonds. Astronomers discovered this planet in 2004. It is commonly known as carbon planet or carbide planet.

4. One of the most amazing fact about space is cold welding. Cold welding is a rare way to bond two metals. In space when two metals touch each other, both of them are joined permanently with each other in such a way that they looks like one.

5. The rotation of our earth is getting slow by 0.001 to 0.002 seconds every century. Due to this slower rotation the length of the days are increasing.

6. Jupiter is the largest planet of Solar system. It is a big monster so it can hold all the planets.

7. If you can calculate one star per second then you can count all the stars in 3000 years.

8. There is no air in space so you can't hear anyone even if he/she shouts in front of you.

9. The rotation of Pluto completes in 6 days and 9 hours approximately. So the length of Pluto's day is equal to one week of Earth.

30. The bird's can't survive in space because they need gravitational force to swallow and there is no gravity in space.

Exsercise 31. Study the key words and word-combinations.
Environmental issues – екологічні проблеми;
sustainability - стійкість;
development – розвиток;
demand – попит;
society – суспільство;
aircraft noise – шум від літаків;
adverse effects – несприятливі наслідки;
management – управління;
operating restrictions – експлуатаційні обмеження.

Exercise 32. Read and translate the text.
Environmental issues for aviation
Like any other form of public mass transport that relies on finite planetary resources, aviation cannot (in its present form) be considered sustainable in the very long term. Because of the finite nature of the resources upon which aviation relies, it is more realistic in the medium term to think how best to improve the sustainability of air transport rather than it achieving sustainable development.

Demand for air transport is continually growing and, if this demand is to be met with all the attendant benefits, society must also accept the costs (noise, pollution, climate change, risk, resource use etc). Whilst it is not possible to make aviation sustainable (in its present form) in the very

long term, much can be and is being done to improve aviation's sustainability including:

- ensuring safety and security;
- efficiently optimising available capacity;
- collaborating to achieve a shared vision for more sustainable aviation;
- making decisions based on optimising the balance between social, economic and environmental imperatives;
- serving the need for mobility in a manner where the greatest overall benefit will arise, meeting the needs of stakeholders;
- taking every opportunity to minimise adverse impacts and resource use by creating and operating more efficient ATM systems, equipment and technology;
- targeting efforts where they will produce the greatest improvement in our citizen's quality of life;
- investing in adequate research, training, education and awareness;
- being transparent and honest about both the good and bad aspects of air transport;
- avoid conflicting policy and regulations.

Aircraft noise

Noise has historically been the principal environmental issue for aviation. It remains high on the agenda of public concern.

Noise disturbance is a difficult issue to evaluate as it is open to subjective reactions. Its impact is not a lasting one on the actual environment, but it can have significant adverse effects on people living close to an airport, including: interference with communication, sleep disturbance, annoyance responses, learning acquisition, performance effects and cardiovascular and psycho-physiological effects.

Unless there are very many aircraft following a route, it is widely recognised that aircraft flying at a height of at least 10,000ft above the ground do not usually produce "significant" noise impact. But because of the subjective nature of disturbance and the wide variance of local factors, this is not an absolute rule. It is normal for aircraft noise to be associated with airports, because of the low height involved.

Noise levels

To reach an understanding of average noise levels, noise is usually modelled using computer programmes that simulate aircraft "virtually" following an airports operating procedures, but with suitable variability

such as track dispersion to make it more realistic. These models, such as the widely used **"International Noise Model"**, produce aircraft noise footprints for the number of and type of aircraft using an airport in order to calculate the extent of particular noise levels around the airport. This will assume average weather conditions. These noise "contours" can then be placed on a map to see which communities are subjected to different degrees of average noise levels. But it should be remembered that, as average conditions rarely occur, the noise contours are only indicative of typical noise impact.

Measuring noise

The most widely used unit for measuring noise levels is dB(A) - the **A-weighted scale in decibels**. This unit attempts to reflect human reaction to "loudness".

Other dB based measurement units are uniquely related to aircraft.

The **perceived noise (PNdB)** and **effective perceived noise (EPNdB)** scales incorporate the different frequencies and duration of noise patterns, resulting from various speeds and modes of operation of aircraft. There is no agreement, even amongst the experts, on which measurement is the most representative, or the most relevant in a particular situation. However, the International Civil Aviation Organisation (ICAO) uses EPNdB for expressing its noise certification standards.

The **European Community proposes "Lden"** as the common unit for measuring transport noise. Day-evening-night level (Lden) is based on Leq over a whole day with a penalty of 10 dB(A) for night time noise (22.00-7.00) and an additional penalty of 5 dB(A) for evening noise (i.e. 19.00-23.00).

A guide to noise level
• normal conversation 50 - 60 dB(A)
• a loud radio 65 - 75 dB(A)
• a busy street 78 - 85 dB(A)
• a heavy lorry about 7 metres away 95 - 100 dB(A)
• a pighouse at feeding time 110 dB(A)
• a chain saw 115 - 120 dB(A)
• a jet aircraft taking off 25 metres away 140 dB(A) (unlikely to impact the general public!)

Aircraft noise management

All commercial aircraft must meet the International Civil Aviation Organization's (ICAO's) noise certification standards. These apply to

aircraft designs and types when they are first approved for operational use, and they have been progressively tightened since the initial standard was adopted in 1971.

The 33rd ICAO Assembly adopted Resolution A33/7 introducing the concept of a **'balanced approach'** to noise management, thereby establishing a policy approach to address aircraft noise. The 'balanced approach' concept of aircraft noise management comprises four principal elements and requires careful assessment of all different options to mitigate noise, including:

• reduction of aircraft noise at source;

• land-use planning and management measures;

• noise abatement operational procedures; and,

• operating restrictions.

The Balanced Approach has since been incorporated into European Community legislation as Directive EC/2002/30).

Other commonly applied **noise management measures** include:

• depicting preferred noise routes on a map that avoid residential areas as far as possible;

• avoiding over-flying sensitive sites such as hospitals and schools;

• ensuring that the optimum runway(s) and routes are used as far as conditions allow;

• using continuous descent approaches and departure noise abatement techniques;

• avoiding unnecessary use of auxiliary power units by aircraft on-stand;

• building barriers and engine test-pens to contain and deflect noise;

• towing aircraft instead of using jet engines to taxi;

• limiting night operations;

• limiting the number of operations or the extent of a critical noise contour;

• providing noise insulation for the most severely affected houses;

• applying different operational charges based on the noisiness of the aircraft;

• monitoring individual noise levels and penalising any breach.

Local air quality at airports

Aviation air quality concerns are principally related to the areas on and around airports. Further, for most airports the most significant air quality related emissions presently come from ground transport (cars,

buses, trains etc). However, because of factors such as growth in demand, more public transport access to airports, and the long service life of aircraft, it is widely expected that aircraft will eventually become the dominant air quality related pollution source for many airports.

Aircraft engines produce emissions that are similar to other emissions resulting from any oil based fuel combustion. These, like any exhaust emissions, can effect local air quality at ground level. It is emissions from aircraft below 1,000 ft above the ground (typically around 3 kilometres from departure or, for arrivals, around 6 kilometres from touchdown) that are chiefly involved in influencing local air quality. These emissions disperse with the wind and blend with emissions from other sources such as domestic heating emissions, factory emissions and transport pollution.

The **chief local air quality relevant emissions** attributed to aircraft operations at airports are as follows:
- Oxides of Nitrogen (NOx);
- Carbon Monoxide (CO);
- Unburnt hydrocarbons (CH4 and VOCs);
- Sulphur Dioxide (SO2);
- Fine Particulate Matter (PM10 and PM2.5);
- Odour.

These are produced by aircraft engines, auxiliary power units, apron vehicles, de-icing, and apron spillages of fuel and chemicals. Often NOx is by far the most abundant and is often considered the most significant pollutant from an air quality standpoint.

Air quality qualification methods

Emissions to air disperse and mix with emissions from other sources. Presently there are no international standards for air quality quantification methods.

Measurement

This involves sampling the local air and analysing for NOx, particulates and other important pollution species. The sampling is often done on a 24 hour continuous basis. Locating the measurement equipment is important because of prevailing weather patterns, the position of emission sources linked to the airport and the proximity of residential areas. Various analysis equipment exists including mechanical-chemical sampling equipment and real-time spectrum analysis monitors. Sometimes, mobile monitoring stations or a combination of different methods are used to allow greatest flexibility.

Modelling

This involves creating an inventory for all significant emitters linked to the airport such as aircraft, ground vehicles (airside and landside), fixed plant such as boilers and fugitive emission sources such as maintenance facilities. The characteristics of the emitters are also determined (operating patterns and emission levels). This data is combined with typical weather patterns in a sophisticated model to predict with reasonable accuracy, the degree of contribution of the airport to local pollution levels and what the dispersion patterns are.

The following measures are commonly used at airports to address emission below 1000 ft:

- low fuel/emission aircraft departure procedures;
- Continuous Descent Approach and Low Power - Low Drag techniques;
- avoiding aircraft queuing on the ground;
- avoiding unnecessary use of aircraft Auxiliary Power Units;
- taxiing management (e.g. towing and single engine taxi);
- increasing the use of public transport, cycling and pedestrian access to an airport (probably the major potential source of benefit);
- supporting and encouraging staff to "car share" or to use more sustainable transport access;
- the use of electric vehicles or less polluting fuels (liquid and natural gas);
- use less polluting fuels in airport buildings;
- ensure adequate vehicle maintenance;
- avoiding combustion equipment running when not required;
- energy management in buildings and for airfield systems (very often the most cost effective opportunity);
- fugitive emission controls.

All of these can contribute to reducing air quality related emissions, whilst at the same time delivering other economy and climate change benefits. For operational measures however, there may also be trade-offs with capacity and noise, and a full assessment should be made before adoption.

Climate change

Climate change is a change in the "average weather" that a given region experiences, including such factors as storm frequency, temperature, wind patterns and precipitation. Since society becomes

increasingly reliant on energy consumption in work at home and for mobility, the heat-trapping nature of the atmosphere has increased. As our scientific understanding of this situation increases, so does public concern and the requirement for a policy response.

Aviation contributes a small but growing proportion to this problem (less than 4% of man-made atmospheric emissions). A key factor however, is that some of aviation's emissions are emitted in the upper atmosphere and may have a more direct effect.

Kyoto protocol

Many countries have ratified The Kyoto Protocol which is an amendment to the **United Nations Framework Convention on Climate Change (UNFCCC)**. These countries commit to reduce carbon dioxide and five other greenhouse gases, or engage in emissions trading if they maintain or increase emissions of these gases. A total of 141 countries have ratified the agreement. Notable exceptions include the United States and Australia.

Affect of aviation on climate change

Aircraft perturb the atmosphere by changing background levels of trace gases and particles and through **condensation trails (contrails)**. Aircraft emissions include greenhouse gases such as CO_2 and water vapour that trap terrestrial radiation and chemically active gases that alter natural greenhouse gases, such as O_3 and CH_4. Particles may directly interact with the Earth's radiation balance or influence the formation and radiative properties of clouds.

Aircraft "Contrails" are lines of ice crystals that are formed by the aircraft disturbing the air in certain conditions (e.g. moisture content, temperature etc) with some contribution from combustion exhaust. It is now widely believed that these contrails can trigger the formation of cirrus clouds which thus affect climate. In 1992, aircraft contrails were estimated to cover about 0.1% of the Earth's surface on an annually averaged basis with larger regional values. Contrails tend to warm the Earth's surface, similar to thin high clouds. The contrail cover is projected to grow to 0.5% by 2050 at a rate which is faster than the rate of growth in aviation fuel consumption.

Closer to the ground, airport related operations also contribute to climate change, though **emitters** such as aircraft, passenger transport trips, airfield ground transport, airport buildings and airfield systems. Below 1,000ft aviation related emissions also affect air quality which is

covered elsewhere. Measures to improve climate change impact at heights of less than 1,000ft above the ground, may also have an air quality benefit.

Managing the effect of aviation on climate change

There are a number of policy options being considered at governmental level and, instruments such as ICAO engine emission standards are helping to reduce aircraft fuel use and greenhouse gas emissions. However, other than general efficiency aims and, because the science on the relative climate effects of altitude, contrails and NOx is not yet fully understood the evaluation of potential policy solutions with the certainty of a positive result is incomplete.

Nevertheless there is a lot that can be done to conserve fuel which in-turn reduces climate change forcing effects:

• Making routes more direct;

• Aiming for a fuel optimised flight profile;

• Increasing load factor and the capacity (and use) of more fuel optimised routes;

• Operating more fuel efficient aircraft;

• Avoid holding and queuing aircraft with engines running (in the air and on the ground);

• Avoiding noise restrictions and procedures that do not achieve sufficient benefit compared to the other environmental disbenefits;

• Using effective fuel optimised speeds when circumstances change;

• Using the other potential management options in the air quality section.

Affect of climate change on aviation

Climate change itself may also have direct and indirect effects on aviation; for example:

• More severe weather patterns (winds, storms and visibility) affecting capacity or efficiency;

• Shifting route-demand patterns due to changes in preferred destination;

• Water shortage constraining airport development;

• Sea level rises affecting low lying airports;

• Changing wind directions affecting runway configuration;

• Changes to winterisation requirements;

• The suppression of demand phenomenon cause by major catastrophe;

• Economic burden caused by climate change may reduce potential disposable income and hence propensity to travel.

Measuring climate change

In terms of global climate change itself, this is measured using a term **"radiative [climate change] forcing" effect** which tries to describe the net effect of both the positive and negative climate change effects of an emission, i.e. to account for the fact that some emissions may have both global warming and global cooling effects. Quantifying these complex climate effects requires a combination of chemical science to work out how different pollutants inter-react and complex atmospheric models to see how changes might happen.

Aviation emissions
Water Vapour

The natural cycle of water in the atmosphere is complex, involving a suite of closely coupled physical processes. This is particularly true in the troposphere, where there is continual cycling between water vapour, clouds, precipitation, and ground water. Water vapour and clouds have large radiative effects on climate and directly influence tropospheric chemistry. The stratosphere is much drier than the troposphere.

Nevertheless, water vapour is important in determining radiative balance and chemical composition, most dramatically in polar ozone loss through the formation of polar stratospheric clouds. Emissions of water vapour by the global aircraft fleet into the troposphere are small compared with fluxes within the natural hydrological cycle; however, the effects of contrails and enhanced cirrus formation must be considered. Water vapour resides in the troposphere for about 9 days. In the stratosphere, the time scale for removal of any aircraft water emissions is longer (months to years) than in the troposphere, and there is a greater chance for aircraft emissions to increase the ambient concentration. Any such increase could have two effects: a direct radiative effect with a consequent influence on climate, and a chemical perturbation of stratospheric ozone both directly and through the potentially increased occurrence of polar stratospheric clouds at high latitudes.

Carbon Dioxide

The behaviour of CO_2 within the atmosphere is simple and well understood. There are no important formation or destruction processes that take place in the atmosphere itself. Atmospheric sources and sinks occur principally at the Earth's surface and involve exchanges with the

biosphere and the oceans. The effect of CO_2 on climate change is direct and depends simply on its atmospheric concentration. CO_2 molecules absorb outgoing infrared radiation emitted by the Earth's surface and lower atmosphere. The observed 25–30% increase in atmospheric CO_2 concentrations over the past 200 years has caused a warming of the troposphere and a cooling of the stratosphere. There has been much discussion about how stabilization of CO_2 concentrations might be achieved in the future. One of the most important factors is the accumulated emission between now and the time at which stabilization is reached.

