Міністерство освіти і науки України

НАЦІОНАЛЬНИЙ УНІВЕРСИТЕТ

«ОДЕСЬКА ПОЛІТЕХНІКА»

ІНОЗЕМНА (АНГЛІЙСЬКА) МОВА

МЕТОДИЧНІ ВКАЗІВКИ ДО ПРАКТИЧНИХ ЗАНЯТЬ

З АНГЛІЙСЬКОЇ МОВИ ДЛЯ ЗДОБУВАЧІВ I КУРСУ (2 семестр)

СПЕЦІАЛЬНІСТЬ: F7 Комп’ютерна інженерія

Освітня програма: Комп’ютерна інженерія інтелектуальних систем

2025

Одеса НУОП– 2025

Міністерство освіти і науки України

НАЦІОНАЛЬНИЙ УНІВЕРСИТЕТ

«ОДЕСЬКА ПОЛІТЕХНІКА»

ІНОЗЕМНА (АНГЛІЙСЬКА)МОВА

МЕТОДИЧНІ ВКАЗІВКИ ДО ПРАКТИЧНИХ ЗАНЯТЬ

З АНГЛІЙСЬКОЇ МОВИ ДЛЯ ЗДОБУВАЧІВ І КУРСУ (2 семестр)

СПЕЦІАЛЬНІСТЬ:F7 Комп’ютерна інженерія

Освітня програма:Комп’ютерна інженерія інтелектуальних систем

2025

Затверджено

на засіданні кафедри

іноземних мов

Протокол № 2
від 25.09.2025

Одеса НУОП– 2025

Методичні вказівки до практичних занять з англійської мови для здобувачів І курсу (2 семестр) СПЕЦІАЛЬНІСТЬ F7 Комп’ютерна інженерія
Уклад.: Г Ф Дьяченко, Л.Ю. Цапенко, М М Неврева,
О.В.Гвоздь,О В Лєбєдєва , – Одеса: НУОП, 2025.- 26 с Освітня програма:.
Комп’ютерна інженерія інтелектуальних систем 2025

Автори:

Г Ф Дьяченко кандидат філол. наук доцент .
Л Ю. Цапенко, кандидат філол. наук, доцент ,
М М Неврева, кандидат філол. наук, доцент О
В Гвоздь ст. викладач
ОВ.Лєбєдєва, ст.викладач.

Одеса НУОП– 2025

Передмова

Метою “Методичних вказівок” для роботи студентів є формування впродовж 44 годин роботи (вхідний рівень володіння мовою – В1) вмінь та навичок читання та перекладу за тематикою спеціальності “ F7 Комп’ютерна інженерія “
на І курсі навчання. Курс з англійської мови (вихідний рівень володіння мовою – В2). За рахунок тренування і виконання читання текстів та комунікативних завдань студенти зможуть досягти практичного володіння англійською мовою за фахом.

Практичне володіння іноземною мовою в рамках даного курсу припускає наявність таких умінь, які дають можливість:

- вільно читати оригінальну літературу іноземною мовою у відповідній галузі знань;
- оформляти витягнуту з іноземних джерел інформацію у вигляді перекладу або резюме;
- робити повідомлення і доповіді іноземною мовою на теми, пов'язані з науковою роботою майбутнього фахівця;
- вести бесіду за фахом.

Кожне заняття складається з тексту й комплексу мовних вправ, які розраховані на удосконалення навичок активізації словарного і граматичного мінімуму професійного спрямування.

“Методичні вказівки” забезпечують підготовку до міжнародного усного спілкування англійською мовою для спеціальних цілей, а саме – оволодіння лексичними, граматичними і стилістичними навичками, а також умінням читати, перекладати, згортати і розгортати усну англомовну інформацію наукового функціонального стилю, що передбачено вимогами Програми вивчення іноземних мов у нефілологічному ВНЗ.

Зміст

Lesson 1

Мета заняття: здатність працювати з різними джерелами, розшукувати, обробляти, аналізувати і синтезувати отриману інформацію.

Read the text: **Computer programming.**

Computer programming is the process of designing, writing, testing, debugging, and maintaining the source code of computer programs. The role of a programming language can be described in two ways:

Technical: It is a means for instructing a Computer to perform Tasks.

Conceptual: It is a framework within which we organize our ideas about things and processes. Writing computer programs means writing instructions, that will make the computer follow and run a program based on those instructions. Each instruction is relatively simple, yet because of the computer's speed, it is able to run millions of instructions in a second.

The basic instructions are composed of a sequence of ons and offs, that the computer follows as it runs them through the processor, turning switches on and off. The ons are coded (meaning written in programming) with an 1, and the offs with a 0. Numbers and letters are also represented by this; 0000=0, 0001=1, 0010=2 etc. In the beginning, programs looked like "10101001001011110101010101". Someone realized that since the purpose of writing programs is in order to make life easier, why don't we write a program that will take a kind of code that is easier to create, and the program will translate it into computer code (1s and 0s). So, assembly language was created, where the code then looked like "add $5, $7, $8 #comment", which although not completely readable, it was a lot better than "010101".

The program that converted the assembly language into computer code was called the assembler. When you learn how to program you learn how to break up the objective into different chunks, and work only on that chunk at a time. This is in order to focus on what you need to do right now, and that which you don't need to know is pushed off to be done at a different time. One writes code with a specific terminology for the language that he is programming in. The different terminologies can be grouped into the few categories of keywords, variables, operations and predefined classes (in Java). Keywords are the words that have a specific meaning to the compiler. For example, "if" tells the compiler that "if the condition is true then run the next piece of code". Operations are symbols that give specific meaning. For example, the operation of "+" can be used to add two numbers together. The operation of "=" means that the operand (the thing using the operation) on the left "gets" what is

on the right. Variables are the values that you give to a word that you make up. For example, in Java the keyword "int" means a number. If you write "int sum = 8 + 7;" you are telling the compiler, I want a variable called sum to get the value of 8 and 7 added together. From now on until you change it, whenever you write "sum" in the program, the compiler reads it as "15". For example if you were to write "if (sum==15)" means if that variable called sum equals 15 (which for now it has not been changed) then run the next piece of code. Different programming languages support different styles of programming.

The choice of language used is subject to many considerations, such as company policy, suitability to task, or individual preference. Languages form an approximate spectrum from "low-level" to "high-level"; "low-level" languages are typically more machine-oriented and faster to execute, whereas "high-level" languages are more abstract and easier to use but execute less quickly. It is usually easier to code in "high-level" languages than in "low-level" ones.

http://www.apl.jhu.edu/~hall/java/beginner/programming.html

Ex.1. Answer the questions:

1. What is computer programming? 2. How can the role of a programming language be described? 3. How do we call the program that converted the assembly language into computer code? 4. What are keywords? 5. What are the basic instructions composed of? 6. Which languages are typically more machine-oriented and faster to execute? 7. Is it usually easier to code in "high-level" languages than in "low-level" ones?

Ex.2.Match the right part with the left:

1. When you learn how to program you learn how …..	a. writing, testing, debugging, and maintaining the source code of computer programs.
2. The choice of language used is subject to many considerations, such as…….	b. to break up the objective into different chunks, and work only on that chunk at a time.
3. Keywords are the words that have …..	c. company policy, suitability to task, or individual preference.
4. The basic instructions are composed of a sequence of ons and offs, that the computer	d. a specific meaning to the compiler.

….	
5. Computer programming is the process of designing, ….	e. follows as it runs them through the processor, turning switches on and off.

Test questions on the theme.

