



Informatics

Work program of the educational component (Syllabus)

Details of the educational component

Higher education level	<i>First (bachelor's)</i>
Field of Knowledge	<i>13 Mechanical Engineering</i>
Speciality	<i>G 9 Applied Mechanics</i>
Educational program	Engineering of packaging products, processes and equipment
Status of the educational component	<i>Mandatory</i>
Form of study	<i>full-time (full-time)</i>
Year of preparation, semester	<i>1st year, autumn semester</i>
Scope of the educational component	<i>4,0 (120)</i>
Semester Control/ control measures	<i>Passed</i>
Class schedule	<i>4 hours per week (2 hours of lectures and 2 hours of laboratory classes)</i>
Language of instruction	<i>Ukrainian</i>
Information about the course leader / teachers	Lectures: Assoc., Ph.D., Assoc. Kazak Iryna Oleksandrivna http://intellect.kpi.ua/profile/kio69 Laboratory works: Assoc. Prof., Ph.D., Assoc. Prof. Kazak Iryna Oleksandrivna
Course placement	<i>Sikorsky Platform</i>

Program of the educational component

1. Description of the educational component, its purpose, subject of study and learning outcomes

The student receives basic knowledge of computer science, rules for working with a computer, the basics of programming; will be able to type texts, insert objects, build graphs, tables and diagrams in Word, Excel, PowerPoint editors; perform calculations and evaluate the results obtained in MathCAD, VBA, or similar software environments.

The subject of the educational component "Informatics" is basic knowledge of computer science in Word, Excel, PowerPoint editors and in MathCAD, VBA software environments to perform certain tasks using appropriate mathematical methods.

1.1. The purpose of the educational component is to participate in the formation of the following competencies in accordance with the requirements of the educational program.

Integral competence:

The ability to solve complex specialized problems and practical problems in applied mechanics or in the learning process, which involves the application of certain theories and methods of mechanical engineering and is characterized by complexity and uncertainty of conditions.

General competence:

- *skills in the use of information and communication technologies (ZK 09).*

1.2. According to the requirements of the educational program, students, after mastering the academic discipline "Informatics", must demonstrate the following program learning outcomes:

- choose and apply suitable mathematical methods for solving problems of applied mechanics (PRN 01);
- know and understand the basics of information technology, programming, practically use applied software to perform engineering calculations, process information and results of experimental research (PRN 08).

2. Pre-requisites and post-requisites of the educational component (place in the structural and logical scheme of education according to the relevant educational program)

The educational component "Informatics" is based on the student's knowledge of certain sections of higher mathematics. "Informatics" provides educational components "Engineering calculations on computers", "Basics of packaging design".

3. Content of the discipline

Chapter 1. Entry. Organization of students' work on computers for use in the educational process. Properties of information, signals and data.

Topic 1.1. Entry. Organizational provisions. Work in the electronic Campus of KPI. Igor Sikorsky.

Topic 1.1. Data structuring: compilation of linear structures, tables, etc. Hierarchical data structures. Data files and file structure: data units and data storage units. A system for storing information in a computer. Types and types of files. Working with files. Description of different types of algorithms. Components of algorithms. Properties of algorithms. Typical structures of algorithms. Branching and cyclic algorithms. Principles of algorithm assembly. Graphical description of algorithms.

Topic 1.2. Encoding numbers with binary code. Properties of the binary data encoding system Variety of encoding of text data, graphic data, sound data. Amount of information.

Chapter 2. Features of automatic calculations on PCs. The concept of the computer operating system. Computer software products. Creating educational presentations in MS PowerPoint.

Topic 2.1. Features of automatic calculations on PCs.

Mathematical foundations of digital technology - computer. Rules for performing mathematical operations (calculations) in a binary system. Principles of performing mathematical operations using a binary system. Electron cell for binary computing.

Topic 2.2. The concept of the computer operating system. Computer software products. Windows system. Composition and functioning of the computing system (hardware and software configurations). The concept of interfaces (software and hardware). Software hierarchy and its technical implementation. The concept of operating system. Features of building Windows OS. Techniques for working in the GUI mode of the Windows OS. Basic objects and controls of Windows. Windows desktop. Windows object icons and shortcuts.

Topic 2.3. Creating educational presentations in MS PowerPoint.

General provisions for creating educational presentations in MS PowerPoint. Features of presenting information on slides (color scheme of the presentation, size and type of font, volume and structuring of information on the slide, adequacy of the content of the selected visualization tools). Number and content of slides according to the content and duration of the speech. Presentation file in the format "Demonstration" (slideshow). Preparation of handouts based on MS PowerPoint presentations (choice of handout format materials). Creating headers and footers. Printing handouts in MS PowerPoint.

Chapter 3. Spreadsheets and charts. Working with the Excel editor

Topic 3.1. Graphing and charting with an Excel editor. Solving equations by numerical methods; Method of selection using root separation operation. Processing of laboratory observation data by means of spreadsheets. Microsoft Excel program. Enter, edit, and format data. Calculations in spreadsheets. Table cell encoding, cell references. Absolute and relative addressing. Copy the contents of cells. Input automation. Using standard Microsoft Excel functions. Construction of complex functional dependencies. Display of trend charts. Selection of a trend graph for processing experimental dependencies.

Topic 3.2. Solving mathematical problems based on linear and nonlinear equations using Excel. Using standard Microsoft Excel formulas. Principles of compiling calculation programs in Microsoft Excel. The main principles of experimental data processing. Functions and equations; The concept of separation of the root of the equation. Advantages of the Microsoft Excel program in view of the possibilities of automatic calculations in a given range of numbers. Possible options for the intervals of the presence of the root of the equation. The main principles of numerical solution of the equation by the method of selection and change of scales of axes. Mathematical foundations of numerical solution of equations (iteration method, graphical method). Using the combined method of solving equations (graphical and the iteration method in the Microsoft Excel editor. Using the built-in program of the Microsoft Excel package to solve linear and nonlinear equations in automatic mode.

Chapter 4. Mathematical calculations using the MathCad editor

Topic 4.1. Principles of Mathematical Calculations in the MathCad Editor.

Automation of research work through the use of the Mathcad application package. Mathcad working window. The principle of performing calculations using Mathcad tools. Writing down mathematical formulas. Solving linear and nonlinear equations in MathCad using approximate methods (chord method and tangents).

Topic 4.2. Solving equations in MathCad using built-in functions.

Practical calculations for solving equations using iterative formulas. Solving equations using built-in Mathcad functions: root, polyroot, find, minerr. The order of writing commands to solve equations and the first values of the root approximation. The sequence of solving equations: finding the interval of separation of the root, building a graph of functions to visually solve the question of whether the equation has roots.

Topic 4.3. Ranked variables. Operations with matrices and vectors. Graphing; graphical representation in MathCad matrices; three-dimensional graphs.

Acquaintance with the menu of matrix operations. The concept of ranked variable; entry in the working window of the MathCad matrix; Maximum dimensions of matrices. Vectorization operation; the concept of a vector in the MathCad environment. Operations with matrices. The use of matrices to solve a system of algebraic linear equations.

Topic 4.4. Symbolic calculations MathCad. Symbolic solution of linear and nonlinear equations.