The amount of CO_2 formed from the combustion of aircraft fuel is determined by the total amount of carbon in the fuel because CO_2 is an unavoidable end product of the combustion process (as is water). The subsequent transport and processing of this CO_2 in the atmosphere follows the same pathways as those of other CO_2 molecules emitted into the atmosphere from whatever source. Thus, CO_2 emitted from aircraft becomes well mixed and indistinguishable from CO_2 from other fossil fuel sources, and the effects on climate are the same. The rate of growth in aviation CO_2 emission is faster than the underlying global rate of economic growth, so aviation's contribution, along with those of other forms of transportation, to total emissions resulting from human activities is likely to grow in coming years.

Nitrogen Oxides

Nitrogen oxides (NO and NO_2 are jointly referred to as NO_x) are present throughout the atmosphere. They are very influential in the chemistry of the troposphere and the stratosphere, and they are important in ozone production and destruction processes. There are a number of sources (oxidation of N_2O, lightning, fossil fuel combustion) whose contribution to NO_x concentrations in the upper troposphere are not well quantified.

In all regions, the chemistry of the atmosphere is complex; aircraft NO_x emissions are best viewed as perturbing a web of chemical reactions with a resultant impact on ozone concentrations that differs with location, season, and so forth. In the upper troposphere and lower stratosphere, aircraft NO_x emissions tend to cause increased ozone amounts, so increased ozone and its greenhouse effects are the main issues for NO_x emissions from subsonic aircraft. The pathways of other atmospheric constituents are also affected. Principal among these effects for NO_x

emissions is the reduction in the atmospheric lifetime and concentration of methane, another greenhouse gas. On the other hand, NOx emissions at the higher altitudes (18 km or above) of supersonic aircraft tend to deplete ozone.

Particulates

Although this covers a wide range of substances contained within aircraft exhaust emissions, the compounds of concern include sulphate aerosols and soot. These particles are heavily involved in the formation of contrails and cirrus clouds.

Sulphate aerosols play a critically important part in the stratosphere where they determine the NOx budget, and changes in sulphate levels would therefore have an effect on ozone levels.

Contrails

In 1992, aircraft line-shaped contrails were estimated to cover about 0.1% of the Earth's surface on an annually averaged basis with larger regional values. Contrails tend to warm the Earth's surface, similar to thin high clouds. The contrail cover is projected to grow to 0.5% by 2050 at a rate which is faster than the rate of growth in aviation fuel consumption.

This faster growth in contrail cover is expected because air traffic will increase mainly in the upper troposphere where contrails form preferentially, and may also occur as a result of improvements in aircraft fuel efficiency. Contrails are triggered from the water vapour emitted by aircraft and their optical properties depend on the particles emitted or formed in the aircraft plume and on the ambient atmospheric conditions. The radiative effect of contrails depends on their optical properties and global cover, both of which are uncertain.

Cirrus Clouds

Extensive cirrus clouds have been observed to develop after the formation of persistent contrails. Increases in cirrus cloud cover (beyond those identified as line-shaped contrails) are found to be positively correlated with aircraft emissions in a limited number of studies. About 30% of the Earth is covered with cirrus cloud. On average an increase in cirrus cloud cover tends to warm the surface of the Earth. An estimate for aircraft-induced cirrus cover for the late 1990s ranges from 0 to 0.2% of the surface of the Earth.

Exercise 33. Make a vocabulary list of the unknown words from the text.

Exercise 34. What are the main points discussed in this text?
What new did you learn from the text?
Are there any points in the text you can disagree with? What are they? Why? Express your opinion.

Exercise 35. Write 30 special questions to the text. Exchange them with your colleagues. Discuss the answers in the class.

Exercise 36. Retell the text.

CONFERENCES

Exercise 1. Learn how to make a presentation.

Conference presentations

THE STRUCTURE OF A PRESENTATION

Conference (or congress) presentations are typically divided into IMRaD sections (Introduction, Methods, Results, Discussion).

If the presentation has a different form, the speaker may start by outlining its structure. This helps to orientate the audience:

I'll begin by ...

First of all. I'll ...

I'll then ...

Secondly. I'll ...

Finally, I'll ...

Many speakers like to start a new section with a **signal**:

Now,...

Moving on to X,...

As far as X is concerned,...

An alternative technique is to use a question:

How did we investigate this problem? (to introduce Method)

What did we find? (to introduce Results)

How does this compare with previous studies? (to introduce Discussion)

THE INTRODUCTION

A formal way of beginning is:

I'd like to present to you the results of our research into ...

Many speakers prefer to begin in a less formal way:

When we first began to look into the question of X, we thought ...

You may wish to begin with a generalisation or reference to shared knowledge:

It is well known that ...

Many studies have shown that...

X has established clearly that ...

SIGNALING

Other signals that you may w ish to give include:

Emphasizing	■	For instance ...
Giving examples		
■I'd like to emphasize ...	■	… such as…

Listing points Contrasting
- ■ Firstly,...
- ■On the other hand ...
- ■   Secondly,...

■In contrast…
■However,...
Referring to slides
■ This slide shows...

THE CONCLUSION

It is important to end well, for example by summing up the main conclusions

So, **In conclusion,** **To sum up.** **Finally,**	we can see ... I'd like to say end by these studies show ...

Exercise 2. Here are some extracts from a presentation on carbon monoxide poisoning. After announcing his topic, the speaker talked about the pathophysiology of CO poisoning, then the possible sources of the gas, and finally diagnosis and treatment. Put the extracts in the correct order.

1 There is, however, no evidence at all that giving steroids in pharmacological doses is of any proven prophylactic value. ...

2 How do we diagnose it? The early clinical appearances of carbon monoxide poisoning can be very non-specific. ...

3 So, the actual diagnosis of the condition can be very difficult....

4 I'd like to tell you about some of our experiences in relation to carbon monoxide poisoning. ...

5 On the slide here, you'll sec that there are a variety of sources of carbon monoxide, such as car exhausts, fires, and so on. ...

6 First of all, I want to concentrate on smoke from fires as one of the most important sources of carbon monoxide....

7 Now, in relation to the treatment of carbon monoxide poisoning, ICO per cent oxygen administered through a tight-fitting face mask or endotracheal tube is essential. ...

8 I think its important to emphasize that the presence of cherry-red mucous membranes is a very, very poor sign. ...

9 Now, you will remember that carbon monoxide strongly binds with hemoglobin to produce carboxyhemoglobin. ...

10 The only accurate way of detecting whether the patient has been exposed to carbon monoxide is to measure carboxyhemoglobin in, usually, the venous blood. ...

Exercise 3. Write the word or phrase used by the speaker in the presentation in above next to its function. Look at the exercise 1 to help you.

Emphasizing	
Listing	
Exemplifying	
Contrasting	
Summing up	
Changing topic	
Referring to a slide	
Announcing the topic	

Exercise 4. Learn how to present the cases.
CASE PRESENTATIONS
SECTIONS OF A CASE PRESENTATION
In a **case presentation**, a doctor presents the derails of a patient's case to colleagues at a clinical meeting in a hospital. A typical case presentation is divided into the following sections:

Section	Example language
Introduction	I'd like to **present** Mr. Simpson,
Patient's age and occupation	a 34-year-old plumber.
Presenting symptom(s) and duration	who **presented with** a one-month history of breathlessness.
Associated symptoms	He also **complained of** ankle swelling which he'd had for two weeks.
Past medical history	There was no **relevant past history**.

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Social history	He was married with one son. He smoked 25 cigarettes a day and drank about 50 units of alcohol per week.
Family history	His father died of myocardial infarction at the age of 42. His mother was **alive and well**.
Findings on examination	On **examination**, he was obese ...
Investigation results	We did a chest X-ray which **showed** ...
Diagnosis	So we thought he had ...
Treatment	We gave him intravenous furosemide and ...
Outcome - what happened	He **responded to treatment** and was **discharged home**.

BEDSIDE PRESENTATION

A less formal type of case presentation can take place at a patient's bed, for example during ward rounds, when the house officer presents a new patient to the consultant; or in a **teaching ward round**, when a medical student presents a case to the tutor. This type of presentation begins less formally:

This is Mr Simpson. He's 34, and he's a plumber. He **came into hospital** yesterday, sent by his GP. He's complaining of breathlessness, which he's had for one month ...

SLIDES

In a formal presentation, the main points are usually summarized on slides.

Mr Simpson 34, plumber	
c/o	dyspnea **1/12**; ankle swelling **2/52**
SH	married with 1 son
	25 cigs/day; 50 units alcohol/week
PH	**nil** relevant
FH	father **d.** 42 **Ml**; mother **a&w**
OE	obese; 2 spider naevi on chest
	P 110/min reg.
	BP 100/60
CX	enlarged heart and bilat. pleural effusions

R	

Exercise 5. Write the abbreviations in words. Look at the previous exercise and at Appendix to help you.

c/o   _____

2/52   _____

PH   _____

FH   _____

MI   _____

BP   _____

1/12   _____

nil   _____

SH   _____

a&w   _____

OF. .   _____

CXR   _____

Exercise 6. Put the sections of a short informal case presentation in the correct order. Look at the exercise 4 to help you.

1 Mr Collins is a 60-year-old security guard.

2 There was no relevant previous medical history.

3 He smokes 20 cigarettes per day and drinks 15-20 units of alcohol each week.

4 On examination, there was marked tenderness around the lower legs above the ankles and knees. There were crackles at the left base posteriorly in the chest. There was nothing else abnormal to find on examination except for clubbing of the fingers.

5 He presented with a six-week history of pain in the legs.

6 Chest X-ray showed consolidation in the left lower lobe. Bronchoscopy and biopsy showed adenocarcinoma of the lung and computed tomography (CT) scan showed that this was not resectable.

7 Treatment with chemotherapy has resulted in temporary improvement in the chest X-ray but the leg pain has continued to prove difficult to control.

8 The pain, which was located around the ankles, had been increasing in intensity and was associated with local tenderness.

9 On routine questioning, he said that he had had a morning cough with small amounts of white sputum for many years. He produced, once, some streaks of blood in the sputum.

Exercise 7. Read the presentation below and make notes for a slide. Look at the exercise 4 to help you.

I'd like to present Mr McNamara who's a 63-year-old taxi driver who presented to the Outpatient Clinic with a three-month history of increasing shortness of breath and ankle swelling. He had a chronic cough with purulent sputum and occasional hemoptysis. Of note in his past medical history was that he'd had a partial gastrectomy in 1980.

On examination, he was pale. He was apyrexial. He had leg edema, but no clubbing or lymphadenopathy. And examination of his chest was entirely normal. His liver was palpable 5 centimeters below the costal margin, and was smooth and non-tender, and there was also a scar from his previous operation.

Exercise 8. The number of news items about conference speeches is a reflection of just how important meetings of this kind have become for the international business community. Read the information about this international conference and match Delegate Two's answers to Delegate One's questions/concerns, e.g. 1 = d

DELEGATE ONE

1 I don't know what to do about accommodation.
2 I hope we don't have to pay extra for meals.
3 How many languages will the conference be in?
4 I'd like him to go in my place if I can't attend.
5 I wonder when we stop for lunch.
6 I can't pay until the second day.
7 Can we collect our programme during the reception?
8 Perhaps it will be cheaper if we all stay at the same time.

a Yes we can between 7.00 p.m. and 9.00 p.m.
b They don't say.
c They ask for the fee before it starts.
d You might get a room at the conference hotel.
e There's no problem about that.
f Dinner isn't included, but otherwise food and drink is paid for.
g Only one.
h Let's ask for information about groups.

DELEGATE TWO

Information

The language of the conference will be English.

The morning session on each day will commence at 09.00 and delegates are invited to collect their documents during the pre-forum reception from 19.00 to 21.00.

The registration fee of £650.00 is payable in advance and includes the cost of all refreshments, cocktails, lunches, receptions, documents and copies of speakers' papers. Discounts on the registration fee are given on corporate block bookings, details are available on request.

Fees (less a 10% administration charge) will be returned for any cancellation received before Wednesday, 30 March. However, substitutions are accepted at any time.

The fee does not include accommodation. A limited amount of accommodation is available at Lodge Hotel.

Exercise 9. Complete these guidelines on conference organization using the definitions below to find the missing words. The first letter of each word is given to help you. e.g. 1 = speakers

A month before the conference, it is essential to request copies of the s_____ (1) papers and details of their timing. S_____ (2) requirements and the v_____ (3) must be confirmed, as must the contractor. The p_____ (4) and list of p_____ (5) must be ready for printing. Name b_____, (6) welcome banners, and vouchers must also be prepared. Official invitations must be sent to the p_____ (7) and any dignitaries. P_____ (8) leading the main s_____ (9) must decide on their chosen t_____ (10).

people making a speech or giving a talk		6	identification labels
the total area allocated to the conference		7	media
place where the conference takes place		8	person who sits on the panel
conference guide book		9	items on the program
those taking part		10	subjects

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Exercise 10. Conference organizers must take seating layouts into careful consideration. Look at the arrangements below and decide which of the descriptions best suits them.

classroom
discussion groups
theatre style
board of directors
hollow square
U-shape
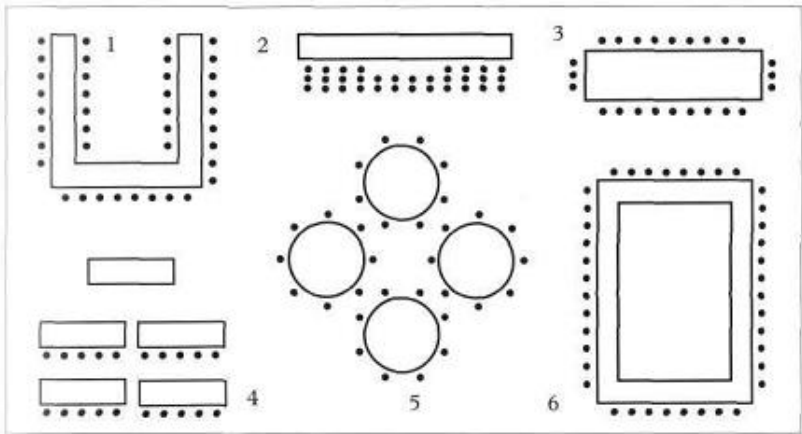
Exercise 11. A speaker is going to address delegates at an international conference. All the special equipment and audio-visual aids have been prepared. Identify the ten items in the list.
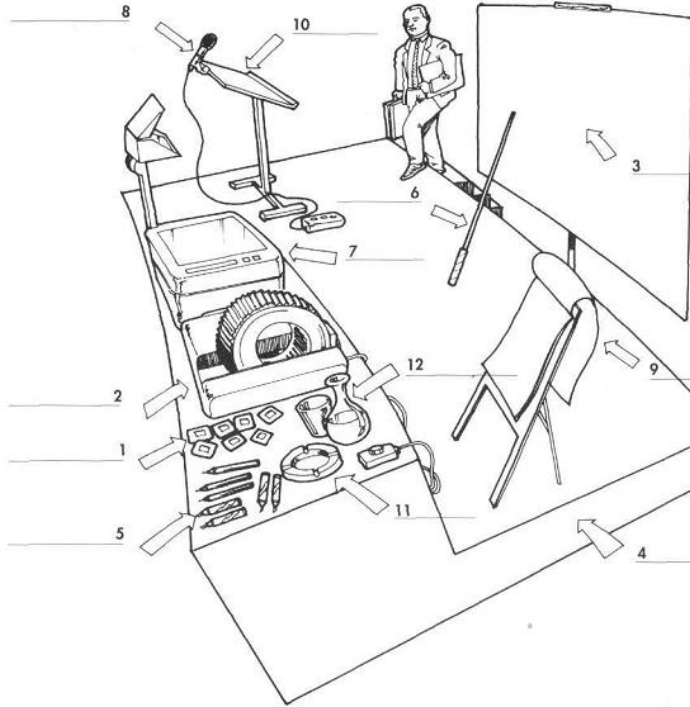
lectern	marker pens	flipcharts
overhead projector	pointer	Slide projector
podium/platform	slides	
whiteboard/screen	microphone	

There are three other items on the table - small and yet important:
a glass, a _____ (11) of water and an _____ (12).