1. What is computer programming?
2. How can the role of a programming language be described?
3. How do we call the program that converted the assembly language into computer code?
4. What are keywords?
5. What are the basic instructions composed of?

Lesson 2

Мета заняття: здатність працювати з різними джерелами.

Read the text: **Web design**

Web design is used as a general term to describe any of the various tasks involved in creating a web page. More specifically, it refers to jobs focused on building the front-end of a web page. The web consists of myriad pages, presenting information using different technologies and linked together with hyperlinks. There are two basic aspects to any web page found on the Internet. The first is a presentation that the user interacts with, usually visually, while the second is a back-end that includes information for non-human browsers.

The basic markup language used to tell a browser how to present information is called the Hyper Text Markup Language (HTML). A stricter version of HTML is also widely used, known as eXtensible Hyper Text Markup Language (XHTML). Using HTML or XHTML, a web designer is able to tell a browser how a web page should appear. In the last few years there has been a push towards separating the underlying structure of a web-page (using HTML) from the visual presentation of the site (using Cascading Style Sheets or CSS). This approach has a number of major benefits in both the short and long term, and is gathering popularity as time progresses.

From a technical standpoint, the act of web design can be quite difficult. Unlike more traditional print media, HTML has a number of variable factors. To begin with, not all browsers interpret HTML according to the standards created by the standard-setting body — the World Wide Web Consortium. This means that while one piece of web design will appear as the designer wishes it to in one browser, it may appear completely differently in another.

Another major limiting factor of web design is the plethora of formats a site might be viewed in. While graphic designers know exactly how large the piece of paper they are printing on will be, a web designer must account for different monitor sizes, different display settings, and even browsers for non-sighted surfers! Combined, these concerns often leave a web designer struggling to incorporate enough dynamism to make a web page attractive on a range of browser sizes, while creating a layout static enough to allow for the use of images and other necessarily fixed-size components.

In addition to XHTML and CSS, web designers often use a number of database driven languages to allow for more dynamism and interactivity on their websites. While useful with smaller sites, database driven languages become a virtual necessity on any site presenting huge amounts of data. Some of the most popular languages for 'dynamic' web design include ASP, PHP, and ColdFusion. Macromedia's Flash also allows for a different sort of web design and is very popular amongst many web designers.

The possibilities for web design are virtually limitless, although at one point they were quite constrained by the boundaries of the browser itself. With the advent and flexibility of Flash and other embedded technologies, these boundaries have been all but removed, allowing for a versatility and dynamism that challenges the imagination of anyone interested in web design.

http://www.wisegeek.com/what-is-web-design.htm

Ex.1. Answer the questions:

1. What is web design? 2. There are two basic aspects to any web page found on the Internet ? 3. How is the basic markup language used to tell a browser the way to present information called? 4. What does XHTML stand for? 5. Do all browsers interpret HTML according to the standards created by the standard-setting body? 6. What do web designers use a number of database driven languages for? 7. What are the possibilities for web design constrained?

Ex.2.Match the right part with the left:

1. In addition to XHTML and CSS, web designers often use ….	a. a number of variable factors
2. The web consists of myriad pages, presenting information using …….	b. of the various tasks involved in creating a web page.
3. Unlike more traditional print media, HTML has…..	c. is called the HyperText Markup Language.
4. Web design is used as a general term to describe any. ….	d. different technologies and linked together with hyperlinks.
5. The basic markup language used to tell a browser how to present information ….	e. a number of database driven languages to allow for more dynamism and interactivity on their websites.

Test questions on the theme.

1. What is web design?
2. There are two basic aspects to any web page found on the Internet ?
3. How is the basic markup language used to tell a browser the way to present information called?
4. What does XHTML stand for?
5. Do all browsers interpret HTML according to the standards created by the standard-setting body?

Lesson 3

Мета заняття: вміти використовувати іноземну мову, включаючи усну та письмову форми в обсязі програмних вимог у продуктивних та рецептивних видах мовленнєвої діяльності.

Read the text: **Database Management Systems**

Organizations and individuals use databases to bring independent sources of data together and store them electronically. Thus, a database is composed of related files that are consolidated, organized and stored together. Data management systems are used to access and manipulate data in a database. A database management system is a software package that enables users to edit, link, and update files as needs dictate.

A database management system (DBMS) is a software package with computer programs that control the creation, maintenance, and use of a database. A Database Management

System (DBMS), is a software program that enables the creation and management of databases. Generally, these databases will be more complex than the text file/spreadsheet. A database is an integrated collection of data records, files, and other objects. A DBMS allows different user application programs to concurrently access the same database.

In order to track and analyze data effectively, each record requires a unique identifier or what is called a key. The key must be completely unique to a particular record just as each individual has a unique social security number assigned to them.

The structure of a database begins with the character, the most basic element of data. These characters are organized into fields, records, and files, the other important building blocks of a database. Database management systems are designed to access and manipulate data in a database. These systems allow users to work with and manipulate data so that, eventually, someone can extract meaning from it. DBMSs come in many shapes and sizes. A computerized database refers to a collection of related files that are digitized.

Some databases are small enough to be created and contained on your desktop computer while others are so large that they are stored on network servers or powerful mainframe computers. Popular database management software applications such as Paradox, Access, and dBASE 5 are utilized to manage databases small enough to be stored on a desktop computer. Individuals use these programs to perform specific tasks, such as to keep track of customers and manage data for small research projects.

Some databases are so large that that they must be stored on a server or mainframe computer and accessed by going online. Some large, public databases can be accessed online for a fee. These are referred to as information utilities or online services.

1.http://www.personal.psu.edu/glh10/ist110/topic/topic07/topic07_04.html

2.http://www.google.com.ua/search?hl=ru&noj=1&q=Some+large%2C+public+databases+can+be+accessed+online+for+a+fee.&oq=Some+large%2C+public+databases+can+be+accessed+online+for+a+fee.&aq=f&aqi=&aql=&gs_l=serp.12...7245.9317.0.10264.1.1.0.0.0.0.168.168.0j1.1.0...0.0.JeHW6fAHTfM

Ex.1. Answer the questions:

1. What is a database composed of? 2. What do we use to access and manipulate data in a database? 3. How do we define a database management system? 4. What does DBMS allow different user application programs? 5. What does each record require in order to track and

analyze data effectively? 6. What does the structure of a database begin with? 7 What are database management systems designed for?

Ex.2.Match the right part with the left:

1. The structure of a database begins with ….	a. to access and manipulate data in a database.
2. Some databases are so large that that they must be stored …….	b. the character, the most basic element of data.
3. A database management system (DBMS) is a software package with computer programs..…..	c. on a server or mainframe computer and accessed by going online.
4. These characters are organized into fields, records, and files, the other ….	d. that control the creation, maintenance, and use of a database.
5. Data management systems are used ….	e. important building blocks of a database.

Test questions on the theme.

1. What is a database composed of?
2. What do we use to access and manipulate data in a database?
3. How do we define a database management system?
4. What does DBMS allow different user application programs?
5. What does each record require in order to track and analyze data effectively?

Lesson 4

Мета заняття: здатність працювати з різними джерелами, розшукувати, обробляти, аналізувати і синтезувати отриману інформацію.

I. Read the text: **Engineering and computer graphics**.

Engineering and computer graphics.

Computer graphics is a powerful medium. Computer graphics are graphics created using

computers and the representation and manipulation of image data by a computer with help from specialized software and hardware.