Features of the Mathcad program that distinguish it from software products designed to implement numerical methods in mathematics. Symbolic calculation menu; commands for performing character calculations: simplify, solve, expand. The use of symbolic calculations for mathematical transformations (algebraic simplifications, the use of series expansion, equations, integrals, and differentiation). List of problems that can be calculated using symbolic calculations. Examples from the tasks of the educational material from the higher education course

mathematics and other academic disciplines that can be performed using symbolic calculations.

Topic 4.5. Elements of automatic calculations in MathCad. Programming mathematical calculations in the built-in MathCad language.

Basics of programming in the Mathcad environment. Operators of logical operations: conditional, comparative. Programming menu. Initial data on creating an area on the Mathcad desktop in which calculations will be performed automatically according to the program. Applied programming problems using conditional and unconditional operators. The concept of priority operations and sequence of the program. Creation of calculation programs.

Chapter 5. Programming in a VBA environment

Topic 5.1. Basic principles of programming in a VBA environment. Create macros. Data types. Familiarity with the interface. Data types. Variables, constants, operators, and functions. Create macros.

Mathematical expressions. I/O operations in a VBA environment.

Syntax of basic operators and functions in the VBA environment. User functions.

Topic 5.2. Organization of conditional statements and loops in the VBA environment. Working with arrays in a VBA environment. Conditional statements in VBA. Organization of cycles. Working with arrays.

Subroutines in VBA.

4. Learning materials and resources

Basic literature

1. Informatics. Lecture notes: teaching aids for the training of students in the specialties 131 "Applied Mechanics", educational program "Engineering of Packaging and Packaging Equipment" and 133 "Industrial Engineering", educational program "Engineering of Equipment for the Production of Polymer and Building Materials and Products" / Igor Sikorsky Kyiv Polytechnic Institute; compiled by I. O. Kazak. – 2nd ed., revised and supplemented – Kyiv: Igor Sikorsky Kyiv Polytechnic Institute, 2025. – 114 p. – Access from the screen: <https://ela.kpi.ua/handle/123456789/73809>
2. Informatics. Laboratory Practicum [Electronic resource] : textbook for the training of bachelors of specialty 133 "Industrial Engineering", educational program "Engineering of equipment for the production of polymer and building materials and products" and specialty 131 "Applied Mechanics", educational program "Engineering of packaging and packaging equipment" / KPI. Igor Sikorsky; comp. I. O. Kazak. – Electronic text data (1 file: 5.39 MB). – Kyiv: KPI. Igor Sikorsky, 2019. – 171 p. – Access from the screen: <https://ela.kpi.ua/handle/123456789/31415>
3. Method. Instructions for full-time students to perform. laboratory work and independent work in the discipline "Informatics" (Part 1) for students. specialties 131 "Applied Mechanics" of specialization "Packaging Machines and Technologies" and specialty 133 "Branch Engineering" of specialization "Engineering, Equipment and Technologies of Production of Polymer and Building Materials and Products" / Compiled by: I.O. Kazak, O.L. Sokolsky. – K.: NTUU "KPI. Igor Sikorsky", 2016. – 92 p. – Access from the screen: <http://ela.kpi.ua/handle/123456789/17704>
4. Method. Instructions for full-time students to perform. laboratory work and independent work in the discipline "Informatics" (Part 2) for students. Specialty 131 "Applied Mechanics" of the specialization "Packaging Machines and Technologies" and specialty 133 "Branch Engineering" of the specialization "Engineering, Equipment and Technologies of Production of Polymer and Building Materials and Products" / Compiled by: I.O. Kazak, O.L. Sokolsky. – Kyiv: NTUU "KPI them. Igor Sikorsky", 2016. – 50 p. – Screen access: <http://ela.kpi.ua/handle/123456789/17705>
5. Informatics. Recommendations for the performance of calculation work: teaching aids for the training of students in the specialties 131 – "Applied Mechanics", educational program "Engineering of Packaging and Packaging Equipment" and 133 – "Industrial Engineering", educational program "Engineering of Equipment for the Production of Polymer and Building Materials and Products" / Igor Sikorsky Kyiv Polytechnic Institute; compiled by: I. O. Kazak. – 2nd ed., revised and supplemented – Kyiv: Igor Sikorsky Kyiv Polytechnic Institute, 2025. – 24 p.– Screen

access: <https://ela.kpi.ua/handle/123456789/73810>

6. Informatics. Computer equipment. Computer Technologies: Textbook for Students. higher. Teaching. Conclusion. / V.A. Bazhenov et al. 7th Edition. – Kyiv: Karavela, 2022. – 496 p.

Further reading

1. Informatics and Computer Technology: Teaching. Manual. / M.E. Rogoza. - Kyiv: VC "Academy", 2006. - 368 p.
2. Informatics and Computer Technology: Manual. / L.M. Dybkova. - Kyiv: VC "Academy", 2002. - 320 p.
3. Bilan B.S., Karpovych I.M. Informatics and Information Technologies: Study. Manual. – Rivne: NUWGP, 2010. – 197 p.
4. Gurzhiy A.I., Povoroznyuk N.I., Samsonov V.V. Informatics and Information Technologies: Textbook for Students of Vocational Institutions. —Kharkiv: LLC "Kompaniya SMIT", 2007. — 352 p.
5. Informatics: Excel and Basic for Application: Manual. Manual. / Lopotko O.V. Recommended by the Ministry of Education and Science of Ukraine. - Kyiv: Karavela Publ., 2018. - 272 c.
6. Gurzhiy A. M. Fundamentals of Information Technologies: A Textbook for Applicants for Professional (Vocational and Technical) Education / A. M. Gurzhiy, L. I. Voznenko, N. I. Povoroznyuk, V. V. Samsonov. — Kyiv: Litera LTD, 2023. — 288 p.
7. Klymenko O. F., Golovko N. R., Sharapov O. D. Informatics and Computer Technology: Teaching Method. manual / For general. Ed. O. D. Sharapova. — Kyiv, KNEU Publ., 2002. — 534 p.
8. Voytyushenko N. M., Informatics and Computer Technology: Study. Pic. [for students of higher education]/ N. M. Voytyushenko, A. I. Ostapets. – [2nd ed.]. – Kyiv: Center for Educational Literature, 2009. – 564 p.)
9. Tsapovska Zhanneta Yaroslavivna. Working with Microsoft PowerPoint 2000/ 2003/ 2007: tutorial. Manual. / Lviv National University. Ivan Franko. — L. : LNU. I. Franko, 2009. — 316 p.
10. Karavanova T.P. Informatics. Collection of exercises and problems of algorithmization and programming: teaching. Manual. / T.P. Karavanova. - Shepetivka: PE "Shestopalov S.A.", 2017. - 152 p.
11. Unified Information Environment of the National Technical University of Ukraine "Kyiv Polytechnic Institute" SYSTEM ELECTRONIC CAMPUS OF NTUU "KPI" User Manual Profile "Teacher-Scientist" (IC 80.3 – 02070921. 004.002: 2011) version 1.04.251115 – K.: NTUU "KPI. Igor Sikorsky", 2022. – 38 p.

