Міністерство освіти і науки України
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Кафедра іноземних мов

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МЕТОДИЧНІ ВКАЗІВКИ

і навчальні завдання до розвитку мовних, мовленнєвих і соціокультурних компетентностей та навичок самостійної роботи з навчальної дисципліни **«Іноземна мова професійного спілкування (англійська)»** для здобувачів вищої освіти другого (магістерського) рівня за освітньо-професійними програмами:
«Прикладна математика» спеціальності 113 «Прикладна математика» галузі знань 11 «Математика та статистика», «Інформаційні технології в бізнесі» спеціальності 126 «Інформаційні системи та технології» галузі знань 12 «Інформаційні технології», «Прикладна інформатика» спеціальності 122 «Комп'ютерні науки» галузі знань 12 «Інформаційні технології» та «Комп'ютерна інженерія» спеціальності 123 «Комп'ютерна інженерія» галузі знань 12 «Інформаційні технології»
денної та заочної форм навчання

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Методичні вказівки і навчальні завдання до розвитку мовних, мовленнєвих і соціокультурних компетентностей та навичок самостійної роботи з навчальної дисципліни «Іноземна мова професійного спілкування (англійська)» для здобувачів вищої освіти другого (магістерського) рівня за освітньо-професійними програмами: «Прикладна математика» спеціальності 113 «Прикладна математика» галузі знань 11 «Математика та статистика», «Інформаційні технології в бізнесі» спеціальності 126 «Інформаційні системи та технології» галузі знань 12 «Інформаційні технології», «Прикладна інформатика» спеціальності 122 «Комп'ютерні науки» галузі знань 12 «Інформаційні технології» та «Комп'ютерна інженерія» спеціальності 123 «Комп'ютерна інженерія» галузі знань 12 «Інформаційні технології» денної та заочної форм навчання. [Електронне видання] / Тадеєва М. І. – Рівне : НУВГП. 2024. – 50 с.

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ЗМІСТ

ВСТУП

Сучасне трактування цілей освітнього процесу у вітчизняному та зарубіжному просторі вищої освіти тісно пов'язане із завданнями формування в майбутніх фахівців різних галузей основних умінь і компетентностей, які необхідні для успішного проживання в XXI столітті. Серед низки ключових умінь нинішнього століття вчені-педагоги та методисти-практики виділяють комунікативні вміння та здібності. Культуру спілкування сьогодні необхідно послідовно формувати й розвивати в тісному зв'язку з академічними та інформаційними вміннями й готовністю вирішувати комунікативні завдання одночасно рідною та іноземними мовами. Без комунікативної компетентності неможливо здійснювати рефлексію, тобто ефективне планування та проектування особистої освітньої та професійної траєкторії. Важливим засобом формування іншомовної комунікативної компетентності студентів, необхідної в їхній майбутній професійній діяльності, служить іноземна мова професійного спілкування.

Вивчення англійської мови професійного спілкування вкрай необхідне для підготовки досвідчених фахівців у сфері комп'ютерних наук та інженерії, прикладної математики й інформаційних технологій в індустрії та бізнесі. Основними завданнями цієї дисципліни є подальший розвиток мовних, мовленнєвих та соціокультурних умінь і навичок майбутніх магістрів популярної сьогодні IT сфери в усіх видах мовленнєвої діяльності: говорінні, аудіюванні, читанні, письмі та перекладі фахової літератури певної сфери. У процесі вивчення англійської мови професійного спілкування важливо сконцентрувати увагу майбутніх магістрів на таких складових змісту освіти, як предметна інформація, уміння працювати з фаховою літературою, створювати власні продукти (презентації, ессе, портфоліо), брати участь в діловій комунікації.

Запропоновані методичні вказівки та завдання містять предметну інформацію за фахом. Тексти для роботи структуровано за тематичними розділами (прикладна математика, інформаційні технології в бізнесі, комп'ютерні

науки та комп'ютерна інженерія) й відібрано з адаптованих спеціалізованих текстів з вітчизняних та оригінальних англомовних джерел. Також запропоновано низку завдань і вправ для розвитку мовленнєвих умінь та мовних навичок (лексичних, граматичних, орфографічних). У завданнях акцентовано на особливостях галузевої термінології, що сприяє формуванню навичок професійного та ділового міжкультурного спілкування англійською мовою. Важливою складовою курсу є практика перекладу спеціальної фахової літератури та формування в майбутніх магістрів-айтівців здатності працювати в міжнародному контексті.

Мета методичних вказівок і навчальних завдань – допомогти майбутнім фахівцям зазначеної сфери орієнтуватися в потоці англомовної інформації та навчити їх створювати, виділяти та архівувати зібрану інформацію, виділяти базові проблеми галузі інформаційних технологій, комп'ютерних наук, комп'ютерної інженерії та прикладної математики, дотримуватися норм усного і письмового спілкування (на прикладі підготовки доповіді й презентації виступу на науково-практичній конференції, огляду літератури за фахом, написання ессе).

METHODICAL RECOMMENDATIONS FOR MASTER`S STUDENTS IN IT SPHERE

The Structure and Content of ENGLISH for Specific Purposes (ESP) for the students of Applied Mathematics, Information Technologies in Business, Computer Science and Computer Engineering

This subject belongs to the basic components in the Curriculum of training Master`s students in Ukrainian higher educational institutions. The graduates of the second educational level should obtain the English language proficiency level B2+ which ensure their foreign language communicative competence in modern society for effective functioning in academic and professional spheres. Today the university instruction in our country should further develop foreign language communicative competences of Master`s students due to growing trends of their international academic mobility which have been promoted by Bologna agreements. According to the Common European Framework of Reference for Languages (2001) the content of professional training realization of future Master`s students should be closely connected with their foreign language skills and aptitudes.

The principles of ESL Curriculum construction for the future Masters of Science are based on the ideals of internationalism, democracy and equal opportunities of young people to have access to language learning and teaching. Based on the principle of plurilingualism the Curriculum is adapted to European academic space and it opens wide international opportunities for the students. The innovative character of the Curriculum is defined by the influence of the following factors: developing intercultural and interlanguage communication and supporting the students` opportunities to sociocultural studies.

The language skills of the students are directed to the knowledge and aptitudes to use lexical, grammatical, semantic and orthographic norms of this or that language which are important components of the professional communicative competence. This competence is connected with the ability to use foreign language for communication in real life academic and job related fields and situations of professional communication. Due to the fact that the

Master`s degree programs are diverse, there are no unified recommendations to the construction of Core Curriculum learning objectives and Course design. Professional communicative competence includes the development of linguistic skills by means of performing job oriented tasks, projects, presentations, exercises and learning special vocabulary in the sphere (terminology). For highly developed competence in the professional communication will be mandatory to use team teaching by language and subject specialists and also personal motivation intentions of the future professionals in Computer Engineering, Computer Science, Applied Mathematics and Information Technologies in Business.

The Main Requirements for Syllabus Design

The English for Specific Purposes Syllabus is directed on the students with B1+ proficiency level on the period of admission. It includes two modules which consist of job related skills and the bases of business communication in professional sphere. The aim of the ESP course is to develop English language competence of students on the frames of effective communication in the academic and special professional environment.

The objectives of the course:

- understand the main ideas and content of information in the processes of debates, formal discussions, talks, lectures;
- read and understand authentic texts, special literature from professional journals or Web-based resources;
- know the bases of understanding instructions, specifications for operating devices, instruments and other types of equipment;
- equire the skills how to make professional correspondence of different types (letters, e-mail communication etc.);
- participate in different students` forums (seminars, debates, scientific and practical conferences, meetings);
- react to the messages, instructions in engineering environment;
- prepare individual presentations on the topics of computer engineering, computer sciences and applied mathematics, information technologies in business;
- write professional correspondence, business correspondence (CV, letter of application for employment, cover letter, resume); take part in job interview in order to receive a nice job ;
- prepare academic assignments, reports, reviews in standard norms;
- write an essay on the actual problem of engineering.

The Content of the Curriculum in ESP for Master` s Students is based on international levels of proficiency and corresponds to the national qualification levels. It includes the professionally oriented content (fields of subject knowledge), situational context, pragmatic skills and abilities. The purpose of the Curriculum is to help students to achieve language proficiency on B2+ and C1 levels. For this aim

realization students` academic activities should be concentrated on the development of their foreign language communicative competence which includes the skills in the following areas: language and linguistic competences, socio-cultural competence, professional communicative competence. In this aspect the defined competences are characterized from the point of view of students` language behavior in specialism- related spheres and situations of every day academic and professional activities.