Computer graphics is simply the art and science of producing and manipulating images on a computer. It is one of the most visible and exciting aspects of computer science. And unlike some fields of computer science, it has a rigorous foundation in theory and mathematics. Computer graphics is a very large field. It covers both two dimensional and three dimensional graphics and animation, graphics programming, theory, and techniques. The major topics include:

OpenGL programming.

OpenGL (Open Graphics Library) is a standard specification defining a cross-language, multi-platform API for writing applications and simulating physics, that produce 2D and 3D computer graphics. The interface consists of over 250 different function calls which can be used to draw complex three-dimensional scenes from simple primitives. OpenGL is a graphics standard that is available on a wide variety of computers, and is implemented in hardware on many graphics cards. It has been used for many computer games. For the programmer, OpenGL is just a large library of subroutines that can be used for creating 2D and 3D images.

GIMP, an image processing program.

GIMP is a program for creating and manipulating two-dimensional images. It is very similar in capability to the commercial program Photoshop. While you can use GIMP to create images from scratch, it is most often used for touching up photographs, color-correction of images, adding visual effects, and composing images from pieces of other images.

Blender is a free and open-source 3D computer graphics software product used for creating animated films, visual effects, interactive 3D applications or video games. Blender lets you build three-dimensional scenes and animations using a graphical user interface. It's difficult to design an interface for building a three-dimensional model on a two-dimensional screen. Blender has an unusual interface that does a better job than other programs.

POV-Ray. The Persistence of Vision Ray tracer, or POV-Ray, is a ray tracing program available for a variety of computer platforms. Ray tracing is one of the techniques that are used to produce very realistic computer-generated 3D images. POV-Ray has been around for a long

time, and it now supports many other techniques as well. However, it is not a modeling program. It is an interpreter for scripts written in a "scene description language."

Shading refers to depicting depth in 3D models or illustrations by varying levels of darkness. It is a process used in drawing for depicting levels of darkness on paper by applying media more densely or with a darker shade for darker areas, and less densely or with a lighter shade for lighter areas.

Texture mapping is a method for adding detail, surface texture, or colour to a computer-generated graphic or 3D model. Its application to 3D graphics was pioneered by Dr Edwin Catmull in 1974. A texture map is applied to the surface of a shape, or polygon. This process is akin to applying patterned paper to a plain white box. Multitexturing is the use of more than one texture at a time on a polygon.

Computer graphics specialists are the experts who use computers and related technologies to create and manipulate electronic images. These specialists apply their talents to three-dimensional cartoons, video games, television and film. They use CAD (computer-aided design) systems to design models of building, cars or entire environments. In the ever-changing world of computer technologies and design, computer graphics specialists must be on the cutting edge of both hardware and software developments.

1. http://dl.acm.org/citation.cfm?id=1242075
2.http://www.sccs.swarthmore.edu/users/08/ajb/tmve/wiki100k/docs/Texture_mapping.html

Ex.1. Answer the questions:

1. What does computer graphics refer to? 2. What does OpenGL stands for? 3. Which program is very similar in capability to the commercial program Photoshop? 4. What is GIMP used for? 5. What is Blender software? 6. What is ray tracing used for? 7. Who and when was texture mapping application to 3D graphics was pioneered by?

Ex.2.Match the right part with the left:

1. Computer graphics specialists are the experts who ….	a. used to draw complex three-dimensional scenes from simple primitives.
2. It is a process used in drawing for depicting levels of darkness on paper by applying media more densely or with …….	b. specialists must be on the cutting edge of both hardware and software developments.
3. The interface consists of over 250 different function calls which can be..……..	c color-correction of images, adding visual effects, and composing images from pieces of other images. ..
4. In the ever-changing world of computer technologies and design, computer graphics ….	d a darker shade for darker areas, and less densely or with a lighter shade for lighter areas.
5. While you can use GIMP to create images from scratch, it is most often used for touching up photographs, ….	e. ..use computers and related technologies to create and manipulate electronic images. .

Test questions on the theme.

1. What does computer graphics refer to?
2. What does OpenGL stands for?
3. Which program is very similar in capability to the commercial program Photoshop?
4. What is GIMP used for?
5. What is Blender software?

Lesson 5

Мета заняття: здатність працювати з різними джерелами, розшукувати, обробляти, аналізувати і синтезувати отриману інформацію.

I. Read the text: **Structural organization and architecture of computer systems**.

Computer organization refers to the operational units and their interconnections that realize the architectural specifications. Examples of architectural attributes include the

instruction set, the number of bits used to represent various data types (e.g., numbers, characters), I/O mechanisms, and techniques for addressing memory.

Computer architecture refers to those attributes of a system visible to a programmer or, those attributes that have a direct impact on the logical execution of a program. It is concerned with the structure and behavior of the various functional modules of the computer and how they interact to provide the processing needs of the user. It is built on four basic viewpoints:

1.the structure- defines the interconnection of various hardware components,

2.the organization- defines the dynamic interplay and management of the various ccomponents,

3.the implementation- defines the detailed design of hardware components,

4.the performance- specifies the behavior of the computer system.

A computer's organization expresses the realization of the architecture. Architecture describes what the computer does and organization describes how it does it. Architecture and organization are independent; you can change the organization of a computer without changing its architecture. For example, a 64-bit architecture can be internally organized as a true 64-bit machine or as a 16-bit machine that uses four cycles to handle 64-bit values. Instruction set architecture (ISA) is the interface between the software and hardware. Computers do not understand high level languages.

A processor only understand instructions encoded as binary numbers. Besides instructions, the ISA defines items in the computer that are available to a program—including data types, registers, addressing modes, and memory organization. Register indexes (or names) and memory addressing modes are the ways that instructions locate their operands. Software tools, special computer programs such as compilers, translate high level languages into instructions for a particular instruction set architecture.

This guide describes the binary numbers that encode the instructions. Most often, short three-letter human names for the instructions can be recognized by a software development tool called an assembler. An assembler is a computer program that translates a human-readable form of the ISA into a computer-readable form. Dissemblers are also widely available, usually in debuggers, software programs to isolate and correct malfunctions in binary computer programs. ISAs vary in quality and completeness. A good ISA compromise between programmer convenience (more operations can be better), cost of the computer to interpret the instructions (cheaper is better), speed of the computer (faster is better), and size of the code (smaller is better). For example, a single-instruction ISA is possible, inexpensive, and fast, (e.g., subtract and jump if zero—actually used in the SSEM), but not convenient or helpful to make programs small. Memory organization defines how instructions interact with the memory

1.http://cnx.org/content/m29444/latest/

2.http://www.scribd.com/doc/58604904/01-Introduction-to-Computer-Systems

Ex.1 . Answer the questions:

1. What does computer organization refer to? 2. What is computer architecture? 3. What are the basic viewpoints, the computer architecture is built on ? 4. What are the ways that instructions locate their operands? 5. What does a good ISA compromise between? 6/ What does memory organization define?

Ex.2.Match the right part with the left:

1. An assembler is a computer program that translates ….	a. attributes that have a direct impact on the logical execution of a program.
2. Register indexes and memory addressing modes are. …….	b. interconnections that realize the architectural specifications.
3. Computer architecture refers to those attributes of a system visible to a programmer or, those..……..	c. defines how instructions interact with the memory.
4. Computer organization refers to the operational units and their. ….	d. a human-readable form of the ISA into a computer-readable form.
5. Memory organization ….	e. the ways that instructions locate their operands.

Test questions on the theme.

1. What does computer organization refer to?
2. What is computer architecture?
3. What are the basic viewpoints, the computer architecture is built on ?
4. What are the ways that instructions locate their operands?
5. What does a good ISA compromise between?