Information resources on the Internet

Electronic Archive of KPI <https://ela.kpi.ua/>

Website of the Department of Chemical Engineering, <http://cpsm.kpi.ua/mr.html>

Electronic campus of Igor Sikorsky Kyiv Polytechnic Institute. Igor Sikorsky, <http://login.kpi.ua/>

Sikorsky distance learning platform <https://sikorsky-distance.kpi.ua/>

It is possible to conduct On-Line classes using Zoom platforms

Syllabus of the credit module "Informatics" in the system for 131 specialties

"Engineering Mechanics" in "Campus";

Lecture notes on the discipline "Informatics" on the website of the department:

<https://cpsm.kpi.ua/metodichni-rozrobki/magistri-2020-2021-roku-vipusku/informatika.html>

;

Methodical instructions for laboratory work and independent work in the discipline "Informatics" on the website of the department: <https://cpsm.kpi.ua/metodichni-rozrobki/magistri-2020-2021-roku-vipusku/informatika.html> ;

Laboratory workshop in computer science: <https://cpsm.kpi.ua/metodichni-rozrobki/magistri-2020-2021-roku-vipusku/informatika.html> .

5. Methods of mastering the educational component

Lectures (36 hours)

Lectures are aimed at:

- providing modern, holistic, interdependent knowledge in the discipline "Informatics", the level of which is determined by the target setting for each specific topic;
- ensuring the creative work of bachelors together with the teacher during the lecture;
- education of bachelors' professional and business qualities and the development of independent creative thinking in them;
- formation of the necessary interest in bachelors and providing direction for independent work;
- reflection of methodological processing of the material (highlighting the main provisions, conclusions, recommendations, clear and adequate to their formulation);
- use of visual materials for demonstration, combining, if possible, them with the demonstration of results and samples;
- teaching the materials of the discipline in a clear and high-quality language in compliance with structural and logical connections, explaining all newly introduced terms and concepts;
- accessibility for perception by this audience.

№ sala ry	Title of the lecture topic and list of main questions	Hours
1	2	3
1	<u>Topic 1.1. Entry. Organizational provisions. Work in the electronic Campus of KPI. Igor Sikorsky. Data structuring: compilation of linear structures, tables, matrices. Data files and file structure: data units and data storage units. A system for storing information in a computer.</u> <u>Lecture 1. Work in the electronic Campus of KPI. Igor Sikorsky</u> General provisions of work with the system of the electronic Campus of Igor Sikorsky Kyiv Polytechnic Institute. Entrance to the personal virtual account of the electronic Campus system of KPI. Igor Sikorsky (EC Igor Sikorsky Kyiv Polytechnic Institute). Exit from the EC KPI system. Igor Sikorsky. Sections of the personal virtual account of the system EC KPI. Igor Sikorsky: section "Messages" (viewing messages, replying to messages, deleting messages, creating a message); section "RNP"; section "Methodological support" in the electronic campus of Igor Sikorsky Kyiv Polytechnic Institute (methodological support and its levels, view section "Methodological support").	1

<i>No sala ry</i>	<i>Title of the lecture topic and list of main questions</i>	<i>Hours</i>
1	2	3
	<i>Tasks on the SRS: Study of the lecture material. References: [main 1, add. 11].</i>	
	<u>Topic 1.1. Data structuring: compilation of linear structures, tables, matrices. Data files and file structure: data units and data storage units. A system for storing information in a computer. Types and types of files. Working with files. Descriptions and typical structures of algorithms.</u> <i>Data structuring: compilation of linear structures, tables, etc. Files and file structure of data: units of data measurement and data storage units. A system for storing information in a computer. Types and types of files. Description of different types of algorithms. Components of algorithms. Properties of algorithms. Typical structures of algorithms. Branching and cyclic algorithms. Principles of algorithm assembly. Graphical description of algorithms. References: [Foundations 1, 3, Additions 1, 3, 4, 7, 10].</i> <i>Tasks on the SRS: Study of the lecture material. Hierarchical data structures. References: [main 1, 2, add.1, 2].</i> <i>Development of linear algorithms. Development of branched and cyclic algorithms and their recording in the form of flowcharts. References: [Foundations 1, 3, Additions 1, 3, 4, 7, 10].</i>	1
2	<u>Lecture 2. Encoding numbers with binary code. Properties of the binary data encoding system. Features of automatic calculations on computers.</u> <u>Topic 1.2. Encoding numbers with binary code. Properties of the binary data encoding system. Features of automatic calculations on PCs.</u> <i>Encoding numbers with binary code. Properties of the binary data coding system. Features of automatic calculations on computers.</i> <i>Encoding numbers with binary code. Properties of the binary data encoding system. Variety of encoding of text data, graphic data, sound data. Amount of information. General information about interactive methods in computer science. References: [Foundations 1, 2, Supplements 1, 2, 4, 6].</i> <i>Tasks on SRS: Study of the lecture material. Solving the problem with the help of Formulas for the amount of information, solving problems on the topic: examples of coding and decoding. References: [Foundations 1, 2, Supplements 1, 2, 4, 6].</i>	1
	<u>Topic 2.1. Features of automatic calculations on computers.</u> Mathematical Foundations of Digital Engineering – Computer. Rules for Performing Mathematical Operations (Calculations) in the Binary System. Principles of Performing Mathematical Operations Using the Binary System. Electronic Cell for Binary Calculations. References: [Foundations 1, 2, Additions 4, 6]. <i>Tasks on the SRS: Study of the lecture material. Solving problems on the topic: Addition, subtraction, multiplication and division in the binary number system.</i>	1

№ sala ry	Title of the lecture topic and list of main questions	Hours
1	2	3
	<i>Bibliography: [Osn. 1, 2, Add. 4, 6].</i>	
3	<u>Topic 2.2. The concept of the computer operating system. Computer software products. Windows system.</u> <u>Lecture 3. The concept of the computer operating system. Computer software products. Windows system.</u> Composition and functioning of the computing system (hardware and software configurations). The concept of interfaces (software and hardware). Software hierarchy and its technical implementation. The concept of operating system. Features of building Windows OS. Techniques for working in the GUI mode of the Windows OS. Basic objects and controls of Windows. Windows desktop. Windows object icons and shortcuts. Windows files and folders. Principles of working with the Windows file structure. References: [Basics 1, 2, 6, Add.1, 2, 4, 6, 8]. <u>Tasks for the CPC:</u> Study of the lecture material. Tasks for a workshop on the basic techniques of working with the Windows graphical interface (hanging, dragging, dragging, highlighting). The concept of a dialog box, a context menu; the main techniques of working with the right and left buttons of the graphic manipulator. Overview of standard Windows Applications. Windows utility applications: archivers, clipboard. Standard multimedia tools. Microsoft Word text editor. Purpose and techniques of working with Microsoft Word. Microsoft Word utility window structure, Microsoft Word commands, and tools. Microsoft Word settings. Create complex text documents using Microsoft Word. Formula editor. References: [Basics 1, 2, 6, Add.1, 2, 4, 6, 8].	1
	<u>Topic 2.3. Creating Educational Presentations in MS PowerPoint</u> <u>Creating Educational Presentations in MS PowerPoint</u> General provisions for creating <u>educational presentations</u> in MS PowerPoint. Features of presenting information on slides (presentation color scheme, font size and type, volume and structuring of information on the slide, adequacy of the content of the selected visualization tools). Number and content of slides according to the content and duration of the speech. Presentation file in the format "Demonstration" (slideshow). Preparation of handouts based on MS PowerPoint presentations (choice of handout format). Creating headers and footers. Printing handouts in MS PowerPoint. References: [Osn. 6, Add. 4, 7, 8, 9]. <u>Tasks on the SRS:</u> Study of the lecture material. References: [p. 6, add. 4, 7, 8, 9].	1
4	<u>Topic 3.1. Construction of graphs and diagrams by an Excel editor. Solving equations by numerical methods; method of selection using the operation of separating the root.</u> <u>Lecture 4. Construction of graphs and diagrams by an Excel editor. Solving equations by numerical methods; method of selection using the operation of separating the root.</u> Processing of laboratory observation data by means of spreadsheets.	2