Exercise 12. Read these guidelines on choosing and organizing guest presenters for a conference.

Guest speakers should always be experts in their profession and an eminent personality — not necessarily in the profession — should always be chosen to open a conference by outlining its theme. A call for papers from delegates attending the conference may lead to additional speakers.

If simultaneous interpretation is used, interpreters should receive a copy of all speeches well in advance so they can familiarize themselves with the contents.

The organizer must brief speakers to make their speeches relevant to the topic and obtain an abstract of the speech, plus a biography and picture of the speaker ahead of time (for use in the programme, publicity material etc.).

- Scan the text and find:
1 six people
e.g. guest speakers
2 six written items
- Distinguish between the following pairs of words:
3 abstract/paper
Which is a short form of the other?
4 eminent/expert
Which is well-known and important?
5 theme/topic
- Which is the main general idea?
- Find words in the text that mean the following
6 giving a general description without many details
7 extra
8 an immediate verbal translation of a speaker's words
9 formal talk to an audience
10   give someone specific instructions

Exercise 13. Many formal speeches begin in a similar way. Complete this introduction. The first letter of each word is given to guide you.
    "Good evening l_____(1) and g_____(2). As mayor, it is both a p_____(3) and a p_____(4) to be invited to h_____(5) this international conference in this city and to be able to w_____(6) so many participants from all over the world. Speaking personally, may I also say what an h_____(7) it is to have been chosen to o_____(8)…"

Exsercise 14. Study the key words and word-combinations.
Cardiovascular Medicine – серцево-судинна медицина
Cardiologist – кардіолог
The latest addition – останнє доповнення
Relation – відношення
Regeneration – регенерація
Tug – буксир
Mirror images – дзеркальне відображення
Fascinating pathway – захоплюючий шлях
The cell – клітина
 Full efficacy – повна ефективніст
 Promising avenues – перспективні напрямки

Exercise 15. Write a resume of the following article.
Roberto Ferrari, MD, PhD David J. Hearse, BSc, PhD
CARDIO-ONCOLOGY: TO HYPHENATE OR NOT TO HYPHENATE?
Readers of Dialogues in Cardiovascular Medicine may wonder why a cardiologist should be receiving an issue devoted to cardio-oncology. To date, there are a mere 25 citations of this word in titles of articles in PubMed. In 1996— coincidentally the very same year the first issue of Dialogues went to print— Daniela Cardinale published so to speak the maiden article on the topic, announcing: "A new frontier: cardio-oncology. " Twelve years elapsed before the second citation in a title, in 2008. The latest addition to the list dates back to May 2013, with Javid Moslehi and Susan Cheng referring in their paper to cardio-oncology as an "emerging disci¬pline," as does Bernard Levy in the Lead Article of this issue of Dialogues.

An emerging discipline is by necessity a hot topic, so there are some very good reasons for publishing an issue of Dialogues on cardio-oncology today. These two "hyphenated" disciplines—cardiology and oncology—have a lot in common in terms of research, and even though oncologists have been enjoying quite a head start, cardiologists are now catching up. To take a topic like "apoptosis," cardiologists have been showing increasing interest in the mechanisms of apoptosis and how it is triggered, whether in relation to the endothelium or to the myocyte, as they have been realizing that an excess of apoptosis is linked to the onset and progression of atherosclerosis as well as to postischemic remodeling,

ultimately leading to heart failure. Beyond apoptosis, there is also growing interest in the regeneration of endothelial cells, leading to neo¬vascularization, and the prospects of complete repair with major strides being made in the understanding of regeneration of the myocyte.

If we now turn to practical, in other words, clinical, applications, our two "hyphenated" disciplines tug and pull and want to "dehyphenate," assuming mirror images of each other. What does the cardiologist want? The cardiologist must fight against apoptosis and favor regeneration. And what does the oncologist want? The exact opposite of the oncologist, by seeking to improve apoptosis and suppress regeneration, so as to forestall neoangiogenesis. Different angles indeed.

So what are you going to read about in Dialogues? Bernard Levy, who leads this issue, expounds on the substantial risk of developing heart disease as a result of chemother-apy and/or radiation therapy. Paola Rizzo and Donato Mele explore a fascinating pathway, the so called Notch pathway, which decides the fate of the cell. Modulation of this pathway could be a promising therapeutic area for both cardiology and oncology. Thor Edvardsen and Sebastian Sarvari praise our colleagues the oncologists for now having extremely powerful chemotherapy protocols to fight cancer, but point out that these come with a risk of cardiotoxicity, since the drugs used act on several pathways such as the ERG system, GP130, and possibly the Notch pathway. It is therefore manda¬tory for the cardiologist to recognize and counter cardiac toxicity as early as possible in order to be able to continue the chemotherapy and achieve full efficacy. The authors discuss the best tools for early diagnosis and suggest setting up guidelines. Finally, Michel Safar examines the interactions between macro- and microcirculation and ex¬plores their interactions in patients with cardiovascular disease and cancer.

Much still lies ahead in the "hyphenated" field of cardio-oncology, and we hope that this issue of Dialogues will make this topic less of a terra incognita by mapping out some of the most promising avenues of research and clinical applications.

Exercise 16. Write an annotation of the following article.
Patients with HCV and diabetes may benefit from antiviral therapy
New research suggests that patients with both hepatitis C and diabetes may have their cardiovascular and kidney outcomes improved with

antiviral therapy. This is according to a study published in the journal Hepatology.

Hepatitis C virus (HCV) is an infection that can infect and damage the liver. It can be contracted if a person comes into contact with infected blood or bodily fluids.

According to the Centers for Disease Control and Prevention (CDC), HCV is the most common bloodborne infection in the US, affecting more than 3.2 million people.

Previous research has indicated that there is an association between HCV and diabetes. The Hepatitis Trust in the UK states that people with HCV have a significantly increased risk for developing diabetes and insulin resistance.

According to the research team from Taiwan, led by Dr. Chun-Ying Wu of the Taichung Veterans General Hospital, patients with HCV who suffer from insulin resistance with or without diabetes tend to have a poorer response to antiviral therapies. They also have an increased risk of developing liver fibrosis and liver cancer.

The investigators note that since there is increasing evidence of a link between HCV and diabetes, they wanted to determine whether antiviral treatment for HCV could improve diabetes outcomes, such as risk of heart attack, stroke and kidney disease.

Using data from the Taiwan National Health Insurance Research Database, the researchers analyzed 1,411 patients with both HCV and diabetes. All the patients were receiving antiviral therapy for HCV in the form of pegylated interferon and ribavirin.

In addition, the researchers analyzed 1,411 patients with HCV and diabetes who were not receiving antiviral therapy, alongside 5,644 patients who had diabetes but were not infected with HCV. All the participants were followed-up for 8 years.

Antiviral therapy 'effective' for diabetic outcomes

Results of the analysis reveal that of patients with both HCV and diabetes who received antiviral therapy, there was a 1.1% incidence rate of end-stage kidney disease, a stroke incidence rate of 3.1% and a heart attack incidence rate of 4.1%.

Patients with both diabetes and HCV who were untreated had incidence rates for kidney disease, stroke and heart attack of 9.3%, 5.3% and 6.6% respectively, while patients with diabetes who did not have

HCV had a 3.3% incidence rate for kidney disease, 6.1% for stroke and 7.4% for heart attack.

Commenting on their results, Dr. Wu says:

"Our findings suggest that HCV may cause clinical complications related to diabetes. But these issues are mitigated by HCV antiviral therapy, specifically pegylated interferon plus ribavirin, which was found to reduce risks of kidney disease, stroke and cardiovascular diseases in diabetic patients."

The investigators note that further research is needed to better understand the association between diabetes and HCV.

Medical News Today recently reported on a phase II trial suggesting that use of the drug danoprevir alongside current antiviral treatments for HCV may lead to higher remission rates.

Written by Honor Whiteman

Exercise 17. Write a resume of the following article.

First-time mothers as young as 30-years-old in 'risk zone'.

For many women who plan to conceive a child at some point, 35 has been perceived as the magic age when they suddenly enter the risk group. But new research from Sweden suggests this "risk zone" begins much earlier, starting as a woman leaves her 20s.

The study, published in the journal Obstetrics and Gynecology, was conducted by investigators from Karolinska Institutet in Stockholm, Sweden.

They note that increasingly, women in the world's wealthiest countries are giving birth at later ages, which has led to an increased risk of preterm birth, hindered growth and stillbirth.

To analyze risks among age groups of women giving birth for the first time, the researchers used data from the Swedish and Norwegian medical birth registers, yielding information on nearly 1 million women between 1990 and 2010.

They adjusted odds ratios of certain categories, including very preterm birth, moderately preterm birth, small for gestational age, low Apgar score, fetal death and neonatal death, after separating the women into four age groups:

- 25- to 29-years-old
- 30- to 34-years-old
- 35- to 39-years-old

• 40-years-old or higher.

Premature birth, stillbirth risk increases at age 30

Although the investigators say women in the age group of 30-34 have not normally been considered as a risk group, their results tell a different story.

Compared with the 25-29 age group, first-time mothers between the ages of 30 and 34 had a higher risk of having a premature birth - in weeks 22-31 - or having a stillbirth.

The team notes that other factors, such as smoking or being overweight or obese, "significantly increased" the risk of experiencing serious pregnancy complications.

"We were surprised that the risk for certain outcomes increased at such a relatively early age," says Ulla Waldenström, professor at the Department of Women's and Children's Health at Karolinska Institutet.

Prof. Waldenström continues:

"For women individually, the risk is small, but for society at large there will be a significant number of 'unnecessary' complications with so many women having children just after 30. It would therefore be advisable to inform both women and men, even at schools, of how important age is to childbirth."

When asked about suggestions for women over 30 who are contemplating having a baby, Prof. Waldenström told Medical News Today:

"The best advice is to avoid smoking and overweight/obesity, if that is possible. I would also point at the very low risk for the individual woman. The prevalence of very preterm birth increased from 6/1000 women in a low-risk group aged 25-29 years to 10/1000 at age 30-34, and the corresponding figures for stillbirths were from 2/1000 to 4/1000."

The researchers say they will soon assess the possible ramifications of giving birth to a second or third child in so-called advanced years in a registry based on 2.2 million women.

A recent study suggested that pregnant women who have pre-existing diabetes have a higher risk of stillbirth or infant death.

Written by Marie Ellis

Exercise 18. Write an annotation of the following article.
Вчені змогли «побачити» біль і виміряти його силу

На науковому мовою метод, створений вченими з США, називається «візуалізація больових відчуттів у режимі реального часу». Він стане в нагоді медикам, яким доводиться лікувати хворих, які втратили дар мови після інсульту, а також знаходяться без свідомості.

Об'єднаної групи американських дослідників з декількох університетів країни (New York University, Johns Hopkins University і University of Michigan) вперше в історії медицини вдалося «побачити» біль.

Експерименти проводилися з участю 114 добровольців, яким по черзі прикладали до внутрішньої сторони передпліччя металеві пластини, гарячі та різної температури - від 39 °C до 55 °C.

Одночасно у випробуваних вивчалася ступінь активності різних ділянок мозку за допомогою функціональної манитно-резонансної (фМРТ).

Зміни в одній і тій же зоні, викликані збільшенням температури металевої платівки, дозволили знайти алгоритм відчуття болю мозком - на наступному етапі експерименту вчені, керуючись виключно томограммой, могли визначити різницю в температурі прикладіваемой до руці випробуваного платівки з точністю до 1 °C.

Також вони отримали об'єктивні докази існування різниці в порогах больових відчуттів у різних людей. У людей з низьким порогом больової чутливості відповідні ділянки мозку виявляли підвищену активність вже при 45 або 46 °З - одночасно ці учасники повідомляли про появу неприємних відчуттів, викликаних дотиком платівки.

В той же час в інших випробуваних така ж температура предмета не викликала підвищення активності «зон болю».

Автори дослідження з допомогою цього експерименту також спростували гіпотезу про те, що душевні страждання викликають фізичну біль.

Спеціально відібраним учасникам, нещодавно який розлучається зі своїми коханими за ініціативою представниць прекрасної статі, показували фото їх колишніх коханих дівчат або дружин - незважаючи на пережиті сильні емоції, активність зон болю у «кинутих» чоловіків у такі моменти не підвищувалася.

Exsercise 19. Study the key words and word-combinations.
interchangeable – взаємозамінні
     successful – успішний
     beliefs – переконання
     carefully – обережно
     invariably – незмінно
     honesty – чесність
     accountability – відповідальність
     labor laws - трудове законодавство
     remorse – каяття
    behavior – поведінка
    consistency – послідовність
     Flexibility – гнучкість

Exercise 20. Read and translate the text.
What Are the Differences Between Ethical Issues & Moral Issues in Business?

In business, you will inevitably run into situations where your morals and ethics will be tested. It is important to understand that the above terms are not interchangeable, so a comprehensive connection is crucial if you want to run a consistent, successful business.

Definitions

By definition, morals are values that we attribute to a system of beliefs, be they religious, political or philosophical, for example. Ethics are how business owners apply those beliefs in their short and long-term business decisions. As a result, these concepts inevitably are intertwined and must be applied carefully to maintain an image of professionalism and accountability.

Moral Issues

Your business invariably will face potential moral issues and approaches. Most importantly, however, your morals should be clear -- they will define your business and what it stands for. As such, it is prudent to insert these morals into your organization's mission statement. Mentioning issues like honesty, accountability, integrity and dedication creates a sense of trust between you and your clients. It is also advisable -- for both legal and moral reasons -- that you promote yourself as an "equal opportunity employer" in your mission statement, website and job postings. This indicates that you do not discriminate based on areas such

as age, marital status, disability, race, nationality or religion -- all of which are protected under United States labor laws.

Ethical Issues

Once your company's morals are established, they will be reflected in your actions. From a legal standpoint, this can affect your hiring practices and employee treatment. For more ambiguous terms, such as honesty or integrity, you put these into practice through transparency with your customers and adherence to the morals your business claims to follow. In short, while morals affect your stance on certain issues, ethics dictate how you deal with them.

Examples

Considering the connection between morals and ethics, the issues associated with them do not necessarily differ. For example, assume that your business values environmental protection -- your morals. In turn, your organization may feel inclined to associate with certain environmental organizations, charities and sound environmental practices -- your ethics. The same applies, for example, if you are faced with an applicant who is a close friend or family member. If you consider yourself an "equal opportunity employer," then your ethical obligation is to consider her qualifications against other potential candidates, rather than practice nepotism. You may even decide to rule her out altogether or have someone else evaluate her if you fear your objectivity is compromised.

Ethics and morals both relate to "right" and "wrong" conduct. However, ethics refer to the series of rules provided to an individual by an external source. e.g. their profession. On the other hand, morals refer to an individual's own principles regarding right and wrong.