Language skills are treated as integral part of linguistic competence and can be formed with help of speaking skills, skills in listening comprehension, reading and writing skills and skills of translation and reviewing specialism-related literature. In this case the students should develop their personal study skills which benefit to the creation of learning opportunities and learning environment.

Linguistic competence of Master`s students means knowledge, skills and abilities to use correctly such language forms as lexical, grammatical, phonological, semantic and orthographic ones. Lexical competence deals with the skills of selection of lexical elements including terminology in a separate sphere (profession). Grammatical competence is connected with knowledge and abilities to use grammatical forms and resources of language which help to perform communicative tasks. Semantic competence which deals with learning professional terminology is closely connected with skills of controlling the organization of meaning. Phonological and socio-cultural competences of students are obligatory to develop in all stages of tertiary education. And professional communicative competence is considered to be as the highest result by the end of the ESP course.

Professional skills as the integral part of professional communicative competence are formed during the following types of language activities, such as listening comprehension, speaking activities, reading of different kinds, writing (essay) and translation of special texts.

1. Students` professional skills in listening comprehension should include the abilities:

- to understand the main content and ideas in extended discussions, debates, seminars, other types of conversations dealing with special field of engineering;

- to understand in detail the telephone conversations and situations of business meetings and negotiations;
- to identify speakers attitude ant reaction in business and professional communication processes;
- to differentiate the people`s talks with fellow students, colleagues, employers, representatives of different age and social groups, etc.

2. Speaking activities of students should combine the abilities to produce dialogues and monologues :

- to take an active part in professional forums, meetings, conferences in academic and professional context;
- to carry out fluent interview, report on academic and field related topics;
- to develop the skills on analysis and logical skills in discussion of important problems in engineering sphere;
- to react appropriately speaking in situations of everyday life problems, social, academic, engineering problems;

3. Reading skills and abilities should be of the following types:

- to receive information, ideas, answers for the questions independently from a wide range of modern resources, such as specialism related texts, articles, text books, journals, etc;
- to read and understand the information from field related texts paying attention to terminology, abbreviations and using reference sources;
- to know how to do information search in the Internet and in library catalogues;
- to understand the meaning of correspondence related to professional field;
- to react on the important instructions and rules from reference books using the field related vocabulary and terminology and the help of special dictionaries.

4. Writing skills should be formed of the next types:

- to know how to write business and professional letters with the aim of searching for a job, describing personal data, experiences in academic and professional activities;
- to write field related essays giving arguments and personal attitudes towards current problems of special engineering;

- to note the important information during the lectures, seminars, workshops, conferences.

5. Translation skills obtained:

- to read and translate with the help of dictionaries texts which contain the information about the developments in specialism related engineering;
- to understand the main ideas and principles how to do different types of translation (adequate translation, review, annotation);
- to prepare personal glossary (to 100 terms) in the special field of engineering.

Another important Master`s students activity in the course of English for Specific Purposes is project work development. Project work gives the opportunity for them to move from the university studied to the world of engineering profession in social life with help of modern information communicational technologies. In the process of project development students learn to work in small groups (team work) sharing ideas, approaches, resources, using their communication styles and creative abilities. Thus, students demonstrate during the project work more cooperation than competition skills in order to develop a joint product. Usually the students` projects can obtain the following final forms: presentation, review, report, small experimental product, poster session, etc.

Project work is closely connected with combination of skill-based and traditional practical classroom activities. It comprises the following stages of its development: 1) preliminary discussion of the main problem of the project, 2) setting the project objective, 3) creation of the plan, 4) language activities, 5) the main research part of the project, 6) collecting the data for the project, 7) recommendations and propositions from the team members, 8) generating the final variant of the project, 9) presentations of project results for discussion, 10) evaluation procedures. During project work development are usually used a number of pedagogical forms and methods, among them we practice brainstorms, working in the team, mapping out project stages, discussing the students` plans, making participants aware of evaluation criteria, demonstration of

presentation. The language skills which the future masters obtain during the project development should be of the following types:

- listening skills (for details, for different attitudes, for teacher`s opinion),

- speaking skills (the art of discussion, arguing, giving relevant explanations, proposing new ideas, responding to the questions and expressing personal ideas, interpreting data,

- reading skills (reference to prior reading, intensive and extensive reading, reading with understanding of main ideas of the texts, making plan and summary of the texts) ,

- writing skills (using professional vocabulary for preparation of an esseys, describing the content of texts, note-making work, personal propositions, filing a number of forms).

- The Syllabus in ESP for Master`s students in Applied Mathematics, Information Technologies in Business, Computer Science, and Computer Engineering is based on the Core ESP Curriculum and should be realized through the main aims: 1) practical, 2) educational, 3) developmental, 4) cognitive, 5) socio-cultural. The Syllabus plan and structure (two modules) is developed by the staff of the foreign languages department of the university with the credits and hours defined in the degree program. The first module deals with business communication (searching the job, application documents – resume, cover letter, job interview) and the second one is connected with tools and techniques of field related communication (reading and translation of texts, types of translation, learning terminology, extra linguistic means of communication, preparing presentation and annotation to graduate Master`s paper, academic writing (essay)).

Unit I. Reading activities

Different types of reading is the integral part of formation the professional foreign language communicative competence of the future IT professionals. Reading field related texts has the aim to develop students` abilities to find and select the relevant information on general and special topics on computer engineering, computer sciences, information technologies and applied mathematics. By the end of the course students should be able to: 1) understand the main ideas of authentic texts in the sphere of this type of engineering (equipment, appliances, devices, innovative technologies, inventions), 2) work with professional correspondence in these spheres, 3) distinguish between relevant and non-relevant information, important and less important facts and phenomena, 4) guess the meaning of unfamiliar word combinations from the context, 5) use the terminology of the sphere, 6) read the sociocultural information with critical thinking and creative approach.

Texts for Reading and Problem-Solving Tasks

Text 1. On the Way from Pure Mathematics to Applied Mathematics

Applied mathematics is the branch of mathematics that focuses on the practical application of mathematical principles to solve real-world problems. Unlike pure mathematics, which is primarily concerned with abstract concepts and theoretical developments, applied mathematics seeks to use mathematical methods and techniques to address specific challenges in various fields such as science, engineering, economics, and computer science.

One of the key aspects of applied mathematics is its interdisciplinary nature. Applied mathematicians collaborate with professionals in other fields to develop mathematical models, algorithms, and computational techniques that can be used to analyze data, make predictions, optimize processes, and design systems. These collaborations often involve translating real-world problems into mathematical formulations, solving mathematical equations or

simulations, and interpreting the results in the context of the original problem.

Applied mathematics encompasses a wide range of areas, including:

- Mathematical Modeling which involves creating mathematical representations of real-world phenomena, systems, or processes. Models may be deterministic or stochastic and can range from simple analytical expressions to complex numerical simulations.

- Numerical Analysis which deals with the development and analysis of algorithms for solving mathematical problems numerically. This includes techniques for approximation, interpolation, integration, optimization, and solving differential equations.

- Statistics and Probability helps applied mathematicians use statistical methods and probability theory to analyze data, estimate parameters, test hypotheses, and make predictions. These techniques are widely used in fields such as finance, insurance, healthcare, and market research.

- Optimization involves finding the best solution to a problem from a set of feasible alternatives. Applied mathematicians develop optimization algorithms and techniques to optimize resource allocation, production processes, logistics, scheduling, and decision-making.

- Dynamical Systems theory studies the behavior of systems that evolve over time. Applied mathematicians use dynamical systems theory to analyze stability, predict future states, and control the behavior of complex systems in physics, biology, ecology, and engineering.

- Operations Research applies mathematical methods to optimize decision-making and resource allocation in complex systems. It includes techniques such as linear programming, integer programming, network optimization, queuing theory, and game theory.

- Computational Science combines mathematical modeling with computer simulation and numerical analysis to study complex systems and phenomena. Applied mathematicians develop computational algorithms and software tools to simulate and analyze physical, biological, and social processes.

Overall, applied mathematics plays a vital role in addressing practical challenges and advancing knowledge across various disciplines. By providing mathematical tools and techniques for problem-solving, analysis, and optimization, applied mathematicians contribute to scientific discoveries, technological innovations, and improvements in society's well-being.

Several famous scientists have made significant contributions to the field of applied mathematics, shaping our understanding of the natural world and revolutionizing technology and industry. Here are some notable figures and their contributions:

1. Isaac Newton (1643-1727): Newton is perhaps best known for his contributions to physics and calculus. His development of the mathematical principles of calculus laid the foundation for modern applied mathematics, enabling the precise description and analysis of physical phenomena such as motion, gravity, and fluid dynamics.