№ sala ry	Title of the lecture topic and list of main questions	Hours
1	2	3
	Microsoft Excel program. Enter, edit, and format data. Calculations in spreadsheets. Table cell encoding, cell references. Absolute and relative addressing. Copy the contents of cells. Input automation. Using standard Microsoft Excel functions. Construction of complex functional dependencies. Display of trend charts. Selection of a trend graph for processing experimental dependencies. References: [Foundations 1, 2, 6, Additions 4, 6, 7, 8]. <u>Tasks for the CPS:</u> Study of the lecture material. Tasks for a computer workshop on the basic techniques of working with the Microsoft Excel editor. Methodological instructions for creating a protocol of a computer workshop. References: [Foundations 1, 2, 6, Additions 4, 6, 7, 8].	
5	<u>Topic 3.2. Solving mathematical problems based on linear and nonlinear equations using Excel.</u> <u>Lecture 5. Solving mathematical problems based on linear and nonlinear equations using Excel.</u> Using standard Microsoft Excel formulas. Principles of compiling calculation programs in Microsoft Excel. The main principles of experimental data processing. Functions and equations; The concept of separation of the root of the equation. Advantages of the Microsoft Excel program in view of the possibilities of automatic calculations in a given range of numbers. Possible options for the intervals of the presence of the root of the equation. The main principles of numerical solution of the equation by the method of selection and change of scales of axes. Mathematical foundations of numerical solution of equations (iteration method, graphical method). Using the combined method of solving equations (graphical and iteration method in the Microsoft Excel editor. Using the built-in program of the Microsoft Excel package to solve linear and nonlinear equations in automatic mode. Using calculations using formulas References: [basic 1, 2, 6, add. 4, 6, 7, 8]. <u>Tasks for the CPC:</u> Study of the lecture material. Tasks for a computer workshop on the basic techniques of working with the Microsoft Excel editor. options for solving equations. References: [Foundations 1, 2, 6, Additions 4, 6, 7, 8].	2
6	<u>Topic 4.1. Principles of Mathematical Calculations in the MathCad Editor.</u> <u>Lecture 6. Principles of Mathematical Calculations in the MathCad Editor</u> Automation of research work through the use of the Mathcad application package. Mathcad working window. The principle of performing calculations using Mathcad tools. Writing down mathematical formulas. References: [Main 1, 4, Add. 2, 4, 6]. <u>Tasks on the SRS:</u> Study of the lecture material. General information about the classes of calculations in Mathcad. References: [osn. 1, 4, add. 2, 4, 6].	2
7	<u>Lecture 7. Solving Linear and Nonlinear Equations in MathCad approximate methods (the method of chords and the method of tangents)</u> Mathematical foundations of numerical solution of equations, basics of the iterative method of finding the roots of an equation. Methods of simple iterations, division of segments, chords and Newton. Conditions for the task of the first approximation of the root.	2

<i>No sala ry</i>	<i>Title of the lecture topic and list of main questions</i>	<i>Hours</i>
1	2	3
	<i>Estimating the number of iterations. The principle of finding the algorithm of sequential root approximations and automation of calculations</i> References: [main 1, 4, add. 2, 4, 6]. <i>Tasks on the SRS: Study of the lecture material. Independent study of the main methods of work in Mathcad: assignment of variables and constants; calculation using formulas. Calculation by formulas of the roots of equations. Examples for solving equations from the course of higher mathematics. References: [Articles 1, 4, Supplements 2, 4, 6].</i>	
8	<u>Topic 4.2. Solving equations in MathCad using built-in functions</u> <u>Lecture 8. Solving equations in MathCad using built-in functions</u> <i>Practical calculations for solving equations using iterative formulas. Solving equations using built-in Mathcad functions: root, polyroot, find, minerr. The order of writing commands to solve equations and the first values of the root approximation. The sequence of solving equations: finding the interval of separation of the root, building a graph of functions to visually solve the question of whether the equation has roots. References: [Main 1, 4, Add. 2, 4, 6].</i> <i>Tasks on CPS: Study of the lecture material. Independent study of solving equations using built-in Mathcad functions: find, minerr. References: [Main 1, 4, Add. 2, 4, 6].</i>	2
9	<u>Topic 4.3. Operations with matrices and vectors. Ranked variables. Graphing: graphical representation in MathCad matrices; three-dimensional graphs.</u> <u>Lecture 9. Operations with matrices and vectors. Ranked variables. Graphing: graphical representation in MathCad matrices; three-dimensional graphs.</u> <i>Acquaintance with the menu of matrix operations. The concept of ranked variable; entry in the working window of the MathCad matrix; Maximum dimensions of matrices. Vectorization operation; the concept of a vector in the MathCad environment. Operations with matrices. The use of matrices to solve a system of algebraic linear equations. References: [Main 1, 4, Add. 2, 4, 6].</i> <i>Graphing in the MathCad environment. Types of graphical representations of mathematical quantities: functions and vectors. Editing graphs. Mathematical content of a three-dimensional graph. Types of functions by which the surface is specified; mathematical notation in MathCad of the surface view as a function of two independent variables. Image of the matrix in the form of a three-dimensional diagram. References: [Main 1, 4, Add. 2, 4, 6].</i> <i>Tasks on the SRS: Study of the lecture material. Independent construction of graphs of various types and their editing. References: [Main 1, 4, Add. 2, 4, 6].</i>	2
10	<u>Topic 4.4. Symbolic calculations MathCad. Symbolic solution</u>	