Lesson 6

Мета заняття: здатність працювати з різними джерелами, розшукувати, обробляти, аналізувати і синтезувати отриману інформацію.

I. Read the text: **System software**

System software is any computer software which manages and controls computer hardware so that application software can perform a task. System software helps run the computer hardware and computer system. System software is software that basically makes the computer work. Examples beside operation systems are anti-virus software, communication software and printer drivers. Without the system software the computer doesn't work. The part of the operating system that resides in main memory (internal instructions) is most important; without these instructions, the computer cannot operate. These instructions must be loaded from storage when the computer is first turned on (called booting for microcomputers and initial program load for mainframes) — otherwise, none of the hardware components will function. Internal instructions must reside in main memory at all times while the computer is on.

External command instructions perform so-called housekeeping tasks, which frequently have to do with "desktop" management and file and storage management. System software performs tasks like transferring data from memory to disk, or rendering text onto a display device. It includes: operating systems, device drivers, diagnostic tools, servers, windowing systems, utilities and more. System Software can be classified as operating system and language processors.

Operating system creates an interface between user and the system hardware. Language processors are those which help to convert computer language to machine level language.

Some low-level languages, called assembly languages, were created using abbreviations to help programmers avoid the tedious and time-consuming task of writing programs in machine language (0s and 1s). High-level languages were developed to make the job even easier. However, both high-level and assembly languages must be translated into machine language for the CPU to use them. The translation can be done by interpreters, which convert software instructions from source code to object code a line at a time and thus allow for on-the-spot error correction, or compilers, which convert the whole source program at once and create a program in object code that the computer can understand (called an object program) and save. The average business user will not have to interact directly with language translators. The level of sophistication of systems software depends on the size of the computer it operates and the tasks it is intended to perform. When operating systems were first developed, they could support only single users; many mainframe operating systems and some microcomputer operating systems can now support multitasking (performing several tasks so fast that it appears they are being done at once), multiprocessing (using two or more CPUs to process two or more programs simultaneously), timesharing (allowing several users to work at the computer at the same time using assigned time slices), and virtual storage (employing a piecemeal procedure for using

secondary storage that increases the efficiency of main memory use). The example of language processors are assemblers, compilers and interpreters.

Specific kinds of system software include: loading programs, operating systems, device drivers, programming tools, compilers, assemblers, linkers, and utility software. If system software is stored on non-volatile memory such as integrated circuits, it is usually termed firmware. The most popular disk operating systems for microcomputers are MS - DOS/PC-DOS, OS/2, Apple DOS, and UNIX. Operating systems like OS/2 and UNIX can support multi-users and multitasking on microcomputers. Software is written to work with a particular type of microprocessor and is incompatible with machines that do not use that type of processor.

1. http://www.wisegeek.com/what-is-assembly-language.htm
2. http://www.thocp.net/software/operatingsystems/operating_systems.htm

Ex .1 Answer the questions:

1. What are the functions of system software? 2. What kind of tasks do external command instructions perform? 3. What transfers data from memory to disk and render text onto a display device? 4. What do operating systems create? 5. What kinds of specific system software do you know?

Exercise 2. Match the left part with the right:

1. System software is any computer software which….	a. help to convert computer language to machine level language.
2.The level of sophistication of systems software depends on…	b. it is usually termed firmware.
3. If system software is stored on non-volatile memory such as integrated circuits,….	c. manages and controls computer hardware so that application software can perform a task.
4. Language processors are those which….	d. the size of the computer it operates and the tasks it is intended to perform.

Test questions on the theme.

1. What are the functions of system software?
2. What kind of tasks do external command instructions perform?
3. What transfers data from memory to disk and render text onto a display device?
4. What do operating systems create?
5. What kinds of specific system software do you know?

Lesson 7

Мета заняття: вміти використовувати іноземну мову, включаючи усну та письмову форми в обсязі програмних вимог в продуктивних та рецептивних видах мовленнєвої діяльності.

I. Read the text: **Information theory and coding.**

Coding theory is the study of the properties of codes and their fitness for a specific application. Codes are used for data compression, cryptography, error-correction and more recently also for network coding. Codes are studied by various scientific disciplines—such as information theory, electrical engineering, mathematics, and computer science—for the purpose of designing efficient and reliable data transmission methods. This typically involves the removal of redundancy and the correction or detection of errors in the transmitted data. There are essentially two aspects to Coding theory:

Data compression (or, source coding)

Error correction (or, channel coding).

These two aspects may be studied in combination.

Source encoding

Source encoding attempts to compress the data from a source in order to transmit it more efficiently. The second, channel encoding, adds extra data bits to make the transmission of data more robust to disturbances present on the transmission channel.

Source coding is the process of transforming information from one representation to another, smaller representation from which the original, or a close approximation to it, can be recovered. The compression and decompression processes are often referred to as encoding and decoding. Data compression has important applications in the areas of data storage and data transmission. Besides compression savings, other parameters of concern include encoding and decoding speeds and workspace requirements, the ability to access and decode partial files, and error generation and propagation.

The data compression process is said to be lossless if the recovered data are assured to be identical to the source; otherwise the compression process is said to be lossy. Lossless compression techniques are requisite for applications involving textual data. Other applications,

such as those involving voice and image data, may be sufficiently flexible to allow controlled degradation in the data.

Data compression techniques are characterized by the use of an appropriate data model, which selects the elements of the source on which to focus; data coding, which maps source elements to output elements; and data structures, which enable efficient implementation.

Channel coding

The aim of channel coding theory is to find codes which transmit quickly, contain many valid code words and can correct or at least detect many errors. The central idea of channel coding is that the sender encodes their message in a redundant way by using an error-correcting code (ECC).

While not mutually exclusive, performance in these areas is a trade off. So, different codes are optimal for different applications. The needed properties of this code mainly depend on the probability of errors happening during transmission.

Ex.1. Answer the questions:

1. What does coding theory study? 2. What are codes used for? 3. Which disciplines study codes? 4. What are two aspects to Coding theory? 5. How do we call the process of transforming information from one representation to another? 6. What is the aim of channel coding theory? 7 What are lossless compression techniques requisite for?

Ex.2.Match the right part with the left:

1. The compression and decompression processes are ….	a. are assured to be identical to the source.
2. The aim of channel coding theory is to find codes which transmit quickly, contain …….	b. the areas of data storage and data transmission.
3. The data compression process is said to be lossless if the recovered data..…...	c. errors happening during transmission.
4. The needed properties of this code mainly depend on the probability of **….**	d. many valid code words and can correct or at least detect many errors.
5. Data compression has important applications in ….	e. often referred to as encoding and decoding. .

Test questions on the theme.

1. What does coding theory study?

2. What are codes used for?

3. Which disciplines study codes?

4. What are two aspects to Coding theory?

5. How do we call the process of transforming information from one representation to another?

Lesson 8

Мета заняття: здатність працювати з різними джерелами, розшукувати, обробляти, аналізувати і синтезувати отриману інформацію

I. Read the text: **Designing microprocessor-based systems**.

The microprocessor (also called CPU for Central Processing Unit) is the principal element of a computer, it executes a list of instructions, without any decision of its share. These instructions lists are commonly called a program. The processor is at the heart of any digital system that uses one at all. It accepts analog data in digital format, manipulates the data in some suitable way, and then generates more analog data as output.

In addition to this signal-processing function, the processor will handle interaction with the user by the input and display devices, it will store data in memory and then retrieve it again, and it may communicate with other systems as well. Each model of microprocessor reads specifics instructions to its design in the form of a basic language which one calls assembler. This programming language is complex to use since it is specific "machine" and coded into hexadecimal (as well as the data what still complicates the programming).