2. Leonhard Euler (1707-1783): Euler was a prolific mathematician whose work spanned many areas of mathematics, including calculus, number theory, and graph theory. His contributions to applied mathematics include the development of the Euler method for solving ordinary differential equations, as well as numerous theorems and formulas in mechanics, fluid dynamics, and geometry.

3. Joseph-Louis Lagrange (1736-1813): Lagrange made significant contributions to mechanics and mathematical analysis. His work on the calculus of variations laid the groundwork for optimization theory, while his formulation of Lagrangian mechanics revolutionized the study of classical mechanics and celestial mechanics.

4. Carl Friedrich Gauss (1777-1855): Gauss was a pioneering mathematician who made fundamental contributions to number theory, algebra, and geometry. His work on the method of least squares laid the foundation for statistical analysis and regression analysis, while his contributions to differential geometry and magnetic theory had profound implications for physics and engineering.

5. George Boole (1815-1864): Boole was a mathematician and logician who is best known for his development of Boolean algebra. His work laid the foundation for modern computer science and digital

logic, enabling the development of digital computers and electronic circuits

6. Henri Poincaré (1854-1912): Poincaré was a French mathematician who made significant contributions to topology, celestial mechanics, and dynamical systems. His work on the three-body problem in celestial mechanics laid the foundation for chaos theory, while his contributions to topology had a profound impact on modern mathematics and theoretical physics.

7. Alan Turing (1912-1954): Turing was a British mathematician and computer scientist who is best known for his work on computability theory and the development of the Turing machine, a theoretical model of computation. His work laid the foundation for modern computer science and artificial intelligence, revolutionizing the way we think about computation and information processing.

These are just a few examples of the many scientists who have made significant contributions to applied mathematics. Their work continues to inspire and influence researchers in fields ranging from physics and engineering to biology and economics, shaping our understanding of the world and driving technological innovation. In the realm of modern science, numerous scientists continue to make groundbreaking contributions to applied mathematics, pushing the boundaries of knowledge and innovation. Here are some notable contemporary scientists and their impactful contributions to the field: Terence Tao, Ingrid Daubechies, Cedric Villani, Maryam Mirzakhani, Stephen Wolfram, Elon Musk, Katherine Johnson.

1. Terence Tao has made significant contributions to various areas of mathematics, including harmonic analysis, partial differential equations, and number theory. His work on the distribution of prime numbers and the Navier-Stokes equations has advanced our understanding of complex mathematical phenomena and has practical implications in physics and engineering.

2. Ingrid Daubechies is a prominent mathematician known for her pioneering work in wavelet theory and signal processing. Her research laid the foundation for the development of wavelet transforms, which have become essential tools in data compression, image processing, and digital communications.

3. Cédric Villani is a Fields Medal-winning mathematician whose research focuses on mathematical physics, kinetic theory, and optimal transport. His work on the theory of nonlinear Landau damping has implications for understanding plasma physics and astrophysics, while his contributions to optimal transport theory have applications in economics, biology, and meteorology.

4. Maryam Mirzakhani (1977-2017 was a pioneering mathematician who made significant contributions to the study of Riemann surfaces and hyperbolic geometry. She became the first woman to win the Fields Medal in 2014 for her groundbreaking work on the dynamics and geometry of moduli spaces of Riemann surfaces.

5. Stephen Wolfram is a computer scientist and mathematician known for his work in computational complexity theory, cellular automata, and symbolic computation. He is the creator of Mathematica, a widely used software system for mathematical computation, and Wolfram Alpha, a computational knowledge engine.

6. While primarily known for his work in entrepreneurship and technology, Elon Musk has also made contributions to applied mathematics through his ventures in space exploration and transportation. His companies SpaceX and Tesla utilize advanced mathematical modeling and optimization techniques to design rockets, spacecraft, and electric vehicles.

7. Katherine Johnson (1918-2020 was a pioneering mathematician whose calculations were critical to the success of NASA's space missions, including the Apollo moon landing. Her work in celestial mechanics and orbital dynamics helped ensure the accuracy and safety of spaceflight trajectories.

These contemporary scientists exemplify the ongoing pursuit of knowledge and innovation in applied mathematics, with their research and discoveries continuing to shape our understanding of the natural world and drive technological advancements that benefit society as a whole.

Mathematical methods serve as foundational tools across various scientific disciplines, facilitating the analysis, modeling, and understanding of complex phenomena. Here's how mathematical methods are applied in physics, engineering, medicine, biology, and linguistics.

Physics relies heavily on mathematical methods to describe the fundamental laws and principles governing the universe. Mathematical equations, such as those in classical mechanics, electromagnetism, quantum mechanics, and general relativity, provide precise descriptions of physical phenomena, enabling predictions and theoretical explanations. Additionally, mathematical techniques such as calculus, differential equations, linear algebra, and Fourier analysis are used to solve complex problems and derive mathematical models of physical systems.

Engineering disciplines, including civil, mechanical, electrical, and aerospace engineering, employ mathematical methods to design, analyze, and optimize systems and structures. Mathematical modeling is used to simulate and predict the behavior of mechanical and structural systems, electrical circuits, fluid dynamics, heat transfer, and more. Numerical methods, such as finite element analysis and computational fluid dynamics, enable engineers to solve complex engineering problems and optimize designs for performance, efficiency, and safety.

In medicine, mathematical methods are used to analyze biological systems, model physiological processes, and develop medical technologies and treatments. Mathematical modeling of biological processes, such as the spread of infectious diseases, the dynamics of cellular signaling pathways, and the pharmacokinetics of drugs, helps researchers understand disease mechanisms and develop interventions. Medical imaging techniques, such as MRI, CT scans, and ultrasound, rely on mathematical algorithms for image reconstruction, signal processing, and data analysis.

Mathematical methods play a crucial role in biological research, enabling the quantitative analysis of biological data and the modeling of biological systems. In genetics and genomics, mathematical techniques are used to analyze DNA sequences, study gene expression patterns, and predict protein structures and functions. Mathematical modeling of population dynamics, ecological systems, and evolutionary processes helps biologists understand biodiversity, ecosystem dynamics, and the impact of environmental factors on living organisms.

Mathematical methods are increasingly used in linguistics to study language structure, semantics, and communication patterns. Computational linguistics applies mathematical and computational techniques to analyze linguistic data, develop natural language processing algorithms, and build language models for machine translation, speech recognition, and information retrieval. Statistical methods, such as probabilistic models and machine learning algorithms, are used to analyze large corpora of linguistic data and extract patterns and relationships between words, sentences, and documents.

Thus, mathematical methods serve as powerful tools for scientific inquiry and discovery across diverse disciplines, enabling researchers and practitioners to tackle complex problems, make predictions, and derive insights that advance knowledge and innovation in physics, engineering, medicine, biology, and linguistics.

Task 1. Memorize the essential vocabulary to the text and try to use it future reading, speaking and writing activities.

Task 2. Read the text and translate it, pay attention to the field related terminology.

Task 3. Divide the text into the sections and present their content in the form of interview.

Task 4. Discuss the following questions dealing with branches of applied mathematics in small groups:

1) What is your understanding of applied mathematics?
2) What is your favorite area or branch of applied mathematics? Why?
3) What can you say about the role of statistics and probability theory in data analysis?
4) How can you define the mathematical modeling?

Task 5. Prepare reports or presentations about the life and scientific contribution of famous personalities in the field of applied mathematics.

Task 6. Render the content of the text how mathematical methods are applied in different spheres of modern life, such as physics, engineering, medicine, biology, ecology, linguistics etc.

Task 7. Put the verb in brackets in the Past Indefinite Active or Passive and translate the text into Ukrainian.

Great minds of Greece such as Thales, Pythogoras, eudoxus, Euclid, Appolonius (to produce) an amazing amount of first-class mathematics. The fame of these mathematicians (to spread) to all corners of the Mediterranean world and (to attract) numerous pupils. Masters and pupils (to gather) in schools which though they had few buildings and no campus (to be) truly centers of learning. The teaching of these schools (to dominate) the entire life of the Greecs.

Despite the unquestioned influence of Egypt and Babylonia on Greek mathematicians, the mathematics produced by the Greeks (to differ) fundamentally from that which (to proceed) it. It (to be) the Greeks who (to found) mathematics as a scientific discipline. The Pythagorean school (to be) the most influential in determining both the nature and content of Greek mathematics. Its leader Pythagoras (to found) a community which (to embrace) both mystical and rational doctrines. The original Pythagorean brotherhood (to be) a secret aristocratic society whose members (to prefer) to operate from behind the scenes and, from there, to rule social and intellectual affairs with the iron hand.