№ sala ry	Title of the lecture topic and list of main questions	Hours
1	2	3
	<u>linear and nonlinear equations.</u> <u>Lecture 10. Symbolic calculations MathCad. Symbolic solution of linear and nonlinear equations.</u> Features of the Mathcad program that distinguish it from software products designed to implement numerical methods in mathematics. Symbolic calculation menu; commands for performing character calculations: simplify, solve, expand. The use of symbolic calculations for mathematical transformations (algebraic simplifications, the use of series expansion, equations, integrals, and differentiation). List of problems that can be calculated using symbolic calculations. Examples from the tasks of the educational material from the course of higher mathematics and other academic disciplines that can be performed using symbolic calculations References: [basic 1, 4, add. 2, 4, 6]. <u>Tasks on the SRS:</u> Study of the lecture material. Self-performance symbolic calculations for tasks in higher mathematics. Bibliography: [p. 1,4, add. 2, 4, 6].	<u>2</u>
11	<u>Topic 4.5. Elements of automatic calculations in MathCad. Programming mathematical calculations in the built-in MathCad language. Lecture 11. Elements of automatic calculations in MathCad. Programming mathematical calculations in the built-in MathCad language.</u> Basics of programming in the Mathcad environment. Operators of logical operations: conditional, comparative. Programming menu. Initial data on creating an area on the Mathcad desktop in which calculations will be performed automatically according to the program. Applied programming problems using conditional and unconditional operators. The concept of priority operations and sequences of the program. Creating calculation programs References: [basic 1, 4, add. 2, 4, 6]. <u>Tasks on the CPS:</u> Study of the lecture material. Development of tasks that require programming of calculations. Examples to solve equations from the course of higher mathematics and physics. Bibliography: [p. 1,4, add. 2, 4, 6].	<u>2</u>
12	<u>Topic 5.1. Basic principles of programming in a VBA environment. Create macros. Data types.</u> <u>Lecture 12. Basic principles of programming in a VBA environment. Create macros. Data types. Mathematical expressions. I/O operations in a VBA environment.</u> Familiarity with the interface. Data types. Variables, constants, operators, and functions. Create macros. Data types. Syntax of basic operators and functions in the VBA environment. User functions. References: [Foundations 1, 3, Additions 1, 3, 8]. <u>Tasks on CPS:</u> Studying the lecture material. Procedures and macros in VBA References: [Foundations 1, 3, Additions 1, 3, 8].	<u>2</u>

<i>Nº sala ry</i>	<i>Title of the lecture topic and list of main questions</i>	<i>Hours</i>
1	2	3
13	<u>Topic 5.2. Organization of conditional statements and loops in the VBA environment. Working with arrays in a VBA environment.</u> <u>Lecture 13. Organization of conditional statements and loops in the VBA environment. Working with arrays in a VBA environment.</u> Conditional statements in VBA. Organization of cycles. References: [Foundations 1, 3, Additions 1, 3, 8]. Working with arrays. Subroutines in VBA. References: [Foundations 1, 3, Additions 1, 3, 8]. <u>Tasks on the SRS:</u> Study of the lecture material. References: [basics 1, 3, addendum 1, 3, 8]. Features of working with arrays. Features of compiling subroutines in VBA. References: [basics 1, 3, add. 1, 3, 8].	2
14	Lecture 14. Modular control work	2
15	Lecture 15. Passed	2
	Just	30

Computer Workshop (36 hours)

The purpose of the computer workshop on the educational component is to consolidate theoretical knowledge, form skills and abilities in MS OfficeWord, Excel and MathCad packages, solve computational problems, present the results of calculations, programming in the VBA environment, get acquainted with the "Campus" system of Igor Sikorsky Kyiv Polytechnic Institute. Igor Sikorsky, create an educational presentation in MS PowerPoint.

<i>Nº sala ry</i>	<i>Name of the topic of the lesson and a list of main questions</i>	<i>Hours</i>
1	Introductory lesson. Conducting safety briefings. Rules of conduct in the computer classroom and the use of computer technology. Work in the system of the electronic Campus of KPI. Igor Sikorsky. Computer workshop 1. General provisions of work with the system of the electronic Campus of Igor Sikorsky Kyiv Polytechnic Institute. Igor Sikorsky. Access to the personal virtual account of the system of the electronic Campus of Igor Sikorsky Kyiv Polytechnic Institute. Igor Sikorsky (EC Igor Sikorsky Kyiv Polytechnic Institute). Sections of the personal virtual account of the EC KPI system. Igor Sikorsky: section "Messages" (viewing messages, replying to messages, deleting messages, creating a message); section "RNP"; section "Methodological support" in the electronic campus of KPI. Igor Sikorsky (methodological support and its levels, revision of the section "Methodological support"). References: [osn. 5, add.11]. Tasks on the SRS: acquaintance with theoretical information about work in the system of the electronic Campus of Igor Sikorsky Kyiv Polytechnic Institute. Igor Sikorsky. References: [Foundations 1, 4, Additions 2, 11].	2
2	Computer workshop 2. Drawing up a comprehensive document in	2

<i>№ sala ry</i>	<i>Name of the topic of the lesson and a list of main questions</i>	<i>Hours</i>
	<i>Word text editor.</i> <i>Composing a complex document in a Word text editor: typing and editing text, creating and modifying a table.</i> <i>References: [main 1, add.4, 6, 8].</i> <i>CPS task: using a table to calculate data. References: [p. 1, add. 4, 6, 8]</i>	
3	<i>Computer workshop 3. Drawing up an algorithm for calculating a function and developing a flowchart in Word (2 academic hours).</i> <i>References: [Foundations 1, 8, Additions 4, 10].</i> <i>Tasks on the SRS: independent creation flowcharts in Word by assignment. References: [osn. 1, add. 4, 10].</i>	2
4	<i>Computer workshop 4. Preparation of a presentation in MS PowerPoint. Features of presenting information on slides (color scheme of the presentation, font size and type, volume and structuring of information on the slide, adequacy of the content of the selected visualization tools). Number and content of slides according to the content and duration of the speech. Create a presentation file in the format "Demonstration" (slideshow). Printing handouts in MS PowerPoint. References: [appendix 4, 8, 9].</i> <i>Tasks on CPS: creating different types of presentations in MS PowerPoint. References: [main 1, 4, add. 2, 8, 9].</i>	2
5	<i>Computer workshop 5. Graphing in the Excel editor.</i> <i>Using tables to calculate data, edit a data table, create graphs based on data tables.</i> <i>References: [main 1, add.4, 6, 8].</i> <i>CPC task: formatting a table and columns of data in an Excel editor. References: [main 1, add.4, 6, 8].</i>	4
6	<i>Computer workshop 6. Methods for approximate solution of equations in the Excel editor.</i> <i>Methods Close Solution Equations into Editor Excel. Finding the roots of an equation using an Excel editor.</i> <i>References: [main 1, add.4, 6, 8].</i> <i>Task on the SRS: determination of the accuracy and convergence of the solution. References: [main 1, add.4, 6, 8].</i>	4
7	<i>Computer Practicum 7. General information about basic MathCAD functions. Constants and variables in the MathCAD environment. Solving algebraic equations using built-in root and polyroots functions in MathCAD</i> <i>General information about the basic functions of MathCAD. Constants and variables in the MathCAD environment. MathCAD icons. and their purpose, application. Solving Algebraic Equations Using Built-in Root and Polyroots Functions in MathCAD</i> <i>References: [Main 1, 4, Add. 2, 4, 6].</i> <i>CPC tasks: application of constants and variables in the MathCAD environment, use of basic commands and functions of MathCAD, using the MathCAD context menu. References: [osn. 1, 4, add.</i>	2