Comparison chart

	Ethics	Morals
What are they?	The rules of conduct recognized in respect to a particular class of human actions or a particular group, culture, etc. It defines how thing are according to the rules.	Principles or habits with respect to right or wrong conduct.It defines how things should work

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	Ethics	Morals
		according to an individuals' ideals and principles.
Where do they come from?	Social system - External	Individual - Internal
Why we do it?	Because society says it is the right thing to do.	Because we believe in something being right or wrong.
What if we don't do it?	We may face peer/societal disapproval, or even be fired from our job.	Doing something against one's morals and principles can have different effects on different people, they may feel uncomfortable, remorse, depressed etc.
Flexibility	Ethics are dependent on others for definition. They tend to be consistent within a certain context, but can vary between contexts.	Usually consistent, although can change if an individual's beliefs change.
The "Gray"	A person strictly following Ethical Principles may not have any Morals at all. Likewise, one could violate Ethical	A Moral Person although

	Ethics	Morals
	Principles within a given system of rules in order to maintain Moral integrity.	perhaps bound by a higher covenant, may choose to follow a code of ethics as it would apply to a system. "Make it fit"
Origin	Greek word"ethos" meaning"character"	Latin word"mos" meaning "custom"
Acceptability	Ethics are governed by professional and legal guidelines within a particular time and place	Morality transcends cultural norms

Source of Principles

Ethics are external standards, provided by the institutions, groups or culture to which an individual belongs. For example, lawyers, policemen and doctors all have to follow an ethical code laid down by their profession, regardless of their own feelings or preferences. Ethics can also be considered as a social system or a framework for acceptable behavior.

Morals may also be influenced by culture or society, but they are personal principles created and upheld by the individuals themselves.

Consistency and Flexibility

Ethics are very consistent within a certain context, but can vary greatly between contexts. For example, the ethics of the medical profession in the 21st century are generally consistent and do not change from hospital to hospital, but they are different from the ethics of the 21st century legal profession.

An individual's moral code is usually unchanging and consistent across all contexts, but can change if the individual has a radical change in their personal beliefs and values.

Exercise 21. What is your opinion about the text above? Discuss it in the class

Exercise 22. Write 10 special questions to the text. Discuss them with your colleagues.

Exercise 23. Read and translate the text.

Careers in Medicine

Years ago a person who was interested in a medical career became a doctor, a nurse, or a dentist. The range of careers was limited. This is no longer the case. Technological advances have greatly increased the need for persons trained in a wide variety of health-related occupations. Now there are hundreds of jobs and professions in the health field. One can work in a hospital, caring for the sick and injured; or one can become a public health worker, trying to prevent illness through education campaigns. There are jobs for those who like people and jobs for those who prefer the solitude of scientific experimentation. The opportunities are so vast that anyone interested in pursuing a medical career can find something appealing and suitable.

The training required for the various occupations differs. It is not always necessary to spend as much time preparing for a medical career as a doctor must. For some careers, no training is needed beyond secondary school. The necessary skills can be learned on the job. For others, a year or two of specialized education are required. Many of these related careers are called paramedical, indicating that persons working in these positions do not have the same role or medical background as a doctor.

One familiar medical career is nursing. Nurses work in hospitals and in doctors' offices. They join public health teams and care for bedridden patients in their homes.

Becoming a nurse does not require as many years of study as becoming a doctor, but one must be equally dedicated. Caring for sick people demands great patience and a lot of work. Nurses work long days, often on irregular shifts or during the night.

Depending on the training, a nurse may be a professional nurse, also known as a registered nurse (R, N,), or a licensed practical or vocational nurse (L.P.N. or L.V.N.). Registered nurses may have completed a full college course (degree) or a two-year course (diploma). Vocational or

practical nurses complete a specialized training course, usually one year long. A professional nurse has the major responsibility for a patient's care, following the physician's instructions. She is assisted in her duties by nurses with less training, who comprise the nursing team. Together they perform such tasks as administering medicine, assisting with blood transfusions, preparing patients for surgery, changing patients' surgical dressings, and making routine checks of patients' vital signs.

Orderlies and nurse's aides are often the unsung heros of hospital care. They may he students working while they pursue further training, or professionals at their trade. They move patients, assist at procedures, and generally help with patient care and comfort, often doing unpleasant and demanding tasks.

A number of newer professionals have merged to join the health care team. Nurse practitioners (N.P.'s) are nurses who have taken a year (or more) of advanced training to enable them to work more directly in primary care areas such as gynecology, allergy and family practice. They work in close collaboration with physicians but are independently licensed under state nurse practice laws.

Certified Nurse Midwives (C.N.M.'s) have taken special training to care for normal pregnancy and routine delivery. They work in collaboration with obstetricians.

Physician Assistants (P.A.'s) are not nurses at all. Many were medics in the armed services. They are awarded a certificate to practice under the direction of an M.D., and perform many functions, including surgical assistance and providing primary care in clinics.

The jobs of the doctor and nurse are also made much easier by the work performed by laboratory technicians. These specialists have training in medical technology. They analyze blood, urine, and tissue specimens from patients, providing valuable information to doctors to help with their diagnoses. Lab technicians use many of the tools of modern medical science, particularly the microscope. Laboratories are usually run by pathologists with specialized training in the science of disease.

Advanced study in physics, chemistry, biology, pathology, parasitology, and other essential sciences is required of laboratory technicians. Others who study these same subjects become scientists engaging in medical research. There are hematologists who study blood and virologists who study viruses. Endocrinologists explore glandular malfunctions while geneticists do research on genetic reproduction. A

relatively new science is biomedical engineering which makes use of computers. All these scientists are engaged in improving the medical techniques available to mankind.

Other technicians who help make medicine a more sophisticated science today are electrocardiograph and electroencephalograph technicians. The electrocardiograph machine, also known as the ECG or EKG machine, records the movements of the heart. It is used to diagnose heart disease. The electroencephalograph machine or EEC measures brain waves and helps brain specialists detect such problems as epilepsy and stroke. Both machines are complicated pieces of equipment requiring the skills of technicians with special training.

X-ray technicians, trained in radiology, operate X-ray machines to take pictures of the bones and inner organs of the body. They also administer any high energy radiation treatment prescribed by a radiologist.

A new and related field is nuclear medicine, which uses radioactive isotopes to locate problems. Nuclear medicine technologists inject an isotope into the blood stream, tissue, or organ and image its pattern of distribution with a scanner. A Nuclear Medicine Specialist (M.D.) then interprets the patterns.

Many of these people work primarily in hospitals. Hospitals are very complex institutions requiring the skills of countless workers, trained in a variety of occupations. In addition to the doctors, nurses, and various technicians, there are trained therapists who rehabilitate patients after an illness. Physical therapists use massage, heat, and exercise to help patients regain the use of their limbs. Occupational therapists use various crafts with patients who must remain hospitalized for a long time. There are medical librarians, records technicians and medical social workers who provide assistance to patients and their families during their readjustment period following an illness. Dietitians and nutritionists play important roles in hospitals and other institutions, assuring that nutritious food is served to patients and staff and sharing the principles of good nutrition with the community. These are only a few of the employees who must be coordinated by the hospital administrator in order for a complex modern hospital to function smoothly.

Other medical professionals and paraprofessionals help people maintain good health and recover from illness. Trained pharmacists prepare prescription drugs after they have been licensed. Dentists clean

teeth and fill cavities with the assistance of dental hygienists. Technical writers and medical illustrators help prepare medical guidebooks and other printed materials. Health educators work through public health departments to educate communities regarding good health practices.

These and other trained personnel help make the physicians jobs easier and allow them to provide the most comprehensive medical care available to patients. The field of medicine today is as advanced as it is in large measure because of the support services provided by these individuals.

Exercise 24. Discussion.

1. Are there more or fewer health-related careers today than there used to be? Why?
2. Do all careers in the health field require as much training as that needed by doctors?
3. Where can one work as a nurse?
4. How does an L.P.N. or L.V.N. differ from an R.N.?
5. What are some duties of the nursing team?
6. How does the job of a Nurse Practitioner differ from that of a nurse?
7. What nursing degree is required to become a Physician s Assistant?
8. What do laboratory technicians do?
9. Who runs most laboratories?
10. Name some branches of science in which research is conducted.
11. How is an electrocardiograph machine used to help physicians with their diagnoses? An electroencephalograph machine?
12. What is the purpose of an x-ray?
13. Explain how a radioactive isotope is used to diagnose illness.
14. Who assists a patient who has just had a leg amputated to learn how to function without the leg?
15. What techniques does an occupational therapist use?
16. What employee assists a patient to readjust to his community after an illness?
17. What else may a dietition do besides planning menus in a hospital?

18.   Who is responsible for assuring that a hospital runs smoothly?
19.   What person is trained to fill prescriptions?
20.   What kind of assistance do dental hygienists provide?

Exercise 25. Match each of the careers in the left column with the appropriate description of the duties performed in the right column.
1.   Registered nurse
2.   Medical social worker
3.   Dietitian
4.   Lab technician
5.   Nuclear medical technician
6.   Health educator
7.   Dental hygienist
8.   Physical therapist
9.   Health administrator
10.   Hematologist

a. Plans menus for hospital patients and staff,
b. Supervises patients' care
c. Makes a health institution run smoothly
d. Works through the public health department on disease prevention
6. Helps patients readjust to normal life after a hospital stay,
f. Analyzes blood and urine specimens
g. Specializes in study of blood
h. Uses radioactive isotopes to detect problems
i. Helps dentist with care of teeth
j. Helps patients to re-gain use of limbs

Exercise 26. Express your opinion.
Which medical career have you chosen? Why? What will your duties be?
Pretend that you are a hospital administrator with the task of staffing a new hospital. What medical personnel would you need, both professional and paraprofessional?

MODULE 10
PROFESSIONAL COMMUNICATION

Exercise 1. Communications are only effective if the receiver actually receives and understands the message the sender intends. Barriers to effective communications can arise for several reasons. Now try to determine the main barriers to communication.

Barriers to communication

The most common barriers are:

_____1 can affect communications in several ways. Most obviously, if the person sending and the person receiving the communication are not both fluent in the language used for the communication, whether written or oral, misinterpretations of the communication may occur.

Similar misinterpretations and lack of understanding can occur if the language used by the person sending the communication is too technical or academic for the person receiving it. Many businesses and functions within businesses have their own 2 _____, which is used fluently by those in the business or function, but not by those outside. Indeed, such jargon often uses words that have other meanings in everyday language.

_____3 in which a communication is made can affect its effectiveness. For example, if the atmosphere is strained, and the person receiving the communication is nervous, perhaps afraid for their job, they are likely to look for hidden meanings in a communication – and will often find one that is not intended.

_____4 to effective communications come in many forms. Some affect the ability of a person to communicate normally, but physical barriers also include factors in the environment that may interfere with the communication. Physical barriers include noise in a factory where a

meeting or conversation is taking place, interference on a telephone line and so on.

_____5 of a communication is frequently important to its effectiveness. Notification of a meeting or other event, for example, should be given in sufficient time for people to arrange to be present and to prepare for the event. If an organization must make a decision about action to be taken on Friday, a report containing the results of research which the organization needs to enable it to make that decision is of little use if it is not completed until the following Monday.

Exercise 2. People in business have to communicate with others in the same business organization and with people outside. Communications with people in the same business organization are called internal communications; those with people outside the organization are called external communications. Put the correct words in the boxes.

Internal and external communications
colleagues, suppliers, other organizations, other employees, managers, customers, subordinates, government bodies

Internal communications People within the business, such as:	
External communications People outside the business, such as:	

Exercise 3.

a) Do you know how people communicate? Read these two texts and find out four advantages and disadvantages of oral and written communications.

Oral communications

Whenever you speak to somebody, or somebody speaks to you, you are communicating orally. Oral means spoken, and speech is the most common method of communication. Most oral communications take place either face to face or over the telephone.

Although we talk to people every day, being able to communicate orally is a skill that must be learned and practiced. Using the telephone is more difficult than speaking face to face, and many people are

uncomfortable about making telephone calls, although this is becoming less so through the widespread use of mobile telephones.

One of the main problems with telephone communications is that when you talk to someone on the telephone, you cannot see their response or facial expressions. It is especially important, therefore, to listen carefully to what the other person is saying and the way they say it - their tone of voice and the words they use. However, technological developments such as videophones are overcoming this problem.

Oral communications are quick and direct between the person communicating the message and the person receiving it. They also offer an opportunity for discussion and for instant feedback to check that the content of the communication has been understood. The main problem with oral communications is that there is no permanent record.

While most oral communications are between individuals on a one-to-one basis, either face to face or at a distance (e.g. by telephone), there are times when it is appropriate for several people to communicate with each other at a meeting. Modern telephone conferencing facilities also mean that that it is possible for several people who may be at different locations to discuss matters over the telephone.

Written communications

The most common types of written communications are letters, written for external communications, and memos (short for memoranda), used for internal communications. Business letters and memos are more formal than the letters you write to your friends, although they serve the same basic purpose - to communicate a message.

An advantage of written communications is that they are permanent records of the communication. They can be referred to later if required, and read at leisure, which means that they can contain information that may take longer to digest and understand, such as figures and technical data. Pictures, tables, graphs and diagrams can also be included in written communications.

Other forms of written communications are used in business for various purposes. These include: reports, financial documents, advertisements, notices, customer and product in¬formation. Written communications should be:

• accurate - everything should be checked, including all facts, spelling and grammar

• clear - the person writing the message must know what they want to say. before they begin to write it down, and the person reading the document should be able to understand its content immediately

• simple - short words and sentences are more effective and have more impact than long ones

• complete - a document which leaves a message unfinished or leaves out a vital piece of information will fail in its purpose.

b) Find out four advantages and four disadvantages of oral and written communications from the texts. You may propose your variants too.

Exercise 4. As you know using information technology can improve the effectiveness of oral and written communications. Read the text and put the correct words from the box in the text.

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network, personal computers, mobile telephones, tool, fax machines, information, Internet, modem, telephone line, communications

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Communications and information technology

Advances in information technology over recent years have led to radical new forms of communication. These include:

• _____1 – which transmit written text, graphics, charts and photographs quickly anywhere in the world

• _____2 – which can be carried by people at all times so that they can keep in touch with their place of work

• _____3 with modems and software for sending e-mail, which may consist of text, graphics and even sounds, depending on the capabilities of the sender's and receiver's computers.

Businesses with several computer terminals can link these to a _____4 or intranet, so that each computer can exchange _____5 with the others and even access information held on their hard drives. Employees' home computers may be networked to their employer's internet so that they can communicate with, and access information stored on, computers at their workplace, using a _____6 and telephone line.

The _____7 is a worldwide network of high-speed computers permanently linked to provide and exchange information. Anyone with a personal computer and a modem connected to a _____8 can connect to the Internet via an Internet Service Provider. The number of computers connected to the Internet is vast and growing daily, as is the amount and

variety of information that can be obtained. The Internet is an invaluable _____9 for businesses, which can use it for _____10, marketing their products, providing customer and technical support, inviting customer feedback and so on.

Exercise 5. Look through the list of technological inventions in the field of communication. Match the advantages and disadvantages to each invention and put your variants in the table. Some may be used more than once.

The list of advantages and disadvantages
1)   easy to use
2)   not everybody can afford one
3)   access to all kinds of information
4)   may lose social skills/become isolated
5)   instant information about world issues
6)   people may ring at inconvenient time
7)   can be contacted at any time
8)   children may access unsuitable information
9)   faster than sending letters by post 10) poor reception in certain areas

Technological inventions	Advantages	Disadvantages
the Internet		
e-mail		
radio/television		
mobile phone		
fax machine		
Telephone		

Exercise 6. The phone is a very useful business tool for immediate communication. But making a phone call is not always easy – especially if you don't know the person on the other end of the line very well. How comfortable are you speaking English on the phone?