The software which we use is written in advanced languages (C, Visual BASIC...) which transpose the programs out of comprehensible assembler by the processor. Except some small improvements, all the microprocessors of the computers of the X86 family include/understand the same assembly language (Pentium, Athlon). The processor does not make any decision, only conditional instructions are influenced by external situations: keyboard, request for service of a peripheral.

The interfaced circuit is varied: memory, I/O ports Nevertheless, all the electronic microprocessor assemblies include a starting program in ROM memory (the contents are not deleted without supply voltage of the circuit). This program makes it possible the microprocessor to carry out its initiation with starting (what it must do like detecting the hard disk, to test the memory).

A microprocessor-based system thus consists of several interfaced circuits, for example, ROM memory (obligatory), memory RAM (working memory for the results), wearing of entry (keyboard), wearing of exit (bill-poster) put in parallel. The program is responsible for analog data stream(the signal processing) and for the operation of the system itself. It is common for there to be two (or even more) microprocessors in a system so that signal processing and signal operating programs are then distinct.

1. http://www.ybet.be/en-hardware-1-03/operation-microprocessor.htm

2.http://www.ukessays.com/essays/engineering/design-of-microprocessor-based-systems.php

Ex.1. Answer the questions:

1. What is the principal element of a computer? 2. What do we call assembler? 3. What is the programming language coded into? 4. What includes a starting program in ROM memory? 5. What does a microprocessor-based system consists of? 6. What are conditional instructions influenced by ?

Ex.2.Match the right part with the left:

1. The processor does not make any decision, only conditional instructions are ….	a. which transpose the programs out of comprehensible assembler by the processor..
2. The software which we use is written in advanced languages …….	b. influenced by external situations: keyboard, request for service of a peripheral.
3. The microprocessor is the principal element of a computer, it executes..….	c. store data in memory and then retrieve it again, and it may communicate with other systems as well.

4. It accepts analog data in digital format, manipulates the data in some suitable way, ….	d. a list of instructions, without any decision of its share.
5 In addition to this signal-processing function, the processor will handle interaction with the user by the input and display devices, it will.. ….	e and then generates more analog data as output.

Test questions on the theme.

1. What is the principal element of a computer?

What do we call assembler?

3. What is the programming language coded into?

4. What includes a starting program in ROM memory?

5. What does a microprocessor-based system consists of?

Lesson 9

Мета заняття: вміти використовувати іноземну мову, включаючи усну та письмову форми обсязі програмних вимог в продуктивних та рецептивних видах мовленнєвої діяльності.

I. Read the text: **Signal and image processing**.

Image processing is any form of signal processing for which the input is an image, such as a photograph or video frame; the output of image processing may be either an image or a set of characteristics or parameters related to the image. The signal and image processing program explores engineering issues related to the modeling of signals starting from the physics of the problem, developing and evaluating algorithms for extracting the necessary information from the signal, and the implementation of these algorithms on electronic and opto-electronic systems. Specific research areas include filter design, fast transforms, adaptive filters, spectrum estimation and modeling, sensor array processing, image processing, motion estimation from images, and the implementation of signal processing algorithms using appropriate technologies

with applications in sonar, radar, speech, geophysics, computer-aided tomography, image restoration, robotic vision, and pattern recognition.

Most image-processing techniques involve treating the image as a two-dimensional signal and applying standard signal-processing techniques to it. Image processing usually refers to digital image processing, but optical and analog image processing also are possible. Images are stored as collections of pixels ('pixel' is in fact short for 'picture element'), each of which is assigned a colour.

Signal processing refers to the acquisition, treatment, and reproduction of physically measurable quantities. Signals can include sound, light, images, environmental signals such as temperature, humidity, and pollution, biological signals, telecommunication transmission signals, and many others. Signals can be continuous (analog) or discrete (digital). Thus, signal and image processing is very much at home in both the physical and digital world, and crucial in the intersection between the two. The application domains are numerous: smartphones, cameras, video production, object recognition and tracking, etc.

Digital Images are electronic snapshots taken of a scene or scanned from documents, such as photographs, manuscripts, printed texts, and artwork. The digital image is sampled and mapped as a grid of dots or picture elements (pixels). Each pixel is assigned a tonal value (black, white, shades of gray or color), which is represented in binary code (zeros and ones). The binary digits ("bits") for each pixel are stored in a sequence by a computer and often reduced to a mathematical representation (compressed). The bits are then interpreted and read by the computer to produce an analog version for display or printing.

Closely related to image processing are computer graphics and computer vision. In computer graphics, images are manually made from physical models of objects, environments, and lighting, instead of being acquired (via imaging devices such as cameras) from natural scenes, as in most animated movies. Computer vision, on the other hand, is often considered high-level image processing out of which a machine/computer/software intends to decipher the physical contents of an image or a sequence of images (e.g., videos or 3D full-body magnetic resonance scans).

1. http://www.library.cornell.edu/preservation/tutorial/intro/intro-04.html

2. https://www.cu.edu/digitallibrary/cudldigitizationbp.pdf

Ex.1.Answer the questions:

1. What is image processing? 2. What are specific areas of image and signal processing? 3. How do most image-processing techniques involve treating the image? 4. What is sampled and mapped as a grid of dots or picture elements (pixels) as a two-dimensional signal? 5. What is the computer vision considered as? 6. What is the digital image is sampled and mapped as a grid of dots or picture elements (pixels).

Ex.2.Match the right part with the left:

1. **Digital Images** are electronic snapshots taken of a scene or scanned from documents, such as ….	a. , and reproduction of physically measurable quantities. .
2. Closely related to image processing are computer …….	b…. photographs, manuscripts, printed texts, and artwork.
3. Thus, signal and image processing is very much at home in both….	c. …the physical and digital world, and crucial in the intersection between the two
4. Image processing usually refers to digital image processing,	d. ...…..graphics and computer vision. .
5. Signal processing refers to the acquisition, treatment….	e. …..but optical and analog image processing also are possible.…..

Test questions on the theme.

1. What is image processing?
2. What are specific areas of image and signal processing?
3. How do most image-processing techniques involve treating the image?
4. What is sampled and mapped as a grid of dots or picture elements (pixels) as a two-dimensional signal?
5. What is the computer vision considered as?

Lesson 10

Мета заняття: знати професійний дискурс; уміти спілкуватися англійською мовою у професійному середовищі, дотримуватись етики ділового спілкування.

L. Read the text: Computer Architecture.

The term computer architecture was coined in the 1960s by the designers of the IBM System/360 to mean the structure of a computer that a machine language programmer must

understand to write a correct program for a machine. Basically, Computer architecture represents the programming model of the computer, including the instruction set and the definition of register file, memory, and so on. Over time, the concept of computer architecture has evolved to include both the functional specification and the hardware implementation. At the system level, it defines the processor-level building blocks, such as processors and memories, and the interconnection among the building blocks. At the microprocessor level, computer architecture determines the processor's programming model and its detailed implementation. The implementation of a microprocessor is also known as micro architecture.

The task of a computer architect is to understand the state-of-the-art technologies at each design level and the changing design tradeoffs for their specific applications. The tradeoff of cost, performance, and power consumption is fundamental to a computer system design. For high-performance server applications, chip and system costs are less important than performance. Computer speedup can be accomplished by constructing more capable processor units or by integrating many processors units on a die. For cost-sensitive embedded applications, the goal is to minimize processor die size and system power consumption.