<i>№ sala ry</i>	<i>Name of the topic of the lesson and a list of main questions</i>	<i>Hours</i>
	<i>2, 4, 6].</i>	
<i>8</i>	<i>Computer Workshop 8. Working with Arrays in MathCAD Working with Arrays in MathCAD. Creating arrays. Working with arrays. Functions of working with arrays. Graphical display of arrays. References: [Main 1, 4, Add. 2, 4, 6]. Tasks on the SRS: using array functions in MathCAD. References: [Main 1, 4, Add. 2, 4, 6].</i>	<i>2</i>
<i>9</i>	<i>Computer workshop 9. Symbolic calculations and working with graphs in MathCAD. Symbolic calculation of derivatives and integrals, limits. Graphing. References: [Main 1, 4, Add. 2, 4, 6]. Task on the SRS: decomposition of functions into series. Bibliography: [p. 1, 4, add. 2, 4].</i>	<i>2</i>
<i>10</i>	<i>Computer Practicum 10. Programming in the built-in MathCAD language. Programming operators, creating programs with conditions and loops. References: [basic 1, 4, add. 2, 4, 6]. Tasks on the CPS: the use of loops with a prerequisite.</i>	<i>2</i>
<i>11</i>	<i>Computer workshop 11. Creating and editing macros in VBA. Using a macro recorder, creating and editing macros. References: [main 2, 3, add. 1, 8]. Tasks on CPS: basic I/O operators. References: [p. 1, 4, add. 2, 8].</i>	<i>4</i>
<i>12</i>	<i>Computer workshop 12. Solving a quadratic equation in VBA. Compiling programs using conditional operators. References: [main 2, 3, add. 1, 8]. Tasks on SRS: block conditional operators. References: [p. 1, 4, add. 2, 8].</i>	<i>2</i>
	<i>Just</i>	<i>30</i>

6. Independent work of a student

Independent work takes 50% of the time to study the educational component, including preparation for the test.

The main task of independent work of bachelors is to master knowledge that is not included in the list of lecture questions through a personal search for information, the formation of an active interest in a creative approach in educational work. In the process of independent work within the framework of the educational component, the bachelor must learn to analyze modern sources, educational literature.

<i>№ sala ry</i>	<i>Name of the topic submitted for independent study</i>	<i>Quantity hours of SRS</i>
<i>1</i>	<i>2</i>	<i>3</i>
<i>1</i>	<u><i>Topic 1.1. Work in the KPI Electronic Campus System</i></u> <u><i>Them. Igor Sikorsky"</i></u>	<i>2</i>

<i>№ sala ry</i>	<i>Name of the topic submitted for independent study</i>	<i>Quantity hours of SRS</i>
	<i>Study of the lecture material, acquaintance with theoretical information about work in the electronic Campus system KPI. Igor Sikorsky. References: [Foundations 1, 4, Additions 2, 11].</i>	
<i>2</i>	<i><u>Topic 1.1. Data structuring: compiling linear structures, tables, matrices. Files and file structure of data: units of data measurement and data storage units. Information storage system in a computer. Types and types of files. Working with files. Hierarchical data structures. Working with files. Selection of materials for preliminary study about computer science. Using a table for calculating data. Independent creation and work with different types of files. References: [main 1, 2]. Study of the lecture material. Hierarchical data structures. References: [main 1, 2, appendix 1, 2]. Development of linear algorithms. Development of branched and cyclic algorithms and their recording in the form of flowcharts. References: [Foundations 1, 3, Additions 1, 3, 7].</u></i>	<i>2</i>
<i>3</i>	<i><u>Topic 1.2. Encoding numbers with binary code. Properties of the binary data encoding system</u> Study of the lecture material. Solving the problem with the help of Formulas for the amount of information, solving problems on the topic: examples of coding and decoding. References: [main 1, 2, add.4].</i>	<i>2</i>
<i>4</i>	<i><u>Topic 2.1. Features of automatic calculations on computers.</u> Solving problems on the topic: Addition, subtraction, multiplication and division in the binary number system. References: [main 1, 2, add.4].</i>	<i>2</i>
<i>5</i>	<i><u>Topic 2.2. The concept of the computer operating system. Computer software products. Windows system.</u> Study of the lecture material. Tasks for a workshop on the basic techniques of working with the Windows graphical interface (hanging, dragging, dragging, highlighting). The concept of a dialog box, a context menu; The main techniques for working with the right and left buttons of the graphic manipulator. Overview of standard Windows applications. Windows utility applications: archivers, clipboard. Standard multimedia tools. Microsoft Word text editor. Purpose and techniques for working with Microsoft Word. Microsoft Word utility window structure, Microsoft Word commands, and tools. Microsoft Word settings. Create complex text documents using Microsoft Word. Formula editor. References: [Foundations 1, 2, 6, Supplements 4, 6].</i>	<i>2</i>
<i>6</i>	<i><u>Topic 2.3. Creating presentations in MS PowerPoint</u> Study of the lecture material. Create different types of presentations in MS PowerPoint. Bibliography: [osn. 1, 6, add. 4, 8].</i>	<i>2</i>
<i>7</i>	<i><u>Topic 3.1. Construction of graphs and diagrams. Solving equations by numerical methods; Method of selection by operation</u></i>	<i>2</i>

№ sala ry	Name of the topic submitted for independent study	Quantity hours of SRS
	<u>Separation of the root.</u> Study of the lecture material. Tasks for a computer workshop on the basic techniques of working with the Microsoft Excel editor. Methodological instructions for creating a protocol of a computer workshop. Formatting a table and data columns in Excel editor. References: [ed. 1, 2, 6, add. 4, 6].	
8	<u>Topic 3.2. Solving mathematical problems based on linear and nonlinear equations using Excel.</u> Study of the lecture material. Tasks for a computer workshop on the basic techniques of working with the Microsoft Excel editor. Issuance of options for solving equations. References: [ed. 1, 2, 6, add. 4, 6]. Preparation for the modular test work in sections 1-3.	2
9	<u>Theme 4.1. Principles Mathematical Computing into MathCad Editor.</u> Study of the lecture material. General information about the calculation classes in Mathcad. Independent study of the main methods of work in Mathcad: assignment of variables and constants; calculation using formulas. Calculation by formulas of the roots of equations. Examples for solving equations from the course of higher mathematics. Application of constants and variables in the MathCAD environment. Using basic commands and functions of MathCAD. References: [Main 1, 4, Add. 2, 4, 6].	4
10	<u>Topic 4.2. Solving equations in MathCad using built-in functions</u> Study of the lecture material. Independent study of solving equations using built-in Mathcad functions: find, minerr. Using the MathCAD context menu. References: [Main 1, 4, Add. 2, 4, 6].	2
11	<u>Topic 4.3. Operations with matrices and vectors. Ranked variables. Graphing; graphical representation in MathCad matrices; three-dimensional graphs.</u> Study of the lecture material. Independent construction of graphs of various types and their editing. Using Functions work with arrays in MathCAD. References: [Main 1, 4, Add. 2, 4, 6].	2
12	<u>Topic 4.4. Symbolic calculations MathCad. Symbolic solution of linear and nonlinear equations.</u> Study of the lecture material. Independent performance of symbolic calculations on tasks in higher mathematics. Decomposition functions in rows. References: [Main 1, 4, Add. 2, 4, 6].	2
13	<u>Topic 4.5. Elements of automatic calculations in MathCad. Programming mathematical calculations in the built-in MathCad language.</u> Study of the lecture material. Development of tasks that require programming the execution of calculations. Examples to solve	4