Remember that sounding polite and helpful doesn't just depend on the words you use, but the way you say them and also if you are talking to someone face-to face on your body language. Basic business phone

language, very much like small talk, consists of constantly repeated expressions with little variations.

The telephone is being used more and more as a way of communicating. It's cheaper than face-to-face meetings, more convenient and saves time. Sometimes the only contact the customer has with your place of work is the telephone and their first impression is very important. As far as that caller is concerned your voice is the voice of a company or organization.

Make a list of all the things that annoy you when you telephone an organization. Underline the sentences which mean you get annoyed when you phone.

You probably get annoyed when:
• no one answers the telephone.
• you're not greeted and you don't know if you've got the right number.
• no-one tells you that you're being transferred and the telephone goes dead.
• the other person just answers 'yes' or 'no' and doesn't give enough information.
• the other person doesn't listen properly.
• the other person talks too much.

Exercise 7. You probably thought of other things too! It makes you realize that using the telephone isn't as easy as you think. When you deal with someone face-to-face you can get lots of information from their body language, facial expressions and gestures as well as hearing what they say and how they say it. On the telephone you might jump to the wrong conclusion!

Make up a list of golden rules for someone who needs to make telephone calls related to work. Did you include some of the following points?
• plan the call first.
• smile and introduce yourself (and your company if you are at work).
• say why you are ringing,
• agree any action.
• finish the call politely.

Exercise 8. Read the following words in the boxes and match them to their meanings.

webcam	videophone	mobile phone, mobile (BrE)/ cellphone, cellular phone, cellular (AmE)
public telephone/payphone		
extension	pager	WAP phone: (WAP - wireless application protocol)
cordless phone, cordless		

1. A phone you can take with you and use anywhere.
2. A mobile phone with access to the Internet,
3. Phone in a public place operated with money, a credit or a credit card.
4. An extension not connected by a wire, so you can use it around the house or in the garden.
5. One of a number of phones on the same line, in a home or office.
6. Allows you to receive written messages.
7. A camera attached to a computer and phone line, so two people talking on the phone can see each other.
8. A special phone with a screen so you can see the other person.
Note: Webcams and videophones enable videoconferencing: holding a meeting with people in different locations

Exercise 9. Read the following text and put the correct expressions in it.

dial, phoning scenario, switchboard, direct line, keypad, dialling, engaged tone (BrE)/busy tone (AmE), wrong number, hang up, get through, extension, operator, put through, transfer, cut off, voicemail

 1_____
_. You want to phone someone in a company. You pick up the phone. You hear the 2_____ tone and 3_____ the number on the 4_____. You don't know the person's 5_____ number, so you dial the number of the company's 6_____. One of these things happens:
 a. The number rings but no one answers.

b.   You hear the 7_____ because the other person is already talking on the phone. You 8_____ and try again later.

c.   You 9_____, but not to the number you wanted. The person who answers says you've got the 10_____.

d.   The 11_____ answers. You ask for the 12_____ of the person you want to speak to.

e.   You are 13_____ to the wrong extension. The person offers to 14_____ you to the right extension, but you are 15_____ - the call ends.

f.The person you want to speak to is not at their desk and you leave a message   on their 16_____. You ask them to call you back or to return your call.

Exercise 10. Messaging can refer to sending faxes and e-mail or leaving voice messages and. One of the most important parts of any telephone call is taking messages. Most organizations have a form for passing on telephone messages. Use the following self-check to make sure that you have included all the important points. Underline Yes or No.

Taking telephone messages Have you included...
- who the message is for - the person's name? Yes No
- the date and time of the telephone call? Yes No
- the caller's name? (ask them to spell it out for you, if you're not sure) Yes No
- his/her company and telephone number? Yes No
- a brief summary of the message? Yes No
- any action needed, e.g. will the caller call back or should the person for whom the message is for call them? Yes No
- your name? Yes No

Exercise 11. Telephone answer machines are becoming more popular at work. Many people aren't very confident about using them. You could practice by leaving messages using a tape recorder. Rehearse the message in your mind a few times or write it down,

Remember you need to give:
• your name and telephone number.
• the date and time .
• the message – lots of people leave one but you could ask to be called back instead!

Exercise 12. Read the following text and correct the mistakes in the Ann's voice mail message after it.

If the person you want to speak to is not there, you may hear this:

You're through to the voicemail of Robert Smith. I'm not at my desk right now, but if you leave a message, I'll get right back to you. To leave a message, press1. To speak to the operator, please hold.

After you leave your message, you may hear this:

To listen to your message, press2.

After you listen to your message, you may hear this:

If you'd like to change your message, press3. If you'd like to erase your message, press4. Otherwise, please hang up.

Hi, Robert, this is Ann calling (1) _____ out of Spring Street in Vallas. It's very difficult to get hold (2) _____ to you. I phoned (3) _____ to you earlier, but your telephone (4) central (5) _____ placed me through to the (6) _____ bad telephone. Anyway, I'm calling (7) _____ to you to discuss the contract we were talking about in Frankfurt. I'll call (8) _____ further later or perhaps you'd like to ring (9) _____ to me here in Vallas on 00494078 91357. Bye for now.

Exercise 13. Read the following voicemail messages and complete each message using one of three verbs in the box.

phoned, faxed, corrected	Message 1. Hello. This is Cheryl. I _____ you about five times yesterday, but you were not in. Anyway, I _____ those figures you _____ me. OK, speak to you later.
explained, finished, wanted	Message 2. Hi, Peter. Anne here. I _____ to talk to you about the project meeting tomorrow, but you've obviously not there. The good news is we _____. Phase one on time. As I _____ I may be a little later for the meeting. So just go ahead and start without me. I'll join you about 10.
included, e-mailed, started	Message 3. Hi, this is John. Just to let you know, I _____ the report this morning and just _____ you the first part. Oh, I _____ the quarterly accounts in the report, too. Let me know what you think.
deliver	Message 4. Mr. Casred. It's Rudolf Tomad. I _____

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ed, talked, despatched	to our stock control manager about the consignment and he says we _____ the goods a week ago. The shipping agent says they _____ them this morning. So, problem solved!
booked, waited, tried	Message 6. Pete. It's me. Sorry, mate, I _____ everything, but head office say we can not have any more time. They say they _____ six months for the preliminary report, another six months for the feasibility study and now they want to see some results. Anyway, I _____ the conference room for three tomorrow. Give me a call when you get in. We need to talk.
Called expected discussed	Message 5. Hello, Mr. Casred. This is Ronald Poger from ABC limited. I _____ you a couple of weeks ago about an estimate for a contract in China. We _____ my client's requirements and, well, I _____ to hear from you last week. Could you give me a call on 028545 9685 as soon as possible, please?

Exercise 14. Look at these six voicemail messages and take notes. Which message is about:

	an order?			a deadline?	
	some figures?			a report?	
	a meeting?			a reminder?	

Exercise 15. Put the recorded message into the right order. The first and last parts are in the right place.
a) Hello. This is Patterson Meats,
b) but if you'd like to leave
c) for calling. I'm afraid
d) a fax, please do so
e) your call right, now.
f) after the tone, and I'll get back
g) Sylvia Wright's office. Thank you
h) I'm not able to take

i) a message or send

j) to you as soon as I can.

Exercise 16. Read the following statistics and match the following questions to the texts and try to answer them.

1.At the end of the 20th century 90% of the world's telecommunications were phone calls. According to Newsweek magazine, that figure will soon drop to less than 10% as we all switch to e-mail and other forms of digitally transmitted data.

2.Online retailerAmazon.com currently stocks 213 books on 'netiquette' or how to write .our e-mail. You can even buy a course on 'cyber-grammar'!

3.Communication experts repeatedly tell us that 60% of communical is how you look, 30% how you sound, and only 10% what you actually say.

If this is true, does it mean that phone calls are only 40% and e-mails only 10% elective?	
Are you getting more e-mail than phone calls these days?	
Is this all really necessary?	
Do you think the shift towards e-mail is a good thing?	
Is e-mail really that difficult?	

Exercise 17. . E-mail is electronic mail. You can send an e-mail to someone, or e-mail them. They will reply to our e-mail or e-mail you back. Now read the following words in the table and try to match these words to their meanings.

send and receive		bcc	
attach		delete	
forward		reply	
cc		reply to all	

1. send an answer to the person who sent an e-mail, and everyone who received a copy of it

2. send an answer to the person who sent an e-mail

3. get rid of an e-mail you don't want
4. send a copy to
5. send a blind copy to ... (the other people don't know you're sending this copy)
6. send an e-mail you have received to someone else
7. send a document, for example, a picture, with an e-mail
8. send all the e-mails you've written and receive all the ones that are waiting for you

Exercise 18. Which of the features in Exercise 17 would you use in each of these situations?
1. You are sending an e-mail to Anna and you want to send a copy to Boris without Anna knowing.
2. You receive a reply from Anna, and you want Peter to see it.
3. You get an e-mail from Denis, who has also sent copies to Lora and David, and you want to send the same answer to all three of them.
4. With the e-mail to Laura, you want to send another document.
5. You've written three e-mails. You want to send them, and read any that are waiting for you.
6. You receive two e-mails, but you don't want to keep them.

Exercise 19. Read the following suggestions for finding a job and, in pairs, discuss which ones you agree with and why.
• Contact your friends and see how they can help.
• Visit an employment agency and ask about available jobs.
• Look for the job that gives the best salary.
• Read the advertisement in the Business Section of your local newspaper and try to find a job that matches your skills, qualifications, and interests.
• Ask your parents of their colleagues to get you a job in the companies where they work.
• Discuss your goals and interests with your friends and make a plan for how to proceed.
• Talk to a counselor at the place where you are studying and ask for some advice.

Exercise 20. In pairs, practice making suggestions about how to start job hunting. Use the phrases in the box to help you.

I think it's time to start. . .	We need to think about where . . .
Maybe we should begin by . . .	I suppose we should think about. . .
Let's go see . . .	We could find out about available jobs. . .
Why don't we read ...	I suggest we start by...

Exercise 21. In pairs, discuss these questions.

1.   How many times have you had a telephone conversation in English?

2.   What were the circumstances of the last English telephone conversation that you had?

3.   What do you find especially difficult or easy about talking by telephone in English?

Exercise 22. Read and complete each space in the telephone conversation with the letter of the correct phrase from the box.

a. Is three o'clock okay for you?

b. Can I ask why you are calling?

c. See you on Thursday,

d. May I ask who is calling, please?

e. When would you like to come in?

Martha: Good morning. Can I speak to Mrs. Mills, please?

Personal Assistant: (1) _____.

Martha: My name is Martha Willis. I'm a student at the university.

PA: I'm afraid Mrs. Mills is in a meeting right now. (2) _____.

Martha: I need some advice on finding a job. Can I make an appointment to see her?

PA: Yes. (3) _____.

Martha: On Thursday afternoon if she is free.

| PA: | Let me check. Yes, that should be alright. |

(4) _____.

| Martha: | Yes, it is. |
| PA: | Fine. So, that's three o'clock on |

Thursday the 15th.

| Martha: | Yes. Thank you. Oh, and can you also include |

my friend John Jones?

PA:	Yes, that's no problem. (5) _____.
Martha:	Thank you. Goodbye.
PA:	Goodbye.

Exercise 23. The following words or phrases are commonly found on resumes. Categorize them in the chart below. Then add two more items in each section.

high school diploma	theater and film
efficient	fluent in French
familiar with Microsoft Office	hard-working
swimming	B.A.
competent in conversational Spanish	independent
diploma in computer science	knowledge of the Internet

Personality	precise, energetic
Skills	knows how to prepare business proposals
Qualifications	diploma in marketing
Hobbies Interests	mountain biking, piano

Exercise 24. In pairs, combine verbs from box A with phrases from box B to form appropriate collocations. Some verbs and phrases may be used more than once.

A	make		proofread		short-list
	submit	apply for		fill out	
	follow		leave		list
B	a section blank		the same steps		your
	abilities and skills		candidates		a job
	the application form		your application		
	decisions	instructions		your most recent	
	jobs				

Exercise 25. Read and complete the text with the correct words.

When you (1) _____ for a job, you are usually asked to (2) _____ an application form as well as your resume and a cover letter. Companies like to have standardized forms containing information about candidates. This makes comparison simpler and also makes it easier for a company to (3) _____ candidates for interview. It is very important that you (4) _____ all your abilities and skills in the spaces provided.

Remember, this is an employer's first impression of you so it is very important that you (5) _____ the form accurately. Read the form very carefully and answer each question honestly and accurately. Show employers that you are able to (6) _____ instructions. Answer all questions as precisely and concisely as you can. Do not (7) _____ any sections blank. If a question does not (8) _____ to you, simply write "not applicable." Proofread your application before you turn it in.

Exercise 26. Preparing your resume

Read the following statements about preparing a resume and write whether you agree or disagree with each one. Then discuss your opinions in pairs.

When preparing a resume, you should.
(a) always give your age and marital status.
(b) provide a current address and phone number.
(c) always use your friends as references.
(d) list all your employment experience.
(e) always include copies of personal references.
(f) use a reliable, non-gimmicky e-mail address.

Exercise 27. Read the steps for preparing a resume and number them in the best order. The first one has been done for you. Then check your answers in pairs.

( ) Include a brief outline of your hobbies and interests.

( ) Provide the names of three references who can be contacted by a prospective employer.

(1) Include your name, and current address, e-mail address, and telephone number(s).

( ) Outline your educational history starting with your most recent studies.

( ) Include other training and courses that you have taken.

( ) List your work experience starting with your most recent employment.

Exsercise 28. Study the key words and word-combinations.

processed – обробляти;
important – важливо;
personal data – особисті дані;
education – освіта;
qualifications – кваліфікація;
marital status – сімейний стан;
nationality – національність;
academic career – академічна кар'єра;
grades – оцінка;
work experience – досвід роботи;
skills – навички;
computer software – комп'ютерні програми;

Exercise 29. Study how to write a resume.

Nowadays, employers tend to receive thousands of applications for a job as soon as it is advertised on the job market. Therefore it is vital that your letter should stand out from the thousands of CVs and letters that people are going to send. The first impression is always the most important one, therefore you need a good and well- structured CV in order to attract the employers' attention. Here are a couple of tips about how to write a good CV when applying for a job in the UK or in Ireland.

Presentation

An employer has very little time to spend on your application. The most important thing is that your CV is clear. Your CV has to be word processed. It immediately shows that you can work on word processors. The CV should be between one or two pages long. Don't be scared to space it out, never condense everything onto one page otherwise it will look messy. Since most employers have very little time to spend on each CV, they tend to skim read what you have written. It is therefore better to start by what is most important and work your way downwards from what is important to what is not so vital.

The structure of a CV must follow a certain order.

1. Personal data

First of all, you have got to introduce yourself: full name, address, date of birth. If you want, you can add your phone number, marital status and nationality. Even if this is not compulsory, this might be important for the type of job for which you are applying. For example, if you are applying to an international company that requires knowledge of a language as a native tongue then it might be useful to mention your nationality. If there is anything that you would feel that is important to mention, you can do it here.

2. Education and qualifications

This part of the CV is one of the most important because it gives the employer an insight into who you are, through your academic career. The trickiest part of mentioning qualifications is to try and find the equivalent in English. This is not always easy as the diplomas in the education system vary from country to country. The best thing to do is to write the original name of your qualification along with the equivalents in English in brackets. Grades can also be a problem.