Modern computer implementations are based on silicon technology. The two driving parameters of this technology are die size and feature size. Die size largely determines cost. Feature size is dependent on the lithography used in wafer processing and is defined as the length of the smallest realizable device. Feature size determines circuit density, circuit delay, and power consumption. Deep submicron technology allows microprocessors to be increasingly more complicated. According to the Semiconductor Industry Association, the number of transistors for high-performance microprocessors will continue to grow exponentially in the next 10 years. However, there are physical and program behavioral constraints that limit the usefulness of this complexity. Physical constraints include interconnect and device limits as well as practical limits on power and cost. Program behavior constraints result from program control and data dependencies and unpredictable events during execution.

Much of the improvement in microprocessor performance has been a result of technology scaling that allows increased circuit densities at higher clock frequencies.
On the other hand, there are a number of major technical challenges in the deep submicron era, the most important of which is that interconnect delay (especially global interconnect delay) does not scale with the feature size. If all three dimensions of an interconnect wire are scaled down by the same scaling factor, the interconnect delay remains roughly unchanged, because the fringing field component of wire capacitance does not vary with feature size. Consequently, interconnect delay becomes a limiting factor in the deep submicron era.
Understanding the following fundamental concepts in computer architecture is essential to learning computer networking.
Working with Binary and Hexadecimal Numbers. Network addresses, network masks, and encryption keys all typically utilize binary and hexadecimal numbers.
Binary-Decimal Number Conversion Calculator.This interactive form computes binary-to-decimal and decimal-to-binary conversions. Unlike ordinary calculators, this calculator displays step-by-step logic as a helpful teaching aid.

Bits are the smallest unit of data transfer in computer networking. Bits represent binary values like "on / off," "yes / no," and "true / false."
Bytes. integrating many processors units on a dies. These are called byte-oriented protocols.
Addresses. Network addresses uniquely identify the network interface of a computer or similar device. Network addressing differs from memory and other types of addressing in computer architecture.
(Computer) Ports. In computer networking, a port represents a communication channel or endpoint. Computer ports can refer to either physical or virtual connections.

Computer architecture has evolved greatly over the past decades. It is now much more than the programmer's view of the processor. The process of computer design starts with the implementation technology. At some point in time, cost may be largely determined by transistor count; later as feature sizes shrink, wire density and interconnection may dominate cost. Similarly, the performance of a processor is dependent on delay, but the delay that determines performance changes as the technology changes. Memory access time is only slightly reduced by improvements in feature size. As feature sizes shrink, the array simply gets larger.

Ex.1. Answer the questions:

1. What does the term computer architecture mean? 2. What does it define at the system level? 3. What does computer architecture determine at the microprocessor level? 4. What is known as micro architecture? 5. What is the task of a computer architect? 6. What is fundamental to a computer system design? 7. How can computer speedup can be accomplished?

Ex.2.Match the right part with the left:

1. If all three dimensions of an interconnect wire are scaled down by the same scaling factor,…..	a…. technology scaling that allows increased circuit densities at higher clock frequencies
2 On the other hand, there are a number of major technical challenges in the deep submicron era, the most.. …….	b. ……the interconnect delay remains roughly unchanged, because the fringing field component of wire capacitance does not vary with feature size.
3. Computer speedup can be accomplished by constructing more capable processor units or by..……..	c…… important of which is that interconnect delay does not scale with the feature size.
4. Computer architecture has evolved. ….	d…… integrating many processors units on a die.
5. Much of the improvement in microprocessor performance has been a result of.. ….	e. …..greatly over the past decades

Test questions on the theme.

1. What does the term computer architecture mean?
2. What does it define at the system level?
3. What does computer architecture determine at the microprocessor level?
4. What is known as micro architecture?
5. What is the task of a computer architect?

Lesson 11

Мета заняття: здатність працювати з різними джерелами, розшукувати, обробляти, аналізувати і синтезувати отриману інформацію.

Read the text*:* **Hardware**

Hardware is computer machinery and equipment, including memory, cabling, power supply, peripheral devices, and circuit boards. Computer operation requires both hardware and software. Hardware design specifies a computer's capability; software instructs the computer on what to do. The advent of microprocessors in the late 1970s led to much smaller hardware assemblies and accelerated the proliferation of computers. Today's personal computers are as powerful as the early mainframes, while mainframes are now smaller and have vastly more computing power than the early models.

Software is a term for instructions that tell a computer what to do. Software is the entire set of programs, procedures, and routines associated with the operation of a computer system, including the operating system. The term differentiates these features from hardware, the physical components of a computer system. Two main types of software are system software, which controls a computer's internal functioning, and application software, which directs the computer to execute commands that solve practical problems. A third category is network software, which coordinates communication between computers linked in a network. Software is written by programmers in any number of programming languages. This information, the source code, must then be translated by means of a compiler into machine language, which the computer can understand and act on.

CPU (*in full central processing unit*) is the principal component of a digital computer, composed of a control unit, an instruction-decoding unit, and an arithmetic-logic unit. The CPU is linked to main memory, peripheral equipment (including input/output devices), and storage units. The control unit integrates computer operations. It selects instructions from the main memory in proper sequence and sends them to the instruction-decoding unit, which interprets them so as to activate functions of the system at appropriate moments. Input data are transferred via the main memory to the arithmetic-logic unit for processing (i.e., addition, subtraction, multiplication, division, and certain logic operations). Larger computers may have two or more CPUs, in which case they are simply called “processors” because each is no longer a “central” unit.

Database is the collection of data or information organized for rapid search and retrieval, especially by a computer. Databases are structured to facilitate storage, retrieval, modification, and deletion of data in conjunction with various data-processing operations. A database consists of a file or set of files that can be broken down into records, each of which consists of one or more fields. Fields are the basic units of data storage. Users retrieve database information primarily through queries. Using keywords and sorting commands, users can rapidly search, rearrange, group, and select the field in many records to retrieve or create reports on particular aggregates of data according to the rules of the database management system being used.

Exercise 1. Answer the questions:

1. What is the difference between software and hardware?
2. How many types of software do you know?
3. Who writes software?
4. Why must the source code be translated into mashine language?
5. What is CPU composed of?
6. How many CPUs may large computers have?
7. How do users retrieve database information?
8. Why are databases structured?

Exercise 2. Match the left part with the right:

1. Input data are	a) much smaller hardware assemblies and accelerated the proliferation of computers.
2. The advent of microprocessors in the late 1970s led to	b) system software and application software.
3. Two main types of software are	c) transferred via the main memory to the arithmetic-logic unit for processing.
4. A database consists of	d) a file or set of files.

Test questions on the theme.

1 What is the difference between software and hardware?

2 How many types of software do you know?
3 Who writes software?
4 Why must the source code be translated into mashine language? 5
What is CPU composed of?

Lesson 12

Мета заняття: здатність працювати з різними джерелами

Read the text*:* **Artificial intelligence**

Artificial intelligence is the ability of a machine to perform tasks thought to require human intelligence. Typical applications include game playing, language translation, expert systems, and robotics. Although pseudo-intelligent machinery dates back to antiquity, the first glimmerings of true intelligence awaited the development of digital computers in the 1940s. AI, or at least the semblance of intelligence, has developed in parallel with computer processing power, which appears to be the main limiting factor. Early AI projects, such as playing chess and solving mathematical problems, are now seen as trivial compared to visual pattern recognition, complex decision making, and the use of natural language.