Task 8. Use the following word-combinations in sentences of your own: a definition of applied mathematics, a specified conditions, familiar from the study, mathematical modeling, numerical analysis, dynamic systems, statistics and probability, mathematical methods in linguistics, operations research, computational science.

Task 9. Translate into Ukrainian, paying attention to the italicized word-combinations.

1) Applied mathematics in modern sense of the term was not the creation of the engineer or *the engineering – minded mathematician.*

2) Fermat, despite of the brief amount of time he was able to spend on mathematics and *the pleasure – seeking attitude* with which he approached it, established himself as one of the truly great mathematicians of all times.

3) The death of Archimedes at the hands of Roman soldier is highly symbolic: *the theoretically – minded Greeks* with their love of abstract science, were replaced in the leadership of the European world by the practical Romans.

4) *Practically – minded Rome* which devoted its energies to administration and conquests, produced little that was truly creative and original.

5) To *the pleasure – loving*, Alexandria offered bazars, baths, parks, theatres, libraries, a hippodrome, a race course and homes for the wealthy.

Task 10. Prepare to the talk with your fellow students in the form of dialogue about the important problems of applied mathematics:

1. The sources of applied mathematics.
2. Mathematics in Europe.
3. Famous Ukrainian personalities in pure and applied mathematics.
4. The interconnections of mathematics and cybernetics.

Text 2. Information Technologies in Business: from Theory to Modern Practices

Information technologies (IT) have revolutionized the way businesses operate, providing tools and solutions that enhance efficiency, productivity, and competitiveness. Here's a foundational text outlining how information technologies have been utilized in business. Information technologies have become integral to modern business operations, transforming the landscape of commerce and industry. From small startups to multinational corporations, organizations of all sizes leverage IT to streamline processes, improve decision-making, and drive innovation.

One of the primary applications of information technologies in business is in the realm of data management and analysis. Advanced databases, analytics software, and artificial intelligence algorithms enable companies to collect, store, and analyze vast amounts of data, extracting valuable insights that inform strategic planning, marketing campaigns, and operational improvements.

Communication and collaboration are also greatly facilitated by information technologies. Email, instant messaging, video conferencing, and collaborative platforms allow employees to communicate seamlessly across different locations and time zones, fostering teamwork and enabling remote work arrangements.

Moreover, the internet has opened up unprecedented opportunities for businesses to reach customers and markets worldwide. E-commerce platforms, digital marketing channels, and social media networks provide avenues for companies to promote their products and services, engage with customers, and expand their reach beyond traditional boundaries.

Information technologies also play a crucial role in enhancing customer experience and relationship management. Customer relationship management (CRM) systems, for example, enable companies to track interactions with customers, personalize marketing efforts, and deliver superior service and support. Furthermore, information technologies enable automation and optimization of various business processes, from supply chain management to financial transactions. Enterprise resource planning (ERP) systems integrate core business functions, such as accounting, human resources, and inventory management, streamlining operations and improving efficiency.

Thus, information technologies have become indispensable tools for businesses in today's digital age. By harnessing the power of IT, organizations can adapt to changing market dynamics, capitalize on emerging opportunities, and maintain a competitive edge in an increasingly complex and interconnected world.

Information technologies have become an essential component of modern business, contributing to efficient management, increased productivity, and expanded capabilities. Here are the key aspects to consider:

-Information Management Systems (IMS): These systems allow organizations to collect, store, process, and analyze large volumes of data for managerial decision-making. They include databases, data analytics software, and other tools.

-Electronic Communication Information Systems: These systems enable businesses to communicate with customers, partners, and employees through email, chats, video conferences, and other tools.

-Internet: The internet serves as the foundation of modern business infrastructure, providing access to a vast array of resources,

information, and opportunities. It is used for e-commerce, marketing, remote work, and collaboration.

-Communication Networks: Communication networks, such as local area networks (LANs), wide area networks (WANs), and wireless networks, facilitate connectivity between different devices and resources, enabling the exchange of information and resources.

-Client Computers: These are the primary devices used by employees to work with information systems and applications. They can be desktops, laptops, or mobile devices, connecting to corporate networks to access resources.

The development of information technologies (IT) in business is dynamic, with constant innovation driving new perspectives and directions. Here's a foundational facts outlining the main perspectives and directions of IT development in business: Information technologies continue to evolve, shaping the way businesses operate and interact in the digital age. Several key perspectives and directions define the trajectory of IT development in business:

-Digital Transformation: Businesses are undergoing digital transformation, leveraging IT to reimagine processes, business models, and customer experiences. This involves the integration of digital technologies across all aspects of operations, from marketing and sales to supply chain management and customer service.

-Data-driven Decision Making: With the proliferation of big data and analytics tools, businesses are increasingly relying on data-driven decision-making processes. Advanced analytics, machine learning, and artificial intelligence enable organizations to extract valuable insights from large datasets, informing strategic decisions and driving competitive advantage.

-Cloud Computing: Cloud computing has revolutionized the way businesses access and utilize IT resources. Cloud-based services offer scalability, flexibility, and cost-efficiency, allowing organizations to deploy applications, store data, and access computing power on-demand, without the need for extensive infrastructure investment.

-Cyber Security and Risk Management: As businesses become increasingly reliant on digital technologies, cybersecurity has emerged as a critical concern. Protecting sensitive data, securing networks, and

mitigating cyber threats are top priorities for organizations, driving investment in cybersecurity solutions and risk management strategies.

-Artificial Intelligence and Automation: Artificial intelligence (AI) and automation technologies are transforming business operations, enabling process automation, predictive analytics, and personalized customer experiences. AI-powered chatbots, virtual assistants, and robotic process automation are increasingly being deployed across various industries to streamline workflows and enhance efficiency.

-Internet of Things is revolutionizing business operations by connecting devices, sensors, and machines to the internet, enabling real-time data collection and analysis. IoT applications span industries, from manufacturing and logistics to healthcare and smart cities, driving efficiency, productivity, and innovation.

-Blockchain technology has the potential to revolutionize business processes by providing secure, transparent, and decentralized systems for recording transactions and data. Applications of blockchain extend beyond cryptocurrencies to areas such as supply chain management, digital identity verification, and smart contracts.

-Sustainability and Green IT: Sustainability has emerged as a key focus area for businesses, driving the adoption of green IT practices and technologies. From energy-efficient data centers to eco-friendly IT equipment and renewable energy solutions, businesses are striving to minimize their environmental footprint while maximizing efficiency and performance.

The development of information technologies in business is multifaceted, encompassing a range of perspectives and directions. From digital transformation and data-driven decision-making to cybersecurity, AI, and blockchain, businesses must navigate a complex landscape of technologies to stay competitive and meet the evolving needs of customers and stakeholders.

Information technologies play a crucial role in modern businesses across various industries, driving efficiency, innovation, and competitiveness. Here are ten examples of how information technologies are utilized in business:

1. E-commerce Platforms: Online retail businesses rely heavily on e-commerce platforms to reach customers worldwide. These

platforms enable businesses to showcase their products, process transactions securely, manage inventory, and provide seamless shopping experiences for customers.

2. Customer Relationship Management Systems are used by businesses to manage interactions with current and potential customers. These systems track customer data, communication history, purchase behavior, and preferences, allowing businesses to personalize marketing efforts, improve customer service, and foster long-term relationships.

3. Supply Chain Management Software helps businesses streamline the flow of goods and services from suppliers to customers. These systems optimize inventory management, logistics, procurement, and distribution processes, reducing costs, minimizing delays, and enhancing supply chain visibility and efficiency.

4. Enterprise Resource Planning Systems integrate core business functions, such as finance, human resources, manufacturing, and sales, into a unified platform. These systems provide real-time insights into business operations, streamline processes, improve collaboration, and facilitate data-driven decision-making across the organization.

5. Business Intelligence and Analytics Tools enable businesses to analyze large volumes of data to uncover actionable insights and trends. These tools help businesses identify opportunities, forecast demand, optimize pricing strategies, and monitor key performance indicators (KPIs) to drive informed decision-making and achieve strategic objectives.

6. Cloud Computing Services offer businesses scalable and cost-effective solutions for storing, processing, and accessing data and applications over the internet. Businesses leverage cloud platforms for hosting websites and applications, running virtual servers, storing data backups, and enabling remote work and collaboration.

7. Digital Marketing Tools, such as social media platforms, email marketing software, search engine optimization (SEO) tools, and analytics platforms, enable businesses to reach and engage target audiences effectively. These tools facilitate customer acquisition, brand building, lead generation, and conversion tracking in today's digital landscape.

8. Collaboration and Communication Platforms, such as project management software, video conferencing tools, and messaging apps, facilitate seamless collaboration among team members, regardless of location. These platforms enable real-time communication, file sharing, task management, and project coordination, enhancing productivity and teamwork.