3. Work experience

This section can be divided in various sub-sections especially if you have got a lot of experience (present post, previous employment, voluntary work). Don't be afraid to describe the tasks that you had to do in your different jobs, especially if these are relevant to the job that you are applying for.

4. Skills

In this section, you can put down all the practical things that you can do that might be useful for the job: driving licence (always say clean driving licence), knowledge of languages and computer software.

5. Interests

Of course, the employer is not going to hire you because you have the same hobbies as him/her but this section helps him/her get a better idea of what kind of person you are. However, you should remain brief.

6. References

It always looks good to put down the names of two people who have agreed to provide references. Ideally, one should be academic and the other from one of your previous job(s). Always give the name and title of your referee.

GUIDELINES TO WRITE A CURRICULUM VITAE

If you were interested in a summer position abroad, a curriculum vitae would be the appropriate document you will send to your targeted employer. A curriculum vitae (CV) represents your personal and working history.

It differs from the traditional U.S. resume in that it could be (and more than likely will be) more than one page. There is no need to send your CV in traditional resume paper; plain white bond paper would be enough. You have the freedom to choose your margins and your font style, but always remember that it should look very professional.

The following is a list of information that should appear in your CV:

• Photo

• Personal details such as age, gender, nationality, place and date of birth and marital status

• Address, phone number (s) and e-mail (s)

• Education (including in some cases high school, undergraduate, graduate and post-graduate)

• Study abroad

• Thesis or Dissertation Title and Advisor

• Graduate fieldwork

• Education and/or Professional Awards, Honors (include in this section Grants and

• Fellowship appointments)

• Research Experience

• Work Experience

• Skills

• Publications and Academic or Professional Presentations

• Thesis or Dissertation (when applicable, with a brief description of the topic)

- Professional Licenses and Certifications
- Language Skills
- Professional Memberships
- Extracurricular Activities (include community involvement)
- Interests (be sure to include traveling as it relates to the country)
- References

STRUCTURE OF A CURRICULUM VITAE

Curriculum Vitae

In other countries is common to see the phrase CURRICULUM VITAE written in the center of the page

Personal Information:

Full Name and Surname

Date of Birth (using the following format: day/month/year)

Gender (particularly if you have an unusual or unisex name)

Place of Birth

Nationality and/or Citizenship (if you are not a citizen of the country you are applying to, you need

to inform your potential employer of your visa situation).

Marital Status

Address

Telephone

Fax

E-mail

Education:

Years- Discipline Degree- Law School's name, Location (city, state or country)

• add academic awards

• add any subjects taken relevant to the targeted employer

Years- Discipline Degree –Undergraduate School's name, Location (city, state or country)

Years- Discipline Degree -High School's name, Location (city, state or country)

Years- Discipline Degree -Middle School's name, Location (city, state or country)

Years- Discipline Degree -Elementary School's name, Location (city, state or country)

Additional training OR Additional Education OR Additional Courses OR Additional

Certificates or Diplomas (any of this titles, choose the one that applies to your background).

Year (s)-Name of the institution, degree received, Location (city, state or country)

Conferences, Courses and/or Seminars:

Year (s)-Name of the institution, Course, Seminar or Conference's name, Location (city, state or

country)

List all of the ones you attended and/or participated.

Languages Skills:

List languages and level of proficiency, orally and written ability. Mention any language certificates

or degrees you might have.

• If you are fully bilingual, say "Fluent English and French (written and spoken).

• If you are not fluent in French but can get by, say "English, French.

• If you only speak English, it would probably be better to leave this section out.

Technical and Specialized Skills:

List all the computer programs you feel comfortable using. If applicable, list how many words per

minute are you able to type.

Awards, Honors and/or Distinctions:

List all awards and honors you achieve throughout your life, in ascendant chronological order.

Work Experience:

Years- Company Name, Division, Location (city, state or country)

Position or Title. Brief explanation of your duties, projects and activities in each job.

Professional Memberships:

Years- Name of the association, Location (city, state or country), Title (if applicable)

Other Categories: (only if applicable)

Teaching Experience: Years- Name of the Institution, Location (city, state or country)

Publications: List published articles, books, etc.

• Description of Thesis or Dissertation, Papers Written, Publications

Community Service or Involvement/Volunteer Work

Travel and Summer Abroad

Academic Presentations and/or Lectures

References

Writing a good CV, Curriculum Vitae Tips

Your CV will look far more attractive if you can convince the employers that you have the qualities they require. Your CV could be your ticket to an interview. Think about what particular employers want, and how you will be an asset to their company. On average an employer spends two minutes reading a CV, so avoid long detailed paragraphs. The employer may only read the first page, or even the first few paragraphs to get a feeling of who you are and what you can do for them. This means that the most important information should at the top of your CV. Make your CV clear, with a simple yet easy to follow layout, showing all the important facts about your skills, employment history and education. You should target your CV at every specific job you apply for. However you should send a more general CV to a recruitment agency which can be sent to a variety of employers.

Layout Guidelines (up to 2 A4 pages of attractively presented information is standard):

1. The first thing is the document title, Curriculum Vitae, followed by your name. This should be in bold with a lager font, but not too big.

2. Your address, contact details should be neatly presented, with date of birth, nationality and marital status also possible here.

3. Brief Personal Profile: This will be about 3 to 4 lines of text giving a brief overview of your key skills and attributes, and perhaps your objective regarding such a position. Be concise, try to appear interesting and professional to the reader. It will encourage them to read on.

4. Work experience (employment history) starting with your current or most recent job first, then go backwards through your career. State the company name, job title and the period you worked there. Begin by listing your duties and responsibilities. Be specific and detail only what is relevant to the new position (up to 5 or 6 duties). List specific achievements such as finishing a job/project ahead of schedule, or learning a new skill. List any industry training and qualifications you gained while in that employment. Employers like to see employees who learn and respect new skills. If you are a graduate, you should list some work experience. This can show that you have worked in a company and can be a team player.

5. Education: Briefly list your school qualifications, college certificate/diploma and university degree giving dates, location and exam results. Again start with your highest level or most recent training first, then go backwards through your education.

6. Additional skills: List your important everyday skills such as some IT skills, programs used, professional skills, languages. Perhaps provide some evidence of where you have used them.

7. Interests: Employers are usually more interested in activities which require you to show team commitment or personal initiative and drive.

8. References/Referees: Write 'References available on request' if you prefer that the employer asks your permission before writing or ringing them up. Referees can be personal or professional, though professional referees are much better.

9. Do not expect to produce a great looking CV at your first attempt. You may need to make a few drafts. Make sure your grammar and spelling are correct. Make sure the font and style is the same throughout keeping it consistent. Microsoft Word contains a variety of CV templates that ensure details are presented clearly and effectively. Show your CV to someone whose advice you trust and listen to what they have to say. Welcome constructive criticism. Print your CV using a laser printer on good quality paper. When sending CVs via email, it's important to include them as attachments rather than in the body of the email.

10. Now that you've created a good CV, you need an equally good quality covering letter to convince the employer to look closely at your CV.

that ensure details are presented clearly and effectively. Show your CV to someone whose advice you trust and listen to what they have to say. Welcome constructive criticism. Print your CV using a laser printer on good quality paper. When sending CVs via email, it's important to include them as attachments rather than in the body of the email.

10. Now that you've created a good CV, you need an equally good quality covering letter to convince the employer to look closely at your CV.

Exercise 30. Write your own CV (resume). Discuss it with your colleagues.

Exercise 31. Learn how to write a cover letter.

COVER LETTER

Prepare a cover letter every time you submit your resume, whether you are responding to an advertisement, following up an employer cold call or pursuing a lead from a friend.

WRITING A COVER LETTER

Before you begin to write

Every cover letter requires planning and organizing. Prepare answers to each of these questions:

Why am I writing this letter? (focus statement)

I am writing this letter to.....

What do I want to happen as a result of this letter? (outcome statement)

I want....

Whom am I writing this letter to? (reader's perspective)

Look at the letter from the point of view of the reader.

Writing the Letter

Prepare a personalized cover letter for each job. Target the letter to ensure that the needs of the employer are met. This can be accomplished by paraphrasing or incorporating some of the terms or words from the ad or your telephone call into your letter.

Type your cover letter unless otherwise specified. It must be free of grammatical, spelling or typing errors. Never cross out, white our or leave in errors. Do not make use of abbreviations. Remember to include

your return address, your telephone number, the date and the employer's address.

The cover letter is a reflection of you. Make a positive first impression.

PARTS OF THE COVER LETTER

Reference Line

Bold and centre the position title, where you saw the ad and the date. For example:

<div align="center">

Sales Position

Winnipeg Free Press, Day, Month, Year

</div>

Salutation

Try to find out the name and gender of the person who will be reviewing your resume.

Be sure you spell the name correctly. Use a colon (:) after the salutation. If you are unable to find out the name, avoid the use of "To Whom It May Concern" or "Dear Sir /Madam". Just go to the first paragraph of your letter.

Paragraphs

Keep them short – generally no more than three sentences each. Long paragraph will be skimmed over and the message may be lost.

Opening Paragraph

This is your chance to make a great first impression. Use this paragraph to set the tone and deliver the message. Make it fresh and interesting. A good strategy is to mention something favorable that you know about the company.

If you haven't used a reference line, the first paragraph should clearly state the position and where you heard about it. When the following up leads from friends, ask if you can use their names. If you are responding to an advertisement in the newspaper, state the name of the paper and the date of the advertisement. Follow-up letters to employer calls will include a reminder of the initial call either to them of the office support staff you directed you to send the letter.

Middle Paragraph

These paragraphs should answer the question, "Why am I an excellent candidate for this position candidate for this position?" Refer to your calling card and resume. Highlight those strengths (education, experience, volunteer work, skills) which specifically relate to the job. Reflect back

some of the words, terms or skills that were mentioned in the job posting or newspaper advertisement.

Final Paragraph

The final paragraph is your chance to leave a positive impression. It should highlight your desire to meet with the person to talk about employment opportunities and to emphasize that you would like to be considered for an available position now or in the future. Be sure to provide for follow-up by mentioning your phone number or indicating a date you will call.

The Closing

Sign the letter with "Sincerely". Be sure to sign your name. Indicate an enclosure in the lower left hand corner.

Follow-Up

Call within a week after sending your resume to make sure the employer received it. This will allow you a means of reviewing your qualifications with the employer and reiterating your interest in present or future employment opportunities.

Continue to follow-up by phone on a regular basis. This will ensure you and your skills are remembered.

Cover letter tips.

When writing your cover letter (and resume), keep in mind that the reviewer is only interested in one thing; the facts. Do not think of your cover letter as an autobiography; it should be brief and to the point. The purpose of the cover letter and resume should be one thing – it should demonstrate that you meet or exceed the requirements listed in the job description. It should demonstrate that you're interested in the position, and that you are available to accept the position if offered. Additional information beyond this can be counterproductive as it dilutes the core purpose of the cover letter and resume.

When writing the cover letter, avoid negatives. A cover letter is not the place to explain why you left or are leaving an employer, why there are gaps in your employment dates, etc. These "negatives" are best delivered in person during the interview so that your personality and can counter them.

Try to avoid a salary history in the cover letter. Even if the position specifically asks for your salary history, providing this information will more likely to cost you a job than not. If the job ad specifically says that

resumes without a salary history will not be considered, give a historical salary range and state that your salary requirements are flexible based on the opportunity the position will provide.

Spend time thinking about the layout of your letter, and make it sure that it is easy on the eyes. It should be easy to scan the letter and have a logical progression. Keep in mind, the reviewer of your resume has 100′s (if not 1,000s) of cover letters and resumes to look at, therefore make it easy for him/her to find the information you want to highlight. Bunched up text in long paragraphs will frustrate anyone who has to review hundreds of resumes and cover letters a week. In addition to the layout, don't just repeat your resume. Your cover letter is not a summary of your resume, instead its an introduction of yourself and an argument for why you are the best candidate for their company and the specific position. Avoid the generic cover letter.

Try to be different. Be different and stand out. The goal is to demonstrate your written communication skills by writing a good cover letter – Cutting and pasting a phrase from a cover letter / resume book is not impressive.

Personalize your cover letter if possible. Your cover letter should be addressed to a specific person – avoid the "Dear Sir or Madam". Form letters insult the reviewer's intelligence and indicate that you, the writer, are broadcasting his/her resume to every employer in the area. Or you have not made an effort to learn more about the company. Generic/canned cover letters can lead to failure. Even if you do not know the name of the recipient, you usually can find a contact name at the company fairly easily. Go to their company website, and search the "about us" pages for names of individuals to address your cover letter and resume to. It takes a few seconds; however will make your letter stand out.

Exercise 32. Read the excerpts from two cover letters written by applicants for a job as a financial assistant. Consider the register of the excerpts and beside each one write formal or informal.

1.   Anyway, you can send me an e-mail at the above address. Or call any time. _____
2.   I enclose my resume and a completed application form. _____

3.   I wish to apply for the position of Financial Assistant advertised recently (Ref. 23456). _____
4.   Do you won, me to send o resume? I haven't prepared one yet, but, I guess it shouldn't take me too long. _____
5.   So, can I come over and see you this week? You see, I'd like to get things together as soon as I can. _____
6.   Since I graduated, I have been working with a small firm that arranges home loans. _____
7.   To the position of Financial Assistant I would bring up-to-date knowledge of computer programs used in financial analysis. _____
8.   I received a diploma in finance a couple of years ago and right now I'm working for a friend's business. _____

Exercise 33. Read the sentences and think about the function of the underlined linking words. Below each sentence, write the correct language function from the box.
        a) show a time relationship
        b) provide a reason
        c) offer additional information
        d) contrast two ideas
1.   I <u>also</u>, enjoy working with people and I would bring energy and enthusiasm to the position.
2.   <u>Since</u> I graduated, I have been working with a small firm that arranges home loans.
3.   <u>Though</u> I am a recent graduate, I have already had some experience working in finance.
4.   I have never worked for a large company and <u>so</u> this would provide a new challenge for me.

Exercise 34. Write a cover letter. Discuss the results with your colleagues. Correct the mistakes if there are any.

Exercise 35. Finally it's time for the interview. In pairs, discuss the questions.

1. When was the last time you attended an interview and what was it for?
2. How did you feel before, during, and after the interview?

3. How well (or otherwise) did the interview go?

Exercise 36. Complete the following sentences with a correct form of make or do.

1.　　　Sarah realized she _____ a mistake when she saw her friend's face.

2.　　　Tom _____ his best but he didn't get past the final interview.

3.　　　There are so many good candidates for the job that it's hard _____ a decision.

4.　　　Thank you very much. It has been a pleasure _____ business with you!

5.　　　We are going to have to work very hard if we want _____ a profit.

6.　　　Although Terry is a very good student, she hates _____ exams.

Exercise 37. Complete the following interview with appropriate questions.

1.　　　Q:
　　　　A: I graduated from college in September 2005.

2.　　　Q:
　　　　A: Yes, I have had some work experience. I worked for four months with Brown and Co. in their Finance Department.

3.　　　Q:
　　　　A: I have heard a lot about your company and feel that I could learn a lot if I worked here.

4.　　　Q:
　　　　A: I enjoy working with people. In my last position, I worked on a project with four other young people and we shared the responsibilities well.

5.　　　Q:
　　　　A: I would like to gain some experience and then go on to do an MBA.

6.　　　Q:

A: I speak Spanish and a little French. I am also quite competent with Microsoft Office and I plan to take some special computer courses for finance.