Database management system is a system for quick search and retrieval of information from a database. The DBMS determines how data are stored and retrieved. It must address problems such as security, accuracy, consistency among different records, response time, and memory requirements. These issues are most significant for database systems on computer networks. Ever-higher processing speeds are required for efficient database management. Relational DBMSs, in which data are organized into a series of tables (“relations”) that are easily reorganized for accessing data in different ways, are the most widely used today.

Operating system is software that controls the operation of a computer, directs the input and output of data, keeps track of files, and controls the processing of computer programs. Its roles include managing the functioning of the computer hardware, running the applications programs, serving as an interface between the computer and the user, and allocating computer resources to various functions. When several jobs reside in the computer simultaneously and share resources (multitasking), the OS allocates fixed amounts of CPU time and memory in turn or allows one job to read data while another writes to a printer and still another performs computations. Through a process called time-sharing, a large computer can handle interaction with hundreds of users simultaneously, giving each the perception of being the sole user. Modern computer operating systems are becoming increasingly machine-independent, capable of running on any hardware platform; a widely used platform-independent operating system in use today on mainframe computers is UNIX. Most personal computers run on Microsoft's Windows operating system, which grew out of and eventually replaced MS-DOS.

Expert system is a computer-based system designed to respond like a human expert in a given field. Expert systems are built on knowledge gathered from human experts, analogous to a

database but containing rules that may be applied to solving a specific problem. An interface allows the user to specify symptoms and to clarify a problem by responding to questions posed by the system. Software tools exist to help designers build a special-purpose expert system with minimal effort. An outgrowth of work in artificial intelligence, expert systems show promise for an ever-widening range of applications. There are now widely used expert systems in the fields of medicine, personnel screening, and education.

Exercise 1 Answer the questions:

1. What typical applications of AI do you know?
2. When did the development of digital computers begin?
3. Why are early AI projects now seen as trivial?
4. What kind of problems does DBMS address?
5. How are data organized in relational DBMSs?
6. What functions does operating system have?
7. How are expert systems built?
8. How does an expert system differ from a database?
9. Where are expert systems widely used?

Exercise 2. Match the left part with the right:

1. Operating system	a) becoming increasingly machine-independent.
2. A large computer can	b) directs the input and output of data.
3. Modern computer operating systems are	c) back to antiquity.
4. Pseudo-intelligent machinery dates	d) handle interaction with hundreds of users simultaneously.

Test questions on the theme.

1. What typical applications of AI do you know?
2. When did the development of digital computers begin?
3. Why are early AI projects now seen as trivial?
4. What kind of problems does DBMS address?
5. How are data organized in relational DBMSs?

Lesson 13

Мета заняття: вміти використовувати іноземну мову, включаючи усну та письмову форми в обсязі програмних вимог у продуктивних та рецептивних видах мовленнєвої діяльності.

Read the text: **Modem**

Modem is an electronic device that converts digital data into analog (modulated-wave) signals suitable for transmission over analog telecommunications circuits (e.g., traditional phone lines) and demodulates received analog signals to recover the digital data transmitted. The "modulator/demodulator" thus makes it possible for existing communications channels to support a variety of digital communications, including e-mail, Internet access, and fax transmissions. An ordinary modem, operating over traditional phone lines, has a data transmission speed limit of about 56 kilobits per second. ISDN lines allow communications at over twice that rate, and cable modems and DSL lines have transmission rates of over a million bits per second.

Data transmission is sending and receiving data via cables (e.g., telephone lines or fibre optics) or wireless relay systems. Because ordinary telephone circuits pass signals that fall within the frequency range of voice communication (about 300–3,500 hertz), the high frequencies associated with data transmission suffer a loss of amplitude and transmission speed. Data signals must therefore be translated into a format compatible with the signals used in telephone lines. Digital computers use a modem to transform outgoing digital electronic data; a similar system at the receiving end translates the incoming signal back to the original electronic data. Specialized data-transmission links carry signals at frequencies higher than those used by the public telephone network.

Bulletin-board system is a computerized system used to exchange public messages or files. A BBS is typically reached by using a dial-up modem. Most are dedicated to a special interest, which may be an extremely narrow topic. Any user may "post" his or her own message (so that they appear on the site for all to read). Bulletin boards produce "conversations" between interested participants, who may download or print out messages they desire to keep or pass on to others. BBS sites today number in the tens of thousands.

Streaming is a method of transmitting a media file in a continuous stream of data that can be processed by the receiving computer before the entire file has been completely sent. Streaming, which typically uses data compression, is especially effective for downloading large multimedia files from the Internet; it permits, for example, a video clip to begin playing on a user's computer as soon as it begins to be downloaded from a Web site. Even with improved modems and connection speeds, downloading and playing large audio and video files without the

use of streaming techniques still takes an inconveniently long time. To accept streaming data, the receiving computer needs to be running a player, a program that decompresses the incoming data and sends the resulting signals to the display and speakers. The audio and video files may be prerecorded, but streaming can also accommodate a live feed over the Internet.

Data compression is the process of reducing the amount of data needed for storage or transmission of a given piece of information (text, graphics, video, sound, etc.), typically by use of encoding techniques. Data compression is characterized as either lossy or lossless depending on whether some data is discarded or not, respectively. Lossless compression scans the data for repetitive sequences or regions and replaces them with a single "token." For example, every occurrence of the word *the* or region with the colour red might be converted to $. ZIP and GIF are the most common lossless formats for text and graphics, respectively. Lossy compression is frequently used for photographs, video, and sound files where the loss of some detail is generally unnoticeable. JPEG and MPEG are the most common lossy formats.

Exercise 1. Answer the questions:

1. How does an ordinary modem operate?
2. Why do high frequencies suffer a loss of amplitude and transmission speed?
3. Why does downloading and playing large audio and video files take an inconveniently long time?

Exercise 2. Fill in the gaps with the suggested words:

algorithm data size form the formats

JPEG (*in full Joint Photographic Experts Group*) is a standard computer file format for storing graphic images in a compressed____1_____ for general use. JPEG images are compressed using a mathematical_____2____ . A variety of encoding processes can be used, depending on whether the user's goal is the highest quality of image (lossless) or smallest file____3____ (lossy). The JPEG and GIF_____4_____ are the most commonly used graphics formats on ___5___ Internet for lossy and lossless _____6_____compression, respectively.

Test questions on the theme.

1 How does an ordinary modem operate?

2 Why do high frequencies suffer a loss of amplitude and transmission speed?

3 Why does downloading and playing large audio and video files take an inconveniently long time?

Lesson 14

Мета заняття: здатність працювати з різними джерелами, розшукувати, обробляти, аналізувати і синтезувати отриману інформацію.

Read the text: **Data mining**

Data mining is a type of database analysis that attempts to discover useful patterns or relationships in a group of data. The analysis uses advanced statistical methods, such as cluster analysis, and sometimes employs artificial intelligence or neural network techniques. A major goal of data mining is to discover previously unknown relationships among the data, especially when the data come from different databases. Businesses can use these new relationships to develop new advertising campaigns or make predictions about how well a product will sell. Governments also use these techniques to discern illegal or embargoed activities by individuals, associations, and other governments.

Data structure is the way in which data are stored for efficient search and retrieval. The simplest data structure is the one-dimensional (linear) array, in which stored elements are numbered with consecutive integers and contents are accessed by these numbers. Data items stored nonconsecutively in memory may be linked by pointers (memory addresses stored with items to indicate where the “next” item or items in the structure are located). Many algorithms have been developed for sorting data efficiently; these apply to structures residing in main memory and also to structures that constitute information systems and databases.