<i>№ sala ry</i>	<i>Name of the topic submitted for independent study</i>	<i>Quantity hours of SRS</i>
	<i>equations from the course of higher mathematics and physics. Application of cycles with a premise. References: [Main 1, 4, Add. 2, 4, 6].</i>	
14	<i><u>Topic 5.1. Basic principles of programming in the VBA environment.</u> <u>Creating macros. Data types.</u> Procedures and Macros in VBA References: [Basics 1, 3, Appendix 1, 3, 8].</i>	4
15	<i><u>Topic 5.2. Mathematical expressions. I/O operations in the VBA environment.</u> Study of the lecture material. Window designer in VBA. Main I/O operators. References: [Foundations 1, 3, Additions 1, 3, 8].</i>	4
16	<i><u>Topic 5.3. Organization of conditional operators and loops in the VBA environment.</u> <u>Working with arrays in the VBA environment.</u> <u>Tasks on the SRS:</u> Study of the lecture material. References: [main 1, 3, add. 1, 3, 8]. Features of working with arrays. Features compiling subroutines in VBA. References: [Foundations 1, 3, Additions 1, 3, 8].</i>	6
17	<i>Preparation for the modular test work on sections 4-5</i>	4
18	<i>Preparation of calculation work</i>	6
19	<i>Preparation for the test</i>	6
<i>Just</i>		60

Policy and control

7. Educational Component Policy

Rules for attending classes and behavior in the classroom

Attendance at classes is a mandatory component of assessment. Bachelors are obliged to take an active part in the educational process, not to be late for classes and not to miss them without a good reason, not to interfere with the teacher's conduct, not to be distracted by actions not related to the educational process.

Rules for assigning incentive and penalty points

Incentive points can be awarded by the teacher only for the performance of creative work on the educational component.

Penalty points within the educational component can be received for late completion or defense of tasks from the computer workshop.

Deadline and retake policy

In case of debts from the educational component or any force majeure circumstances, bachelors must contact the teacher through the available (provided by the teacher) communication channels to solve problematic issues and agree on an algorithm of actions for working out.

Academic Integrity Policy

Plagiarism and other forms of dishonest work are unacceptable. Plagiarism includes the absence of references when using printed and electronic materials, quotes, opinions of other authors. All tasks designed for individual performance must be performed personally by the student. Unacceptable hints and cheating when writing tests,

control, conducting classes; defense of laboratory work, passing a test for another student; copying materials protected by the copyright system without the permission of the author of the work.

The policy and principles of academic integrity are defined in Section 3 of the Code of Honor of the National Technical University of Ukraine "Igor Sikorsky Kyiv Polytechnic Institute". Read more: <https://kpi.ua/code>

Academic Conduct and Ethics Policy

Students should be tolerant, respect the opinions of others, formulate objections in the correct form, and constructively maintain feedback in the classroom.

The norms of ethical behavior of students and employees are defined in Section 2 of the Code of Honor of the National Technical University of Ukraine "Igor Sikorsky Kyiv Polytechnic Institute". Read more: <https://kpi.ua/code>

8. Types of control and rating system for assessing learning outcomes (RSO)

Distribution of study time by types of classes and tasks from the educational component:

Semester	Study time		Distribution of training hours					Control measures		
	Credit to you	Acad. H.	Lecture	Practicum (comp.pr akti-sand)	Lab. Rob.	Ind us zan.	SRS	MCW	C W	Semester control
1	4	120	30	30	-	-	60	1	1	Passed

The student's rating in the educational component consists of the points that he receives for:

Performing tasks on computer practicum, MCW and calculation work.

Semester control is a test.

System of rating (weight) points and evaluation criteria

The system of rating points and evaluation criteria consists of points for:

1. Completing tasks at a computer workshop.

The weight score for the task at the computer workshop is 7 points, there are only 12 tasks. Criteria

for evaluating the completion of a computer workshop task

Completeness and signs of task completion	Points
<i>The task is completed in full</i>	<i>7</i>
<i>Minor shortcomings in the task</i>	<i>6,5-5</i>
<i>Untimely completion of the task and there are shortcomings</i>	<i>4,5-3,5</i>
<i>Poor-quality, untimely completion of the task</i>	<i>3-1,5</i>
<i>Failure to complete the task</i>	<i>0</i>

2. Completing tasks with MCW

There are 2 hours of MCR, which can be divided into two controls of 1 hour each. Weight score of modular tests (2x4)=8 points: The task on the MCW contains 2 tasks, each task is evaluated by 2 points.

Criteria for evaluating the performance of the task

Completeness and signs of task completion	Points
The task is completed in full	2
Minor shortcomings in the task	1,5
Completing the task incompletely or with many flaws	1
Poor performance of the task with gross errors	0,5
Failure to complete the task	0

3. Performance of calculation work

Independent performance of calculation work (CW) is provided. Weight score for the calculation work 8 points: The task for the CW is issued by the teacher according to the option and provides for the design in Word on sheets A 4 according to the requirements in the textbook on recommendations for the implementation of the calculation task in "Computer Science".

Criteria for evaluating the performance of the task

Completeness and signs of task completion	Points
The task is completed in full	8
Minor shortcomings in the task	7,5-6
Completing the task incompletely or with many flaws	5,5-4
Poor performance of the task with gross errors	3,5-1
Failure to complete the task	0

Thus, the rating semester scale from the credit module is:

$$Rc = R_{comp\ prakt} + R_{mcw} + R_{cw} = 12 \cdot 7 + 2 \cdot 4 + 8 = 84 + 8 + 8 = 100 \text{ points}$$

According to the results of academic work for the first 7 weeks, the "ideal student" should score 40 points. At the first attestation (8th week), a postgraduate student receives "attested" if his current rating is at least 20 points.

According to the results of educational work for 13 weeks of study, the "ideal student" should score 90 points. At the second attestation (14th week), the student receives "attested" if his current rating is at least 40 points.

The maximum amount of points for the discipline is 100 points. To obtain admission to the test in the educational component "Informatics", the student must pass all the tasks provided for the semester from the computer workshop on the educational component and the calculation work and have a minimum rating of 24 points. Students who have scored $Rc = 60$ points or more per semester can receive credit automatically based on the points scored. Students who did not score a semester rating of 60 points and have a minimum of 24 points, or students who want to increase their scores in the educational component, write a credit written work. The test card contains 4 questions. The weight score of each test task is estimated at 25 points.

Each task in the credit card is evaluated at 25 points according to the grading system:

"excellent", complete answer (at least 90% of the required information) – 25-24 points;

"very good", a sufficiently complete answer (at least 85% of the required information or minor inaccuracies) – 23-20 points;

"good", a sufficiently complete answer (at least 75% of the required information or minor inaccuracies) – 19-15 points;

"satisfactory", incomplete answer (at least 70% of the required information and some minor errors) – 14-10 points;

"enough", incomplete answer (at least 60% of the necessary information and some gross errors) – 9-5 points;

"unsatisfactory", unsatisfactory answer (less than 60% of the required information and many errors or no answer) – 4-0 points.