7.   Q:

A: Well, I have been told that I am quite fussy about details, but I think it is very important to be accurate, especially in matters of accounting and finance.

Exercise 38. Learn how to write research articles. Study the new vocabulary.

The structure of a research article

Research articles are typically divided into four main sections:

Introduction
Methods
Results
Discussion

This is sometimes called the **IMRaD** structure of articles.

The **Introduction** contains **background** information; in other words, it reminds the reader what is already known about the subject. It includes information about previous **studies**, and explains what has not been investigated previously. Finally, there is usually a statement of the objective, or purpose of the research (why they did it).

In the case of clinical research, the **Methods** section gives details of the people who were studied - the **participants** in the research. The method section also contains information about any **intervention** carried out, for example medication, advice, operations. It gives details of the **steps taken** in the study, how the participants were chosen, and includes the main things measured, such as blood levels. Finally, there is information about **statistical analysis**.

The **Results** section tells what was found, the **findings** of the study.

The **Discussion** section contains explanations, and claims for the importance of the study.

It may also list **limitations**, or parts of the study which were unsatisfactory, and suggest what research needs to be done in the future. There is usually a **Conclusion**, which is sometimes a separate section.

At the end of most articles, there is a short section called **Acknowledgements**. In this the authors thank people who have helped

them in their research. Finally, there is a list of **References** - the books and articles which the authors have used.

Objectives
Statements about objectives often contain the following verbs:
assess   We assessed whether ...
determine   The aim of our study was to determine whether ...
investigate We investigated the ...
evaluate   This study evaluated the ...

Main findings
The Discussion section usually begins with a summary of the main findings. This is related to the objective of the study. Typical verbs include:
show   We have shown that ...
confirm   Our study confirmed that   ...
provide evidence These findings provide strong evidence that...

If the results are less certain:
suggest   These results suggest that ...
and with negative results:
fail to   This study failed to show that...

Exercise 39. Read the eight extracts from an article in the British Medical Journal entitled 'Paternal age and schizophrenia: a population based cohort study'. Decide which section of the article each extract comes from. There are two extracts from each of the four sections.
Look at the text above again if you need more help.

1   People with older fathers were more likely to lose their parents before they reached the age of 18 years.
2   Using a large Swedish record linkage database, we investigated the association between paternal age and schizophrenia in offspring.
3   We used Cox's proportional hazards models to assess the influence of paternal age on psychosis.

4   Our cohort comprised *754,330* people bom in Sweden between *1973* and *1980* and still alive and resident in Sweden at the age of 16 years.

5   Our findings confirm an association between increased paternal age and schizophrenia in offspring, which remained even after we controlled for a wide range of potential confounding factors.

6   There is growing evidence that factors operating at different points in life contribute to an individual's risk of developing schizophrenia.

7   The main limitation of oui analysis is that ease ascertainment was based on people admitted to hospital only with diagnoses recorded on an administrative database.

8   Table I shows the characteristics of subjects in relation to the age of their father.

Exercise 40. Look at the research questions (1-4) and write a statement of the objective of each study, using an appropriate form of the verb in brackets. Look at the text above to help you.

1   Can calcium and vitamin D supplementation reduce the risk of fractures in postmenopausal women? (assess)

2   Does the way doctors dress influence patients' confidence and trust in them? (determine)

3   Is there a risk of herpes virus 8 (HHV-8) transmission by blood transfusion? (evaluate)

4   Is there an association between never being married and increased risk of death? (investigate)

Exercise 41. Now write a sentence about the main finding in each of the studies in the previous exercise, assuming a result as shown in brackets below. Look at the text above to help you.

1   (no)
2   (yes)
3   (yes)
4   (uncertain)

Grammar Section
Present simple

We use the present simple to talk about actions we see as long term or permanent. It is a very common and very important tense.

Here, we are talking about regular actions or events.

• They drive to the office every day.
• She doesn't come here very often.
• The news usually starts at 6.00 every evening.
• Do you usually have bacon and eggs for breakfast?

Here, we are talking about facts.

• We have two children.
• Water freezes at 0° C or 32° F.
• What does this expression mean?
• The Thames flows through London.

Here, we are talking about future facts, usually found in a timetable or a chart.

• Christmas Day falls on a Monday this year.
• The plane leaves at 5.00 tomorrow morning.
• Ramadan doesn't start for another 3 weeks.
• Does the class begin at 10 or 11 this week?

Here, we are talking about our thoughts and feelings at the time of speaking. Although these feelings can be short-term, we use the present simple and not the present continuous.

• They don't ever agree with us.
• I think you are right.
• She doesn't want you to do it.
• Do you understand what I am trying to say.

Present continuous

The present continuous is used to talk about present situations which we see as short-term or temporary. We use the present simple to talk about present situations which we see as long-term or permanent.

In these examples, the action is taking place at the time of speaking.

• It's raining.
• Who is Kate talking to on the phone?
• Look, somebody is trying to steal that man's wallet.

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• I'm not looking. My eyes are closed tightly.

In these examples, the action is true at the present time but we don't think it will be true in the long term.

• I'm looking for a new apartment.

• He's thinking about leaving his job.

• They're considering making an appeal against the judgment.

• Are you getting enough sleep?

In these examples, the action is at a definite point in the future and it has already been arranged.

• I'm meeting her at 6.30.

• They aren't arriving until Tuesday.

• We are having a special dinner at a top restaurant for all the senior managers.

• Isn't he coming to the dinner?

Present simple or continuous

The Present Simple is used for:

• regular actions or events

He plays tennis most weekends.

• facts

The sun rises in the east.

• facts known about the future

We leave at 8.30 next Monday

• thoughts and feelings about the time of speaking

I don't feel very well.

The Present Continuous is used for:

• the time of speaking ('now')

Shh, I'm trying to hear what they are saying .

• things which are true at the moment but not always

We're looking for a new flat.

• present plans for the future

We're having dinner with them next week .

Look at these examples :

• I don't usually have cereals for breakfast but I'm having some this morning because there is nothing else.

• I often cycle to work but I'm taking the car this morning because it's raining very hard.

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• I'm thinking about having my hair cut short but I don't think my husband will be very happy about it.

• My parents live in Washington but I'm just visiting.

Note how, in all these examples, we use the present continuous to talk about events which are temporary/limited in time and the present simple to talk about events which are habits/permanent.

Past simple

We use the past simple to talk about actions and states which we see as completed in the past.

We can use it to talk about a specific point in time.

• She came back last Friday.

• I saw her in the street.

• They didn't agree to the deal.

It can also be used to talk about a period of time.

• They were in London from Monday to Thursday of last week.

• When I was living in New York, I went to all the art exhibitions I could.

You will often find the past simple used with time expressions such as these:

• Yesterday
• three weeks ago
• last year
• in 2002
• from March to June
• for a long time
• for 6 weeks
• in the 1980s
• in the last century
• in the past

Past continuous

We use the past continuous to talk about past events which went on for a period of time.

We use it when we want to emphasize the continuing process of an activity or the period of that activity. (If we just want to talk about the past event as a simple fact, we use the past simple.)

• While I was driving home, Peter was trying desperately to contact me.
• Were you expecting any visitors?
• Sorry, were you sleeping?
• I was just making some coffee.
• I was thinking about him last night.
• In the 1990s few people were using mobile phones.

We often use it to describe a "background action" when something else happened.

• I was walking in the street when I suddenly fell over.
• She was talking to me on the phone and it suddenly went dead.
• They were still waiting for the plane when I spoke to them.
• The company was declining rapidly before he took charge.
• We were just talking about it before you arrived.
• I was making a presentation in front of 500 people when the microphone stopped working.

Past simple or continuous

Both the past simple and the past continuous refer to completed actions in the past.

Most of the time when we are talking about such actions, we use the past simple. This is by far the most common way of talking about the past.

• I only found out a few moments ago.
• I asked her but she didn't know anything.
• The company made 100 people redundant last year.

Only use the past continuous when you want to emphasize the continuity of the action.

• Everybody was talking about it all evening.
• They were really trying hard but couldn't do it.
• I was thinking about you the other day.
• Were you expecting that to happen?

When we use these two forms in the same sentence, we use the past continuous to talk about the "background action" and the past simple to talk about the shorter completed action.

• It was raining hard when we left the building.
• I was reading the report when you rang.
• He was going out to lunch when I saw him.
• The company was doing well when I last visited it.

Irregular verbs
All new verbs in English are regular.
• I photocopied the report.
• She faxed it to me.
• They emailed everybody about it.
• I googled my name and got more than 20 000 responses.

There are approximately 180 irregular verbs. You don't need to learn all of them because some of these are very rare but many others are very useful and you do need to know them.

What's the easiest way to learn them? Some people think you should learn a list 'by heart'. Others think you should not learn them at all – you will just gradually acquire them over time.

One useful method is to note down new irregular verbs as you meet them. It is useful to write these verbs (or any vocabulary you want to learn) in sentences and learn those rather than the individual word.

Which is easier to learn?
• stick stuck stuck
• I stuck the photo into my album.

Another technique is to classify the irregular verbs into 4 categories.

1. All forms the same
• set set set
• cost cost cost
2. Similar sound groups
• beat beat beaten
• eat ate eaten
• blow blew blown
• throw threw thrown
• drink drank drunk

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- sing sang sung
- speak spoke spoken
- wake woke woken

3. The second and third forms are the same.
- bend bent bent
- sleep slept slept
- spend spent spent
- bring brought brought
- buy bought bought
- teach taught taught
- have had had
- pay paid paid
- say said said

4. The "unclassifiables"
- come came come
- do did done
- go went gone
- show showed show

Present perfect

(Please note that British and American English have different rules for the use of this tense. The explanation and exercises here refer to British English. In American English, it is often acceptable to use the past simple in some of these examples.)

We use the present perfect when we want to look back from the present to the past.

We can use it to look back on the recent past.
- I've broken my watch so I don't know what time it is.
- They have cancelled the meeting.
- She's taken my copy. I don't have one.
- The sales team has doubled its turnover.

When we look back on the recent past, we often use the words 'just' 'already' or the word 'yet' (in negatives and questions only).
- We've already talked about that.
- She hasn't arrived yet.
- I've just done it.
- They've already met.

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• They don't know yet.
• Have you spoken to him yet?
• Have they got back to you yet?
It can also be used to look back on the more distant past.
• We've been to Singapore a lot over the last few years.
• She's done this type of project many times before.
• We've mentioned it to them on several occasions over the last six months.
• They've often talked about it in the past.
When we look back on the more distant past, we often use the words 'ever' (in questions) and 'never'.
• Have you ever been to Argentina?
• Has he ever talked to you about the problem?
• I've never met Jim and Sally.
• We've never considered investing in Mexico.

Present Perfect or Past Simple?

(Remember that British and American English have different rules for the use of the present perfect. The comments and the exercises here refer to correct grammar for British English. In American English, it is often considered acceptable to use the past simple in some of these examples.)

The past simple is used to talk about actions in the past that have finished. It talks about 'then' and definitely excludes 'now'.

The present perfect simple to look back on actions in the past from the present. It always includes 'now'.

These sentences are in the past with no connection to the present.
• I first got to know him 10 years ago.
• I started work here in 1989.
• I had too much to eat at lunchtime.
Now look at these same situations seen from the present.
• I've known him for 10 years.
• I've worked here since 1987.
• My stomach hurts. I've eaten too much.
We use time expressions like 'yesterday', 'ago', 'last year', 'in 1999' with the past simple.
• We spoke to him yesterday.

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• He came in a few moments ago.

• We made our last purchase from them over a year ago.

• She joined the company in 1999.

We use time expressions like are 'ever', 'never', 'since' with the present perfect.

• I've never seen so many people here before.

• Have you ever been more surprised?

• I've done a lot since we last talked about it.

Typical time expressions used with the present perfect in British English but often used with the past simple in American English are 'already', 'just', 'yet'.

• I haven't done it yet. (UK)

• I didn't do it yet. (US)

• I've just done it. (UK)

• I just did it. (US)

I've already done it. (UK)

• I already did it. (US)

We can use the time phrase 'for' with both forms, but with different meanings.

• I lived in Paris for a couple of years before I moved here.

• I've lived in Paris for a couple of years and still love it.

Past perfect

We use the past perfect simple to talk about what happened before a point in the past. It looks back from a point in the past to further in the past.

• I hadn't known the bad news when I spoke to him.

• I checked with the supplier and they still hadn't received the contract.

• She had already told him before I got a chance to give him my version.

• The company has started the year well but was badly hit by the postal strike.

The past perfect simple is often used when we report what people had said/thought/believed.

• He told me they had already paid the bill.

• He said he believed that John had moved to Italy.

• I thought we had already decided on a name for this product.

Used to

Used to do

We use 'used to' for something that happened regularly in the past but no longer happens.

• I used to smoke a packet a day but I stopped two years ago.

• Ben used to travel a lot in his job but now, since his promotion, he doesn't.

• I used to drive to work but now I take the bus.

We also use it for something that was true but no longer is.

• There used to be a cinema in the town but now there isn't.

• She used to have really long hair but she's had it all cut off.

• I didn't use to like him but now I do.

'Used to do' is different from 'to be used to doing' and 'to get used to doing' to be used to doing

We use 'to be used to doing' to say that something is normal, not unusual.

• I'm used to living on my own. I've done it for quite a long time.

• Hans has lived in England for over a year so he is used to driving on the left now.

• They've always lived in hot countries so they aren't used to the cold weather here.

to get used to doing

We use 'to get used to doing' to talk about the process of something becoming normal for us.

• I didn't understand the accent when I first moved here but I quickly got used to it.

• She has started working nights and is still getting used to sleeping during the day.

• I have always lived in the country but now I'm beginning to get used to living in the city.

Present perfect continuous

This tense is used to talk about an action or actions that started in the past and continued until recently or that continue into the future:

We can use it to refer to an action that has finished but you can still see evidence.

• Oh, the kitchen is a mess. Who has been cooking?
• You look tired. Have you been sleeping properly?
• I've got a a stiff neck. I've been working too long on computer.

It can refer to an action that has not finished.

• I've been learning Spanish for 20 years and I still don't know very much.
• I've been waiting for him for 30 minutes and he still hasn't arrived.
• He's been telling me about it for days. I wish he would stop.

It can refer to a series of actions.

• She's been writing to her regularly for a couple of years.
• He's been phoning me all week for an answer.
• The university has been sending students here for over twenty years to do work experience.

The present perfect continuous is often used with 'since', 'for', 'all week', 'for days', 'lately', 'recently', 'over the last few months'.

• I've been wanting to do that for ten years.
• You haven't been getting good results over the last few months.
• They haven't been working all week. They're on strike
• He hasn't been talking to me for weeks.
• We've been working hard on it for ages.
• I've been looking at other options recently.
• He's been working here since 2001.

Present perfect simple or continuous

Often there is very little difference between the present perfect simple and the present perfect continuous. In many cases, both are equally acceptable.

• They've been working here for a long time but Andy has worked here for even longer.
• I've lived here for 10 years and she has been living here for 12 years.

To emphasize the action, we use the continuous form.

• We've been working really hard for a couple of months.
• She's been having a hard time.

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To emphasize the result of the action, we use the simple form.

• I've made fifteen phone calls this morning.

• He's written a very good report.

Look at the difference in these examples.

• I've been reading this book for two months but I've only read half of it. It's very difficult to read.

• She's been trying to convince him for 20 minutes but she hasn't managed to yet.

• They've been talking about this for month and they still haven't found a solution.

When an action is finished and you can see the results, use the continuous form.