MIDI (*in full Musical Instrument Digital Interface*)is a protocol for transmission of musical data between digital components, such as synthesizers and a computer's sound card. MIDI uses 8-bit asynchronous serial transmission with a data rate of 31.25 kilobytes per second. The transmitted data do not directly represent musical sound but specify various aspects (pitch, loudness, starting and stopping points in time). The data are then applied to waveforms stored digitally on a computer chip to create a specific sound.

Object-oriented programming is computer programming that emphasizes the structure of data and their encapsulation with the procedures that operate upon it. It is a departure from traditional or procedural programming. OOP languages incorporate objects that are self-contained collections of computational procedures and data structures. Programs can be written by assembling sets of these predefined objects in far less time than is possible using conventional procedural languages. OOP has become extremely popular because of its high programming productivity. C++ and Objective-C (early 1980s) are object-oriented versions of C that have gained much popularity.

Protocol is, in computer science, a set of rules or procedures for transmitting data between electronic devices, such as computers. In order for computers to exchange information, there must be a preexisting agreement as to how the information will be structured and how each side will send and receive it. Without a protocol, a transmitting computer, for example, could be sending its data in 8-bit packets while the receiving computer might expect the data in 16-bit packets. Protocols are established by international or industrywide organizations. Perhaps the most important computer protocol is OSI (Open Systems Interconnection), a set of guidelines for implementing networking communications between computers.

Pattern recognition is, in computer science, the imposition of identity on input data, such as speech, images, or a stream of text, by the recognition and delineation of patterns it contains

and their relationships. Stages in pattern recognition may involve measurement of the object to identify distinguishing attributes, extraction of features for the defining attributes, and comparison with known patterns to determine a match or mismatch. Pattern recognition has extensive application in astronomy, medicine, robotics, and remote sensing by satellites.

Speech recognition is the ability of computer systems to accept speech input and act on it or transcribe it into written language. Current research efforts are directed toward applications of automatic speech recognition (ASR), where the goal is to transform the content of speech into knowledge that forms the basis for linguistic or cognitive tasks, such as translation into another language. Practical applications include database-query systems, information retrieval systems, and speaker identification and verification systems, as in telebanking. Speech recognition has promising applications in robotics, particularly development of robots that can "hear."

Exercise 1. Answer the questions:

1. What is the major goal of data mining?
2. What does the simplest data structure look like?
3. What may stages in pattern recognition involve?

Exercise 2. Match the left part with the right:

1. Programs can be written	a) toward applications of automatic speech recognition
2. Current research efforts are directed	b) OSI
3. Perhaps the most important computer protocol is	c) international or industrywide organizations.
4. Protocols are established by	d) by assembling sets of these predefined objects in far less time than is possible using conventional procedural languages.

Test questions on the theme.

1 What is the major goal of data mining?
2 What does the simplest data structure look like?
3 What may stages in pattern recognition involve?

Lesson 15

Мета заняття: здатність працювати з різними джерелами, розшукувати, обробляти, аналізувати і синтезувати отриману інформацію.

Read the text. Engineering and computer graphics

The computer revolution has rapidly changed the way the world works. Developments in radio, television, radar, transistors, computers, and robotics have fundamentally altered human life. The field of Computer Engineering is at the epicenter of this development. It encompasses a wide range of topics including operating systems, computer architecture, computer networks, robotics, artificial intelligence, and computer-aided design. Computer engineering is a closely related field concerned with the design and practical application of computer hardware and software systems to the solution of technological, economic, and societal problems. The computer engineer analyzes a problem and selects from a variety of tools and technologies those most appropriate for its solution. A computer engineer can expect to be involved in hardware design, software creation, and systems integration.

Computer graphics is a sub-field of computer science which studies methods for digitally synthesizing and manipulating visual content. Although the term often refers to three-dimensional computer graphics, it also encompasses two-dimensional graphics and image processing. Computer graphics have come long way ahead in terms of technology and creativity.
Computer graphics is one of the most visible and exciting aspects of computer science. And unlike some fields of computer science, it has a rigorous foundation in theory and mathematics. Computer graphics is a very large field. It covers two dimensional and three dimensional graphics and animation, graphics programming, theory, and techniques
Cartoon animation is one such feature that is being used extensively in website designing. In animation different series of drawings are segregated together in order to create movement. Resolution of vision requires at least 24 frames per second in a particular frame.

The term computer graphics includes almost everything on computers that is not text or sound. Today almost every computer can do some graphics, and people have even come to expect to control their computer through icons and pictures rather than just by typing.
The aim of computer graphics is to visualize real objects and imaginary or other abstract items. In order to visualize various things, many technologies are necessary and they are mainly divided into two types in computer graphics: modeling and rendering technologies.

Rendering is the process of generating an image from a model (or models in what collectively could be called a scene file), by means of computer programs. A scene file contains objects in a strictly defined language or data structure; it would contain geometry, viewpoint, texture, lighting, and shading information as a description of the virtual scene. The data contained in the scene file is then passed to a rendering program to be processed and output to a digital image or raster graphics image file. The rendering program is usually built into the computer graphics software, though others are available as plug-ins or entirely separate programs. The term "rendering" may be by analogy with an "artist's rendering" of a scene. Though the technical details of rendering methods vary, the general challenges to overcome in producing a 2D image from a 3D representation stored in a scene file are outlined as the graphics pipeline along a rendering device, such as a GPU. A GPU is a purpose-built device able to assist a CPU in performing complex rendering calculations. If a scene is to look relatively realistic and predictable under virtual lighting, the rendering software should solve the rendering equation. The rendering equation does not account for all lighting phenomena, but is a general lighting model for computer-generated imagery. 'Rendering' is also used to describe the process of calculating effects in a video editing file to produce final video output.

Computer graphics is now used in various fields; for industrial, educational, medical and entertainment purposes. Computer graphics specialists are the experts who use computers and related technologies to create and manipulate electronic images. These specialists apply their talents to three-dimensional cartoons, video games, television and film. They use CAD (computer-aided design) systems to design models of building, cars or entire environments. In the ever-changing world of computer technologies and design, computer graphics specialists must be on the cutting edge of both hardware and software developments.

1. http://dl.acm.org/citation.cfm?id=1242075
2.http://www.sccs.swarthmore.edu/users/08/ajb/tmve/wiki100k/docs/Texture_mapping.html

Ex.1. Answer the questions:

1. What does the field of Computer Engineering encompass? 2. What does computer graphics refer to? 3. What device is able to assist a CPU in performing complex rendering calculations? 4. Which fields is computer graphics used in? 5. What do computer graphics specialists use CAD for? 6. What is the most visible and exciting aspects of computer science? 7. What can computer engineer expect to be involved in?

Ex.2.Match the right part with the left:

1. Computer engineering is a closely related field concerned with ……	a. a general lighting model for computer-generated imagery.
2. If a scene is to look relatively realistic and predictable under ……	b. the design and practical application of computer hardware and software systems to the solution of technological, economic, and societal problems.

3. Computer graphics specialists are the experts who use computers and related technologies …..	c. virtual lighting, the rendering software should solve the rendering equation.
4. The rendering program is usually built into the computer graphics…..	d. to create and manipulate electronic images.
5. The rendering equation does not account for all lighting phenomena, but is …..	e. software, though others are available as plug-ins or entirely separate programs.

Test questions on the theme.

1. What does the field of Computer Engineering encompass?
2. What does computer graphics refer to?
3. What device is able to assist a CPU in performing complex rendering calculations?
4. Which fields is computer graphics used in?
5. What do computer graphics specialists use CAD for?