9. Cybersecurity Solutions: With the growing threat of cyber attacks and data breaches, businesses invest in cybersecurity solutions to protect their sensitive information, systems, and networks. These solutions include firewalls, antivirus software, encryption tools, intrusion detection systems (IDS), and security awareness training programs to safeguard against cyber threats and ensure regulatory compliance.

10. Mobile Applications enable businesses to extend their reach and engage customers on mobile devices. Businesses develop mobile apps for sales, marketing, customer support, and internal operations, providing users with convenient access to products, services, and information anytime, anywhere.

Thus, information technologies empower businesses to operate more efficiently, innovate faster, and deliver superior experiences to customers and stakeholders. From e-commerce platforms and CRM systems to cloud computing services and cybersecurity solutions, businesses leverage a wide range of IT tools and technologies to stay competitive and thrive in today's digital economy.

Task 1. Memorize the essential vocabulary and terminology from the text and try to use it in your reading, speaking and writing activities.

Task 2. Read and translate the text, divide it into sections, discuss each section with your fellow students in the form of interview.

Task 3. Answer the following questions on the content of the text:

1) What do you know about the sources of information technologies in business?

2) What are the basic characteristics of information technologies which have been used in different spheres of modern society?

3) Can you prove the fact that information technologies play a crucial role in modern business, finance, commerce, education etc.?

4) What is the influence of information technologies on the development of economy and marketing?

5) What do you know about the kinds and types of information technologies which are widely used in business activities?

6) What is the function of Internet and other social nets in modern business development?

7) Do you know any interesting facts about the life and contributions of famous people into information technologies sphere?

8) Have you read interesting facts dealing with E-commerce?

9) What are the most important innovations in business sphere of the 21st century?

10) Do you think that digital tools proved to be the most dynamically developed things facilitating customers acquisition, brand building, task management and project coordination?

Task 4. Speak about the main duties of professional in IT in business using the following expressions: to have advanced experience in working in social nets, to cope with customer relationship management systems, to use advanced methods of E-commerce, to solve problems dealing with in collaboration and communication platforms, to monitor the performance of mobile applications, to have a clear view of cyber security solutions.

Task 5. Compose short dialogues about the Internet of Things functioning.

Task 6. Make a three-minutes speech on the following topics:

a) How to use information technologies in marketing.

b) The role of cloud computer services in modern business.

c) The 21st century business opportunities.

d) The most important components of business communication.

Task 7. Discuss the following problems in small groups and propose the most interesting ideas of their solution. Use specific examples and arguments to support your opinion: 1) Do you agree with the fact that it is important to use Internet not only for transferring data but also for playing games? Give your reasons. 2) What are the main attractions and disadvantages of E-commerce?

Task 8. Imagine that you are launching your own business. To start with make a list of advantages and disadvantages of every form of business and then tell us about the decision you have arrived at. Use the following expressions in the sentences of your own: outstanding achievement, to follow directions, to begin a career of entrepreneur, ownership of a corporation, to pay taxes, to receive dividends, to use information technologies in business.

Task 9. Fill the blanks with the correct word. Make any necessary changes in the form of the word. Use each word only once.

Nouns: core, contributions, components, market, upheaval.

Verbs: hesitate, support, reach.

Adjectives: entire, basic.

Adverbs: steadily, periodically.

1. Company sales … one billion dollars before they started to go down.
2. The … class came to the lecture, no one stayed at home.
3. Students take … mathematics before they study geometry.
4. The magnetic core was one of his … to computer technology.
5. There is no longer a large … for typewriters, most people are buying word processors.
6. Sales increased … : each year they doubled their money.
7. Some people … the arts center by working there for free. Others give money.
8. It`s important to review … what you have already learned.
9. He … before making a decision because he didn`t understand the problem.
10. The central part of something is the … .
11. During the … in the company many people lost their jobs.
12. A computer has many … .

Task 10. Use either the past tense or the past perfect tense in the following sentences. In some cases either tense may be possible.

1. When he came to the United States, he (not/have) ------ a job.
2. He (start) ------ his business when he (save) ------- up enough money.
3. By the time he arrived here, the war (end) -------.

4. He (be) ------- a physics student before he (enter) ------ the computer science program.

5. He (get) ------ his Ph. D. by the time he was twenty three.

6. During his lifetime he (contribute) ------- money to cultural programs in Boston.

7. Dr. Wang (invent) ------. The magnetic core while he was working at Harvard.

8. It wasn`t hard for him to market his invention because he (know) ----- many people in the computer industry.

9. After he become rich, he (not/change) ------ his lifestyle.

10. Dr. Wang (receive) the Liberty Medal in 1986.

Text 3. Computer Science: Generations of Computers and Popular Programming Languages

The history of computer science is a captivating journey that spans centuries, evolving from humble beginnings to become an integral part of modern society. Let's embark on this voyage through time. The roots of computer science can be traced back to ancient civilizations, where rudimentary devices were used for calculation and data storage.

However, it was in the 19th century that significant advancements began to take shape. Charles Babbage, often regarded as the "father of the computer," conceptualized the idea of a programmable mechanical device called the Analytical Engine in the 1830s. Though never fully realized during his lifetime, Babbage's work laid the groundwork for future innovations in computing

The true birth of computer science as a formal discipline occurred in the mid-20th century with the advent of electronic computers. During World War II, efforts to break enemy codes led to the development of machines like the Colossus and the ENIAC, which heralded the dawn of the digital age. Pioneers such as Alan Turing, John von Neumann, and Grace Hopper made groundbreaking contributions to the theoretical and practical aspects of computing, laying the foundation for the field as we know it today.

The development of computers can be categorized into distinct generations, each marked by significant advancements in technology

and capabilities. These generational shifts have played a crucial role in shaping the evolution of computing. Let's explore each generation in turn:

First Generation (1940s-1950s) of computers emerged during and after World War II. These machines were massive, room-sized devices that relied on vacuum tubes for processing and magnetic drums for memory. Examples include the ENIAC (Electronic Numerical Integrator and Computer) and UNIVAC (Universal Automatic Computer). Programming was done using machine language, and input/output was typically through punched cards or paper tape.

Second Generation (1950s-1960s) saw the introduction of transistors, which replaced vacuum tubes, leading to smaller, faster, and more reliable computers. Magnetic core memory replaced magnetic drums, offering improved storage capacity and access times. High-level programming languages such as FORTRAN and COBOL began to emerge, making programming more accessible to a broader range of users.

Third Generation (1960s-1970s) witnessed the development of integrated circuits (ICs), which further miniaturized electronic components and increased computing power. Mainframe computers became more prevalent, offering improved performance and capabilities for business and scientific applications. Time-sharing systems allowed multiple users to access a single computer simultaneously, paving the way for interactive computing.

Fourth Generation (1970s-Present) brought about the era of microprocessors, which combined the CPU and other components onto a single chip, leading to the creation of personal computers (PCs). Advances in semiconductor technology continued to drive improvements in speed, efficiency, and affordability. The proliferation of PCs and workstations democratized computing, empowering individuals and businesses with unprecedented computational power and flexibility.

Fifth Generation (Present and Beyond) is characterized by advancements in areas such as artificial intelligence, parallel processing, and quantum computing. AI technologies, including machine learning and natural language processing, are enabling

computers to perform tasks traditionally requiring human intelligence. Parallel processing architectures are unlocking new levels of computational performance by harnessing the power of multiple processors working together simultaneously. Quantum computing holds the promise of solving complex problems exponentially faster than classical computers by leveraging the principles of quantum mechanics.

These generations represent milestones in the ongoing evolution of computers, driven by relentless innovation and the quest for ever-greater computational power and efficiency. Each generation builds upon the achievements of its predecessors, pushing the boundaries of what is possible and shaping the future of computing.

As computer technology advanced, various branches of computer science emerged to address specific challenges and applications. Here are some key branches. Algorithm and Complexity Theory deals with the study of algorithms, their efficiency, and computational complexity. It aims to understand the fundamental limits of what can be computed efficiently.Artificial Intelligence (AI) and Machine Learning focuses on creating intelligent systems that can simulate human intelligence, while machine learning is a subset of AI that involves building algorithms that enable computers to learn from data and make predictions. Computer Architecture and Systems encompass the design and implementation of computer systems, including hardware components such as processors, memory, and input/output devices, as well as the software that controls them. Computer graphics involves the creation, manipulation, and rendering of visual content, while visualization focuses on representing data visually to aid in understanding and analysis. Computer Networks and Security deals with the design, implementation, and management of computer networks, as well as strategies for protecting them from unauthorized access and other security threats. Database systems involve the design, implementation, and management of databases, which are organized collections of data that can be accessed and manipulated using specialized software. Software Engineering focuses on the principles, techniques, and best practices for developing high-quality software systems, including requirements analysis, design, coding, testing, and maintenance. Theory of

Computation explores the mathematical foundations of computing, including formal languages, automata theory, and computability theory. These branches, along with many others, collectively contribute to the rich tapestry of computer science, driving innovation and shaping the technological landscape of the modern world. As we continue to push the boundaries of what is possible, the history of computer science remains a testament to human ingenuity and the relentless pursuit of knowledge.