• The phone bill is enormous. You've been calling your boyfriend in Australia, haven't you?

• You're red in the face. Have you been running?

When you use the words 'ever' or 'never', use the simple form.

• I don't know them. I've never met them.

• Have you ever heard anything so strange in your life.

Past perfect continuous

We use the past perfect continuous to look back at a situation in progress.

• It was a good time to invest. Inflation had been falling for several months.

• Before I changed jobs, I had been working on a plan to reduce production costs.

• We had been thinking about buying a new house but then we decided to stay here.

We use it to say what had been happening before something else happened.

• It had been snowing for a while before we left.

• We had been playing tennis for only a few minutes when it started raining.

• He was out of breath when he arrived because he had been running.

We use it when reporting things said in the past.

• She said she had been trying to call me all day.

- They said they had been shopping.
- I told you I had been looking for some new clothes.

Going to

There is no one 'future tense' in English. There are 4 future forms. The one which is used most often in spoken English is 'going to', not 'will'.

We use 'going to' when we want to talk about a plan for the future.
- I'm going to see him later today.
- They're going to launch it next month.
- We're going to have lunch first.
- She's going to see what she can do.
- I'm not going to talk for very long.

Notice that this plan does not have to be for the near future.
- When I retire I'm going to go back to Barbados to live.
- In ten years time, I'm going to be boss of my own successful company.

We use 'going to' when we want to make a prediction based on evidence we can see now.
- Look out! That cup is going to fall off.
- Look at those black clouds. It's going to rain soon.
- These figures are really bad. We're going to make a loss.
- You look very tired. You're going to need to stop soon.

We can replace 'going to go' by 'going'.
- I'm going out later.
- She's going to the exhibition tomorrow.

Will - future

Some people have been taught that 'will' is 'the future' in English. This is not correct.

Sometimes when we talk about the future we cannot use 'will'. Sometimes when we use 'will' we are not talking about the future.

We can use 'will' to talk about future events we believe to be certain.
- The sun will rise over there tomorrow morning.
- Next year, I'll be 50.

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- That plane will be late. It always is.
- There won't be any snow. I'm certain. It's too warm.

Often we add 'perhaps', 'maybe', 'probably', 'possibly' to make the belief less certain.

- I'll probably come back later.
- He'll possibly find out when he sees Jenny.
- Maybe it will be OK.
- Perhaps we'll meet again some day.

We often use 'will' with 'I think' or 'I hope'.

- I think I'll go to bed now.
- I think she'll do well in the job.
- I hope you'll enjoy your stay.
- I hope you won't make too much noise.

We use 'will' at the moment we make a new decision or plan. The thought has just come into our head.

- Bye. I'll phone you when I get there.
- I'll answer that.
- I'll go.
- I won't tell him. I promise.

Going to or will

When we want to talk about future facts or things we believe to be true about the future, we use 'will'.

- The President will serve for four years.
- The boss won't be very happy.
- I'm sure you'll like her.
- I'm certain he'll do a good job.

If we are not so certain about the future, we use 'will' with expressions such as 'probably', 'possibly', 'I think', 'I hope'.

- I hope you'll visit me in my home one day.
- She'll probably be a great success.
- I'll possibly come but I may not get back in time.
- I think we'll get on well.

If you are making a future prediction based on evidence in the present situation, use 'going to'.

- Not a cloud in the sky. It's going to be another warm day.
- Look at the queue. We're not going to get in for hours.

• The traffic is terrible. We're going to miss our flight.

• Be careful! You're going to spill your coffee.

At the moment of making a decision, use 'will'. Once you have made the decision, talk about it using 'going to'.

• I'll call Jenny to let her know. Sarah, I need Jenny's number. I'm going to call her about the meeting.

• I'll come and have a drink with you but I must let Harry know. Harry, I'm going to have a drink with Simon.

Present forms for the future

We use the present continuous to talk about things that we have already arranged to do in the future.

• I've got my ticket. I'm leaving on Thursday.

• I'm seeing Julie at 5 and then I'm having dinner with Simon.

• He's picking me up at the airport.

• The company is giving everyone a bonus for Christmas.

In many situations when we talk about future plans we can use either the present continuous or the 'going to' future. However, when we use the present continuous, there is more of a suggestion that an arrangement has already been made.

• I'm going to see him./I'm seeing him.

• I'm going to do it./I'm doing it.

We use the present simple to talk about events in the future which are 'timetabled'. We can also use the present continuous to talk about these.

• My plane leaves at 6 in the morning.

• The shop opens at 9.30.

• The sun rises a minute earlier tomorrow.

• My plane is leaving at 8.30.

• The shop is closing at 7.00.

• The sun is rising at 6.32 tomorrow.

Will - other uses

Older textbooks often refer to 'will' as 'the future tense' and this has confused a lot of learners.

It is important to remember that when we talk about the future we cannot always use 'will' and that when we use 'will' we are not always talking about the future.

Here 'will' is clearly referring to the future.
- If I speak to her, I'll tell her about it.
- I'll probably visit Sue when I go to Oxford.
- Next birthday she'll be 32. Or so she says.

In these examples, however, 'will' is referring to events happening at the present.
- The car won't start.
- If that's the phone, I'll get it.
- Will you have another cup of coffee?

When we use 'will' referring to the present, the idea being expressed is usually one of 'showing willingness' or 'will power'.
- My baby won't stop crying. I've tried everything and I'm really exhausted.
- I am the boss. You will do as I say.
- I need quiet to write this but he will keep on talking to me. I wish he would leave me alone.

We use 'will' for requests, orders, invitations and offers.
- Will you give me a hand?
- Will you please take a seat?
- Will you have some cake?
- I'll help you.

We use 'will' to make promises or threats.
- I'll do it at once.
- I'll phone him back immediately.
- I won't forget this.
- I'll get my own back some day.

We use 'will' for habit.
- A cat will always find a warm place to sleep.
- My car won't go any faster than this.

We use 'will' for deduction.
- I expect he'll want us to get on with it.
- The phone's ringing. That will be Mark.

Look again at all of these examples of 'will'. They are all to do with the present or are 'timeless'.

Shall

We don't use 'Shall' very frequently in modern English, particularly in American English.

It is used to make offers and suggestions and to ask for advice.
• What time shall we meet?
• Shall we vote on it now?
• What dress shall I wear?
• Shall I open the window?

You only really need to know that about 'shall' in modern English. Read the rest of this only if you want to know more about how some older speakers still use 'shall'.

Formerly, in older grammar, 'shall' was used as an alternative to 'will' with 'I' and 'we'. Today, 'will' is normally used. When we do use 'shall', it has an idea of a more personal, subjective future.

• I shall go to see the boss and I shall ask him to explain this decision.

Notice that the negative of 'shall' can be 'shall not' or 'shan't' – though the second one is now very rare in American English.

• I don't like these people and I shall not go to their party.
• I shan't object if you go without me.

The Passive

We use the active form to say what the subject does. For example:
• I speak English every day at work.
• I repaired the flat tire on the car.

We use the passive form to say what happens to people and things, to say what is done to them. For example:
• English is spoken here.
• The car is being repaired.

We use the passive form when we don't know who did the action. For example:
• The car was damaged while it was parked on the street.
• The shirts were made in Turkey.

We use the passive form when what was done is more important than who did it. For example:
• It was approved by Gerry last week.

• I was informed by the Human Resources Manager only two days ago.

The -ing form
The –ing form can be used like a noun, like an adjective or like a verb.

• Smoking is forbidden.
• I have a long working day.
• I don't like dancing.

When it is used like a noun it may or may not have an article before it.

• Marketing is a very inexact science.
• The marketing of the product will continue for a few months yet.

It can also be part of a 'noun phrase'.

• Speaking to an audience is always stressful.
• Swimming after work is very relaxing.

In formal English, we would use a possessive with the –ing form. In informal English, many people do not.

• I'm angry about his missing the meeting.
• Do you mind my coming?

As an adjective, the –ing form can be used before a noun.

• I was met by a welcoming party at the airport.
• Let's go to the meeting room.

The –ing form is used after prepositions.

• Before leaving, you need to speak to Sarah.
• After discussing it with her, I've changed my mind.
• Instead of feeling sorry for yourself, do some work for charity.

Notice that when 'to' is used as a preposition, it is followed by the –ing form.

• I don't object to working this Sunday.
• I'm looking forward to seeing him again.
• I'm used to working long hours.

There are many verb + -ing combinations. Here are some common ones:

• I admit telling her.
• I appreciate having the raise.
• I avoid speaking to him.

• I consider blowing your nose in public to be wrong.
• I delayed coming until the last possible moment.
• He denied telling her.
• I detest going to parties.
• I enjoy dancing.
• I feel like having a party.
• I've finished writing the report.
• I've given up going to the gym.
• I can't help thinking about it.
• I can't imagine ever leaving this company.
• I don't mind doing that.
• He put off talking to her as long as he could.
• I can't stand drinking beer.

Some verbs can be followed by either the infinitive or –ing form but with different meanings. Here are some common ones:

• I stopped smoking last month. (I no longer smoke.)
• I stopped to smoke a cigarette. (I stopped what I was doing and had a cigarette.)
• I remember telling him. (A memory of the past.)
• I must remember to tell him. (Something to remember for the future.)
• I'm interested in finding out more details. (Interested about the future.)
• I was interested to read his report. (Interested in the past.)

Some verbs can be followed by either the infinitive or –ing form but with the same meaning. Here are some common ones:

• I love to go shopping.
• I love going shopping.
• I'm afraid to fly.
• I'm afraid of flying.
• I started to learn English 5 years ago.
• I started learning English 5 years ago.

Asking questions 1
The basic rule for asking questions in English is straightforward: Invert the order of the subject and the first auxiliary verb.
• It is snowing. = Is it snowing?

• He can speak German. = Can he speak German?
• They have lived here a long time. = Have they lived here a long time?
• She will arrive at ten o'clock. = Will she arrive at ten o'clock?
• He was driving fast. = Was he driving fast?
• You have been smoking. = Have you been smoking?
If there is no auxiliary, use part of the verb 'to do'.
• You speak fluent French. = Do you speak fluent French?
• She lives in Brussels. = Does she live in Brussels?
• They lived in Manchester. = Did they live in Manchester?
• He had an accident. = Did he have an accident?
Most questions with question words are made in the same way:
• How often does she use it?
• Why don't you come?
• Where do you work?
• How many did you buy?
• What time did you go?
• Which one do you like?
• Whose car were you driving?
Note who, what and which can be the subject. Compare:
• Who is coming to lunch? (who is the subject of the verb)
• Who do you want to invite to lunch? (you is the subject of the verb)
• What happened? (what is the subject of the verb)
• What did you do? (you is the subject of the verb)
Note the position of the prepositions in these questions:
• Who did you speak to?
• What are you looking at?
• Where does he come from?

Asking questions 2
In the section Questions 1, we looked at how to ask direct questions. To make a question, we invert the order of the subject and the first auxiliary verb.
• Where is Johnny?
• Has he found it yet?
If there is no auxiliary, use part of the verb 'to do'. For example:

• What time did he arrive?
• How often do you play tennis?

However, when we ask for information, we often say 'Do you know…?' or 'Could you tell me….?' These are indirect questions and more polite.

Note that the word order is different. For example:
• Do you know where Johnny is?
• Have you any idea if he has found it?

Note that we don't use do, does or did. For example:
• Could you tell me what time he arrived?
• Would you mind telling me how often you play tennis?

Use if or whether when there is no question word.
• Has he done it? = Do you know if he has done it?
• Is it ready? = Can you tell me if it is ready?

The same changes in word order happen when we report questions. Note that in reported questions, the verb changes to the past:
• What are you doing? = He asked me what I was doing.
• What have you done about it? = He asked me what I had done about it.
• Do you work with Pamela? = He asked me if I worked with Pamela.

Question tags

We use tags in spoken English but not in formal written English.

They are not really questions but are a way of asking the other person to make a comment and so keep the conversation open.

Making a tag is very mechanical. To make a tag, use the first auxiliary. If there is no auxiliary, use do, does or did. With a positive sentence, make a negative tag and with a negative sentence, make a positive tag.
• It's beautiful, isn't it?
• He has been, hasn't he?
• You can, can't you?
• It must be, mustn't it?
• You know him, don't you?
• He finished it, didn't he?
• He will come, won't he?

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• It isn't very good, is it?
• It hasn't rained, has it?
• It can't be, can it?
• Jenny doesn't know James, does she?
• They didn't leave, did they?
• He won't do it, will he?
Notice these:
• There isn't an ATM here, is there?
• Let's have a cup of coffee, shall we?
To reply, use the same auxiliary:
• It's beautiful, isn't it? ~ Yes, it is. I think it's fabulous.
• It isn't very good, is it? ~ No, it isn't. In fact, it's terrible.
Although, the rules are very simple and mechanical, in order to use them easily in conversation, they have to be automatic. So you need to hear and practice them very often.

Reported speech
We use reported speech when we are saying what other people say, think or believe.
• He says he wants it.
• We think you are right.
• I believe he loves her.
• Yesterday you said you didn't like it but now you do!
• She told me he had asked her to marry him.
• I told you she was ill.
• We thought he was in Australia.
When we are reporting things in the present, future or present perfect we don't change the tense.
• He thinks he loves her.
• I'll tell her you are coming.
• He has said he'll do it.
When we tell people what someone has said in the past, we generally make the tense 'more in the past'.
• You look very nice. = I told him he looked very nice.
• He's working in Siberia now. = She told me he was working in Siberia now.

• Polly has bought a new car. = She said Polly had bought a new car.

• Jo can't come for the weekend. = She said Jo couldn't come for the weekend.

• Paul called and left a message. = He told me Paul had called and had left me a message.

• I'll give you a hand. = He said he would give me a hand.

However, when we are reporting something that was said in the past but is still true, it is not obligatory to make the tense 'more in the past'. The choice is up to the speaker. For example:

"The train doesn't stop here."

• He said the train doesn't stop here.

• He said the train didn't stop here.

"I like Sarah."

• She said she likes Sarah.

• She said she liked Sarah.

When we are reporting what was said, we sometimes have to change other words in the sentence.

We have to change the pronoun if we are reporting what someone else said. Compare these two sentences. In each case the person actually said "I don't want to go."

• I said I didn't want to go.

• Bill said he didn't want to go.

We have to change words referring to 'here and now' if we are reporting what was said in a different place or time.

Compare these two sentences. In each case the person actually said "I'll be there at ten tomorrow."

• (If it is later the same day) He said he would be there at ten tomorrow.

• (If it is the next day) He said he would be there at ten today.

Now compare these two sentences.

• (If we are in a different place) He said he would be there tomorrow at ten.

• (If we are in the place he is coming to) He said he would be here at ten tomorrow.

Reported speech 2

We also use reported speech when we are saying what other people asked or wanted to know. We do not use do or question marks in indirect questions.

- "What time is it?" = He asked me what time it was.
- "Why hasn't he come? = She wondered why he hadn't come.
- "When will you be arriving?" = He wanted to know when we would be arriving.
- "What were you doing?" = They questioned him about what he had been doing.

We use the same structure when we report answers.

- "147 Oak Street." = I told him what my address was.
- "I didn't have time to do it." = She explained why she hadn't done it.
- "Look at this dress and bag." = She showed me what she had bought.
- "Put the paper here and press this button." = He demonstrated how the scanner worked.

Yes/no questions are reported with if or whether.

- Do you want a ride? = Mike asked me if I wanted a ride.
- Are you coming? = They wanted to know if I was coming.
- Will you be here later? = She asked me whether I would be here later.

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