Let us consider programming languages as the foundation of modern computer software and technology, serving as the means by which humans communicate instructions to computers. These languages provide a structured way to write code that computers can understand and execute. Let's delve into the basics of programming languages: what is a Programming Language?

A programming language is a formal set of rules and syntax used to create sequences of instructions, known as code, that tell a computer how to perform specific tasks or solve problems. These languages are designed to be both human-readable and machine-executable. Programming languages can be broadly classified into several categories based on their design and intended use:

1.Low-level languages: these languages, such as machine language and assembly language, are close to the hardware and provide direct control over computer hardware resources. They are less human-readable and more difficult to work with compared to high-level languages.

2. High-level languages: these languages, such as Python, Java, C++, and JavaScript, abstract away the complexities of computer hardware and provide more expressive and readable syntax. They are designed to be closer to human language and are easier to understand and use for programming tasks.

The main features of Programming Languages are Syntax, Semantics, Data Types, Control structures. Each programming language has its own syntax, which defines the rules for writing code, including keywords, punctuation, and structure. Semantics refer to the meaning of the code written in a programming language. It determines how statements and expressions are interpreted and executed by the computer. Programming languages support various data types, such as

integers, floating-point numbers, strings, and arrays, which define the kind of data that can be manipulated and stored. Control structures, including loops, conditionals, and functions, allow programmers to control the flow of execution in their programs and make decisions based on certain conditions.

The most popular Programming Languages are:

- Python which is known for its simplicity and readability. It is a versatile high-level programming language used in web development, data science, artificial intelligence, and more.

-Java which is a widely-used, object-oriented programming language known for its platform independence, making it suitable for developing cross-platform applications.

-C++: It is a powerful, high-performance language often used in systems programming, game development, and performance-critical applications.

-JavaScript: It is a scripting language primarily used for client-side web development, enabling interactive and dynamic user experiences in web browsers.

The choice of programming language depends on factors such as the nature of the project, performance requirements, developer expertise, and community support. Each language has its strengths and weaknesses, making it essential to select the right tool for the job.

In conclusion, programming languages are essential tools for building software and driving technological innovation. Whether you're a seasoned developer or just starting your coding journey, understanding the basics of programming languages is fundamental to mastering the art of computer programming.

Task 1. Read the text and, make its outline and discuss it with your fellow students.

Task 2. Find out in the text and memorize the essential vocabulary and field related terms.

Task 3. Discuss in small groups the history of modern computer`s development defining its main generations.

Task 4. Prepare three - minutes reports about computer science branches and their importance in programming and computer engineering.

Task 5. Study the section of the text dealing with programming languages and present their main features, such as: syntax, semantics, data types, control structures.

Task 6. Read the section of the text dealing with the most popular programming languages and reproduce its content in the form of an interview.

Task 7. Discuss the following questions in the group, write down your own ideas:

1) What do you know about safety rules for those who work in a computer laboratory?

2) Do you agree or disagree with the statement: students should attend lectures, but their work in computer laboratory with special equipment is not important?

3) Which type of programming languages is the most frequently used today?

4) What is the role of students` self - study in computer science education?

Task 8. Tell your fellow students the following information in English:

Дистанційне вивчення англійської мови з використанням комп'ютерних технологій має забезпечити реалізацію таких завдань, як формування умінь і навичок читання текстів з безпосереднім використанням мережі Інтернет, удосконалення умінь аудіювання на основі адаптованих та автентичних текстів, формування вмінь і навичок перекладу та реферування текстів за фахом, розвиток умінь монологічного та діалогічного мовлення, розширення соціокультурних навичок у процесі діалогу культур, подальший розвиток культури ділового та професійного спілкування. Сьогодні в Україні активно використовуються численні електронні підручники, посібники та комп'ютерні програми, які сприяють ефективному оволодінню іноземними мовами, зокрема, у сфері професійного спілкування.

Task 9. Translate the following sentences into English using Conditionals:

1) Шкода, що ти не мав часу вчора прийти на лекцію з Java Script.

2) Якщо ти вчасно заплатиш за Інтернет, то не матимеш проблем із зв'язком.

3) Якби я мала достатньо грошей, то купила б собі потужний комп'ютер.

4) У вас були б кращі можливості одержати високо оплачувану роботу, якби ви знали мову програмування С++.

5) Якби не існувало мов програмування, то було б неможливо спілкуватися з комп'ютером.

6) Якби не використовувалися мультимедійні програми, то комп'ютерні ігри не були б такими захоплюючими.

7) Якщо вам необхідно виконувати багато обчислень, то доведеться скористатися електронними таблицями.

8) Якби я не забув пароль вчора, то не витратив би стільки часу на пошук важливої інформації.

9) Якби я знав досконало програму комп'ютерного перекладу, то справився б з дипломною роботою набагато швидше.

10) Якби студенти не використовували сучасні інформаційні технології, їм було б набагато складніше готувати курсові та дипломні проєкти.

Task 10. Use the appropriate forms of the verbs given in brackets:

1. If these post - graduates (to be involved) in research, it will perfect their qualification in IC technologies.

2. If your article (to contain) valuable results, it would have been published in scientific journal.

3. You (to finish) your start-up project in time, if you (to find) the creative solution of the problem.

4. If he (to be) advanced student, he (to defend) his diploma work in English.

5. I would make presentation at a scientific conference in programming, if I (to be) you.

6. If you were an active member of university English language society, it (to help) you in research dealing with computer generations.

7. If he (to know) English better, he could have found better job.

8. If Einstein (to formulate) the relativity theory, somebody else (to do) it.

9. If she (to notice) this advertisement, she would (to apply) for the system programmer job.

10. They (to try) a new approach and (to make) fundamental research in programming languages.

Text 4. Computer engineering: the structure and history of development

Computer engineering is an important field that deals with the development and improvement of computer systems and software. Its development goes through several key stages, from the early mechanical computing devices to the powerful microprocessor-based systems of today. The main branches of computer engineering include computer architecture, programming, networking and communication, embedded systems, artificial intelligence, computational graphics, and many others. Each of these branches studies different aspects of computer systems and has its own specificity.

Technical support of computer equipment includes both hardware and software. Hardware includes all the physical components of a computer, such as processors, memory, disk drives, network cards, and others. Software includes operating systems, device drivers, application programs, and other software necessary for the computer to operate.

The development of computer engineering is constantly evolving due to changes in technologies and market needs. Engineers are constantly working on improving technical equipment, developing new algorithms, and programming methods to facilitate working with computers and enhance their functionality.

Computer engineering has evolved through distinct periods in history, each marked by significant advancements and innovations that have shaped the field into what it is today. Thus, we can define the following stages of its development:

Early Mechanical Computing (17th to 19th centuries). The roots of computer engineering can be traced back to the mechanical computing devices developed during the 17th to 19th centuries. Prominent examples include Blaise Pascal's Pascaline and Charles Babbage's Analytical Engine. These machines laid the foundation for computational concepts and set the stage for further developments in the field.

Electromechanical Era (Late 19th to mid-20th century). The electromechanical era witnessed the development of complex calculating machines, such as the IBM Harvard Mark I and the ENIAC (Electronic Numerical Integrator and Computer). These machines utilized electromechanical components for computation, representing a significant leap forward in computational power and capability.

Early Digital Computers (Mid-20th century). The mid-20th century marked the transition to digital computing, with the development of the first electronic digital computers. The invention of the transistor in the late 1940s paved the way for more efficient and reliable electronic components, leading to the creation of machines like the UNIVAC I and the IBM 700 series.

Integrated Circuits and Microprocessors (Late 20th century). The late 20th century saw the rise of integrated circuits (ICs) and microprocessors, revolutionizing the field of computer engineering. The invention of the integrated circuit by Jack Kilby and Robert Noyce in the 1950s enabled the miniaturization of electronic components, making computers smaller, faster, and more affordable. This era witnessed the birth of iconic microprocessors like the Intel 4004, which laid the groundwork for the personal computing revolution.

Modern Computing (21st century). The 21st century has been characterized by rapid advancements in computing technology, driven by innovations in areas such as artificial intelligence, machine learning, cloud computing, and quantum computing. This period has seen the proliferation of smartphones, tablets, and IT devices, as well as the emergence of powerful supercomputers and high-performance computing clusters. Throughout its history, computer engineering has continually evolved in response to technological advancements and societal needs, shaping the way we live, work, and interact with the world around us.

Hardware refers to the physical components of a computer system that can be touched, seen, and manipulated. These components work together to perform various computing tasks. The structure of hardware can vary depending on its function within the computer system. Here's a general description of hardware, its structure, and classification:

Central Processing Unit (CPU) is often considered the brain of the computer. It executes instructions stored in memory and performs arithmetic and logical operations. The structure of the CPU typically includes an arithmetic logic unit (ALU), control unit, and registers. CPUs are classified based on their architecture, such as Reduced Instruction Set Computing or Complex Instruction Set Computing.

Memory stores data and instructions are used temporarily or permanently. Random Access Memory (RAM) is volatile memory used for temporary storage during program execution. Read-Only Memory (ROM) stores firmware and BIOS instructions that do not change. Memory is classified based on its speed, capacity, and type, such as DDR4 (Double Data Rate 4) or SSD (Solid State Drive).

Storage devices store data permanently or semi-permanently. Hard Disk Drives use spinning magnetic disks to store data, while Solid State Drives use flash memory. Other storage devices include optical drives (CD/DVD drives) and USB flash drives. Storage devices are classified based on their capacity, speed, and form factor.

Input devices allow users to enter data and commands into the computer system. Common input devices include keyboards, mice, touchscreens, and microphones. Input devices are classified based on their method of input, such as tactile (keyboard), pointing (mouse), or voice (microphone).

Output devices display or output information processed by the computer system. Examples include monitors, printers, speakers, and projectors. Output devices are classified based on the type of output they produce, such as visual (monitor), audio (speakers), or hard copy (printer).

Peripheral devices are external devices connected to the computer system to enhance its functionality. Examples include scanners, webcams, external hard drives, and network adapters. Peripheral devices are classified based on their function and interface,

such as USB, Ethernet, or Bluetooth. Hardware components work together seamlessly to execute programs, process data, and perform various computing tasks, forming the foundation of modern computer systems.

Computer architecture refers to the design and structure of computer systems, encompassing both hardware and software components. It defines the organization, functionality, and interconnection of these components to create a cohesive computing environment. Understanding computer architecture is crucial for designing efficient and reliable systems.

Here's an overview of computer architecture and its key components: Central Processing Unit (CPU). The CPU is the core component of a computer system responsible for executing instructions. It consists of an Arithmetic Logic Unit (ALU) for performing arithmetic and logical operations, a control unit for managing instruction execution, and registers for temporary data storage. The CPU fetches instructions from memory, decodes them, and executes them to perform tasks.

Memory hierarchy includes cache memory, which provides faster access to frequently used data, and secondary storage devices like hard disk drives (HDDs) and solid-state drives (SSDs) for long-term storage.

Input /Output Devices provide enable communication between the computer system and external devices. Input devices such as keyboards, mice, and sensors allow users to input data, while output devices like monitors, printers, and speakers display or produce output. Communication interfaces such as USB, Ethernet, and HDMI facilitate data exchange between the computer and peripherals.

The system bus is a communication pathway that connects various components of the computer system, including the CPU, memory, and I/O devices. It consists of multiple lines for transmitting data, addresses, and control signals between components. The system bus is categorized into three main types: data bus for transferring data, address bus for specifying memory locations, and control bus for managing data transfer operations.

The motherboard is the main circuit board that houses and connects all major components of the computer system. It provides

electrical connections and interfaces for the CPU, memory modules, expansion cards, and I/O ports. The motherboard also contains chipset components that control data flow between the CPU, memory, and peripherals.

Instruction Set Architecture (ISA) defines the set of instructions that a CPU can execute and the format of those instructions. It serves as an interface between software programs and hardware components, allowing software developers to write programs compatible with specific CPU architectures. Common ISAs include x86, ARM, and MIPS, each with its own instruction set and architecture design. Understanding the architecture of a computer system is essential for optimizing performance, designing efficient software applications, and troubleshooting hardware issues. By studying its components and their interactions, computer engineers can build and maintain robust and scalable computing systems.

Task 1. Memorize the essential vocabulary from the text and try to use it in the next assignments.

Task 2. Read the text, divide it into sections, discuss each part with your fellow students in the form of interview.

Task 3. Answer the following questions on the content of the text:

1) What do you know about the main branches of computer engineering?

2) What are the basic characteristics of hardware and software?

3) Can you prove the fact that memory is one of the key components in computer architecture?

4) What is the influence of input/output devices on the communication process?

5) Which component of computer architecture is responsible for communication pathway that connects various components of computer system?

6) What is the function of peripheral devices?

7) Do you know any interesting facts from the history of computer engineering?

8) Have you read interesting facts about early digital computers?

9) What are the most important innovations in computer engineering in 21st century?

10) Do you think that computer engineering proved to be the most dynamically developed field of modern engineering?

Task 4. Read the statements and indicate whether they are true or false:

1. Junior students are instructed in physics, mathematics, English language and philosophy.
2. Senior engineering students master special subjects according to their specialty.
3. The students of the Institute of Humanities and Social Sciences work in the laboratories of electrical engineering.
4. The department of computer-integrated technologies and robotics of the university train experts in applied linguistics and English literature.
5. The history of modern computer engineering dates back to the 15th century.
6. Specialists in the field of fire safety possess skills necessary for protection of different buildings and environment against fire.
7. With the growth of population and developing of industries the problem of fresh water is not urgent.
8. Governments and big companies in the world adopt laws against the environmental pollution.

Task 5. Speak about the main duties of computer engineer using the following expressions: to have advanced experience in using hardware, to cope with peripheral devices, to use advanced methods of programming, to solve problems dealing with computer devices, to monitor the performance of computer memory, to have a clear view of architecture of computer.

Task 6. Compose short dialogues about the history of computer engineering.

Task 7. Make a three-minutes speech on the following topics:

a) How to use input/output devices.

b) The inventions in computer engineering of the late 20th century.

c) The 21st century computer devices.

d) The most important components of computer engineering.

Task 8. Discuss the following problems in small groups and propose the most interesting ideas of their solution. Use specific examples and arguments to support your opinion: 1) your institute has got extra money to purchase either computers or books for the library. Which would you recommend to choose – computers or books? 2) Attractions and disadvantages of working in computer engineering sphere.

Task 9. Choose FIVE the most important to your opinion traits that recruiters seek in job prospects from the SIXTEEN proposed below and discuss with your fellow students: 1) intelligence, 2)self-confidence, 3) ability to communicate, 4) initiative, 5) willingness to accept responsibility, 6) energy level, 7) leadership, 8) imagination, 9) flexibility, 10) interpersonal skills, 11) ability to avoid conflict, 12) self-knowledge, 13) direction, 14) vocational skills, 15) competitiveness, 16) goal achievement.

Task 10. Translate the following expressions into Ukrainian and use them in sentences of your own: outstanding achievement, to follow directions, designing efficient software applications, hardware components, computer architecture, input/output devices, memory data, early digital computers, peripheral equipment.

UNIT II. SPEAKING ACTIVITIES (topics, dialogues, presentations)

By the end of the course students should be able to: 1) participate in various types of discussions, talks, conversations on engineering related topics (computer engineering, computer science, applied mathematics and information technologies in business), 2) make telephone conversations on engineering problems, 3) change the ideas and views on the content of radio and TV programs connected with these types of engineering, 4) react to the messages and instructions in the sphere, 5) describe the tables, formulae, diagrams in professional direction, 6) use innovative strategies to report at seminars, conferences, 7) understand the values, traditions, customs in development of Ukrainian and foreign engineering and apply intercultural approach in professional communication.

Topics for classroom discussion

1. The development of computer engineering.
2. From the history of computer.
3. Electronic mail as basic means of communication.
4. Virtual reality and real life.
5. Information technologies in business sphere.

SPOKEN PRODUCTION RESULTS

The future Masters in IT sphere should prepare individual presentations on the wide range of themes related to the field and produce monologues and dialogues dealing with the following problems: Computers in modern life. The Computer system. History of Computer. Generations of Computer. Information. Measurement Amount of Information. Software. Microsoft Office. Computer Architecture. Personal Computers. Operating System. History of Computer Engineering. Hardware. Information Communication Technologies. Information Technologies in Business. Internet and Social Nets. From Pure to Applied Mathematics.

Recommendations for successful presentation:

- think over the problem of your future presentation and make a plan of it;
- prepare the logical structure of presentation;
- construct the content and develop the main ideas of presentation;
- use the scientific language style and special field related vocabulary;
- speak slowly, use the words and sentences, terminology correctly;
- try to support the contact with the audience;
- use the visual aids and extra lingual means of communication;
- follow the time limits and do not forget to thank your listeners for attention;
- remember of the following types of presentations: plenary presentations, panel discussions, talks, paper reporting, workshops, poster presentations, swap stop.

ACADEMIC WRITING ACTIVITY

has the aim to develop the future engineers` academic and professionally oriented skills to prepare literature research analysis for their Master`s paper and to make summary in English using it in the process of defense. By the end of the course students should be able to express their attitudes, views, considerations on field related problems, make an outline and the essay, describe instructions, tables and diagrams, etc. Thus, the main skills in academic writing include the followings:

- make a plan and express ideas logically;
- write on introduction or conclusion to Master`s paper;
- use scientific style and logical connectors of paragraphs;
- analyze the ideas and propose personal attitude to ideas from articles, monographs, textbooks;
- compare and interpret data from different sources;
- quote the authors correctly;
- create a bibliography;
- use the consultations and recommendations of your supervisor.

It is also important to take into consideration the language knowledge obtained (proper grammatical structures, the rules of syntax and stylistics in the field of engineering, relevant vocabulary and terminology) and sociolinguistic competence (behavior in home and foreign engineering environments, cross cultural approach, interaction with the help of extra lingual means and factors). By the end of the ESP course students will have the opportunities to prepare written products of the following types: thesis, research work, abstract, summary, academic paper, bibliography, statistical report, essay, language portfolio.

TOPICS FOR ESSEYS:

1. Discoveries of our University scientists and researchers in the field of computer engineering, computer science, applied mathematics and information technologies in business.
2. Foreign languages in IT students` professional activities.
3. Sources of computer engineering today.
4. Comps in modern life.
5. Brief analysis of generations of computers.

UNIT III. SELF-STUDY PROCESS

Self-study is the important part of ESP course and it needs constant and skilled assessment and it deals with the level of teacher`s supervision, control and students` skills of work independently using relevantly self-study resources. Autonomous learning gives the students opportunity to put an end with previous gaps and to choose and develop their own learning styles. It is also important for them to receive the reliable self-study resources which contain clearly formulated for performance tasks, exercises and projects, a set of accessible resources (textbooks, audio and video resources, materials from media and the Internet). In this case self-study tasks may be proposed in various forms (exercises, tests, essays, written reports, presentations, projects). The assessment of tasks, projects can be formative and summative. Formative assessment can include a brief progress of a person or a group of participants in the subject. It is accomplished through teacher and usually needs feedback. The other type – summative assessment is connected with the results or products of learning (qualitative aspect) and should be important for the future students` progress.

Language Portfolio for professional communication is comparatively new means of self-assessment of students` skills. It`s unction is to improve the language learning process helping to students developing their self-assessment and the other cognitive skills. (Self-assessment checklist of language skills for professional needs you can see in English for Specific Purposes, British Council, 2005, pp. 56-58).

THE TASKS
for training foreign language professional competence

Task 1. Discuss with your fellow students the profile of the future professional in Information Technologies commenting the following arguments:

1) IT engineers must understand how modern computer devices work.

2) IT engineers look for creative solving of their field problems.

3) Future professionals in IT sphere must pay attention to details in programs and devices.

4) Future engineers must constantly read and search for the new information.

Task 2. Speak about the problems of patent industry in Ukraine and abroad answering the following questions: 1) What do you know from the history of patent industry? 2) Do patents and inventors play the important role in the development of innovations? 3) What do you know about the work of patent agents and patent examiners? 4) What are the basic skills of the people working in this industry? 5) What are the main problems of training staff in patent industry?

Task 3. Submit your applications for the job interview on the vacancy of highly paid computer engineer position in standardization department of IT company. Prepare the true answers connected you're your educational background, work experience and personal details.

Task 4. Identify the subjects you are taught in the Master`s programs and describe their structure and content: Fundamentals of Computer Engineering, Hardware, Software, Computer Architecture, Operating System, Programming, Information Technologies, Applied Mathematics.

Task 5. Discuss the following questions in small groups and express your ideas later in class for the whole group: 1) Students` work in the laboratories. 2) University laboratories` equipment. 3) Safety rules for the work in laboratory. Describe one of your experiments in the laboratory of your department, e.g., Laboratory of computer engineering.

Task 6. Prepare for the talk (Role-play) with your fellow students about Ukrainian scientists in IT sphere. Find the information from different sources about the scientists who left our native land for other countries due to special reasons (e.g.Ivan Puluy, Olexander Smakula, St. Voznyak, Lubomyr Romankiv).

Task 7. Prepare for the classroom discussion in small groups and agree or disagree with the statement that computer sciences and engineering have nothing in common with ethical and moral problems of modern society. Give your own argumentation.

Task 8. Being a specialist in applied mathematics, information technologies in business, computer science and engineering (Master`s degree) enjoy the opportunity of participating in a scientific conference. In this case it will be useful for you to obtain the new skills

how to express your thoughts and ideas before the audience in the form of reports and presentations. Prepare your small research product for annual scientific conference of department or the foreign languages` department. Use the help of audio-visual aids and Internet resources.

Tests for self-control and self-assessment of linguistic proficiency

e. g. Choose the right option:

1. Drills and milling _____ are always noisy.
   a) devices b) machines c) blades
   d) engines e) gadgets
2. The need to develop _____ energy is widely seen as a futuristic technological challenge.
   a) generated b) renovated c) renewable
   d) innovative e) depleted
3. He needs a new pair of _____ for welding.
   a) helmet b) spanners c) goggles
   d) racket e) drills
4. Please find attached a full set of preliminary ____, as submitted to the client for approval.
   a) paintings b) meetings c) drawings
   d) manufacturing e) provision
5. The electricity was cut _____ for over three hours yesterday.
   a) in b) on c) out
   d) away e) off
6. It's a good idea to check that the cable is not _____.
   a) endangered b) replaced c) removed
   e) damaged d) warned
7. This machinery needs to be _____ before putting it into operation.
   a) adjusted b) suited c) accommodated
   d) conformed e)damaged
8. I must get _____ – I can't use the Internet at all.
   a) my computer fixed b) my fixed computer
   c) my computer fix d) fixed my computer
   e) fixing my computer

9. Our computer system at work is archaic. Archaic most nearly means _____.

a) worthy b) obsolete c) current
d) trendy e) valuable

10. You're a computer expert, Jack. Could I __ __ a minute?

a) rack you brains b) bash your brains
c) pick your brains d) hold your brains
e) brush your brains

ОСНОВНА ЛІТЕРАТУРА

1. Байбакова І., Гасько О., Федоришин М. Getting on in English (Intermediate). Львів : Растр-7, 2011. 276 с.

2. Куліш І. М., Гордійчук А. В. English for IT – Students. Part II. Черкаси : видавництво Черкаського національного університету ім. Б. Хмельницького, 2016. 148 с.

3. Мансі Є. О. Radio Engineering and Computer Techniques. Тексти (13). Київ : Арій, 2008. 80 с.

4. Мансі Є. О. Англійська мова : підручник для студентів та аспірантів немовних факультетів. Київ : Арій, 2008. 344 с.

5. Ямнич Н. Ю, Данькевич Л. Р. English for IT students. К. : Компринт, 2017. 608 с.

6. English for Specific Purposes (ESP). National Curriculum for Universities / Bakayeva H., Bopysenko O. and others. British Council Ukraine. Kyiv, 2005. 108 p.

7. Basic English for Mathematicians : навчальний посібник з англ.. мови для студентів математичного факультету / Укладачі: Н. В. Цинтар, О. В. Мудра. Чернівці, 2023. 235 с.

8. James A. Senn. Information Technology in Business: Principles, Practices and Opportunities. Prentice Hall. 2000. 800 p.

9. Perron C. Computers and Information Systems. Tools for an Informative Age. USA. Redwood City, Calif. : Benjamin/Cummings Pub. Co, 1993. 608 p.

ДОДАТКОВА ЛІТЕРАТУРА

1. Common European Framework of Reference for Languages: Learning, Teaching, Assessment. Ed. Milanovic, M. Cambridge: Cambridge University Press. 2001. 276 p.

2. Duffy. Focus on Innovators and Inventions. USA. NJ. : Prentice Hall, 1994. 144 p.

3. Oxford English for Information Technology. Student`s Book. Oxford University Press. 2019. 137 p.

4. Webster’s New-World Dictionary of Computer Terms. USA. New York : Que, 1999. 580 p.