The sum of all rating points received on the R test **from the educational component is as follows:**

$$R=4*25 = 100 \\ \text{points}$$

To obtain a score, the sum of all received rating points **R** is converted according to the table:

Score	Score
95...100	Perfectly
85...94	Very good
75...84	well
65...74	Satisfactory
60...64	enough
RD < 60	Disappointing
Not met the conditions of admission Rc < 24	not allowed

9. Additional information on the educational component

Approximate list of tasks for modular control work from sections 1-3 of the educational component "Informatics"

1. Formulate what "computer science" is - it is a discipline that....
2. Name how many and what components of the tools "computer science" studies?
3. What are called technical means?
4. What are called software tools?
5. What are algorithmic tools?
6. What is called an "algorithm"?
7. In what forms can information exist in technology?
8. What is information?
9. What actions can be taken with the information?
10. What unit did you agree to adopt to measure information?
11. How many concepts and which ones does one bit correspond to?
12. How many concepts and which ones do two bits correspond to?
13. How many concepts and which do three bits correspond to?
14. Record Formula That Expresses Ratio between encoded Concepts and bit depth.
15. The restaurant's menu contains 124 dishes. How much information does a visitor get by reading

the menu?

16. Perform a division of the numbers 154:11 in binary code.
17. Decode from binary notation of a number to decimal the number "110001101"
18. The exam sheet contains data on grades for 4 exams of a group of students (25 people). How much information does the dean's office receive to process session data?
19. List and describe the types of algorithms in mathematical solution. What is the unit of measurement of an algorithm?
20. Perform multiplication of numbers 11x14 in binary code.
21. Decode from binary notation of a number to decimal the number "111011011"
22. Formulate the conditions for the existence of the root of the equation in a certain range of values X
23. Perform a division of the numbers 180:12 in binary code.
24. Decode from the binary notation of the number to the decimal system the number "101011000"
25. Write down Hartley's formula for the amount of information. Explain what the values present in it mean.
26. Perform multiplication of numbers 12x15 in binary code
27. Decode the number "110101101" from the binary notation of the number to the decimal system.
28. Write down Shannon's formula for the amount of information. Explain what the quantities included in the formula mean.
29. Perform a division of the numbers 187:11 in binary code.
30. Decode the number "110110101" from the binary notation to the decimal system.
31. Describe the graphical method for solving equations in EXCEL
32. Decode from binary notation of a number to decimal the number "111001101"
33. Determine using the Hartley formula how many iterations must be performed to guess a positive integer that is in the series of numbers from 1 to 50. Perform a solution check.
34. Perform a division of the numbers 153:9 in binary code.
35. What are the auto cell fill methods in EXCEL? Give a brief description of them.
36. Decode the number "100001101" from binary notation to decimal system
37. Determine using the Hartley formula how many iterations must be performed to guess a positive integer that is in the series of numbers from 1 to 100. Perform a solution check.
38. Decode the number "110100101" from binary writing to the decimal system
39. Perform multiplication of numbers 17x9 in binary code.
40. Describe the order of constructing the graphical dependence of one column of data on another in an EXCEL program.

Approximate list of tasks for modular control work from sections 4-5 of the educational component "Informatics"

1. How do you define in MathCAD a function that is defined: $y = x^2$ at $x \leq 0$ and $y = \sqrt{x}$ at $x > 0$?
2. How do you set a ranked variable in MathCAD and perform arithmetic operations with all its elements?
3. Describe the sequence of creating a macro in EXCEL
4. Determine the sum of the numbers s according to
the program if $n = 10$ $s = 0$
FOR $i = 1$ TO n STEP 4
 $s = s + 1$
NEXT i
MsgBox (s)
5. What types of the "=" sign do you know in MathCAD?
6. How do you set an array in MathCAD?
7. How do I declare variables and their types in VBA? Give examples for different types. How do constants

differ from variables?

8. What will be equal to the number of cycles in the program:

```
FOR i = 1 TO 16 STEP 4
```

```
s = s + 1
```

```
NEXT i
```

9. Describe the types of presentations.

10. What actions with arrays does MathCAD allow you to perform?

11. Give the full syntax for calling the data entry window in VBA

12. Write a program for adding numbers from 1 to n

13. What is a presentation, the purpose of a presentation, in which programs presentations are made, how.

14. How is the numbering of array elements carried out in MathCAD and how to specify a specific element of a vector-column, vector-row, matrix?

15. Give the full syntax of calling the data output window to the user in VBA

16. Write a program for multiplying numbers from 1 to n

17. What are the requirements for presentations when creating.

18. How do I create and customize a spatial diagram in MathCAD?

19. Describe the syntax of conditional statements in VBA

20. Write down the order and use cases of the root command in MathCAD

21. Describe the order and possibilities of plotting flat graphs in MathCAD

22. Describe the syntax of organizing loops in VBA

23 Draw a flowchart for calculating the product of two numbers

24. Write down the purpose and order of using the polyroots command in MathCAD

25. Describe the principle of the matrix method for solving a system of linear equations

26. Draw a flowchart for calculating the sum of three numbers

27. Write a program to determine the value of the expression $y = 2x$ at $x \leq 0$ and $y = -x$ at $x > 0$, if x is specified from the window

28. Write down what a program block looks like and where to find it in MathCAD, purpose and order of use

29. How is a conditional statement written in the MathCAD programming unit?

30. Describe array declaration syntax in VBA

31. Draw a flowchart of calculating the product of two numbers

32. Write down the purpose and order of using the polyroots command in MathCAD

33. Describe the sequence of solving a system of linear equations using the matrix method in MathCAD

34. Depict a flowchart of calculating the sum of two numbers

35. Write a program to determine the value of the expression $y = 2x$ at $x \leq 0$

Approximate list of tasks for calculation work on the educational component "Informatics"

1. Determine the sum of S of natural numbers from 1 to n in a program in MathCAD if $n = 12$, and if $S = 0$ is counted at the beginning.

2. Write a program for multiplying numbers from 1 to m, if you count the product of $P = 0$ at the beginning

3. Write a program to determine the value of the expression $y = 5x^2$ at $x \leq 0$ and $y = \sqrt{x}$ at $x > 0$.

4. Define in MathCAD the function that is given: $y = 3x$ at $x \leq 0$ and $y = x$ at $x > 0$.

5. Determine the sum of the numbers S in the program in MathCAD if $n = 8$, if the sum of $S = 0$ is calculated at the beginning.

6. Compose a program in MathCAD calculating the value of the function: $y = x$ if $0 < x < 10$, $y = x^2$ if $x > 10$.

Approximate list of tasks for the test in the educational component "Informatics"

The restaurant's menu contains 124 dishes. How much information does a visitor get by reading the menu? Write the number "47" in binary code.

How to determine in MathCAD a function that is given: $y = x^2$ at $x \leq 0$ and $y = \sqrt{x}$ at $x > 0$?

Write the number "57" in binary code.

Decode from binary number entry to decimal number "1110110" Describe the sequence of creating a macro in EXCEL

How do you set a ranked variable in MathCAD and perform arithmetic operations with all its elements? Give examples.

Write down the rules for adding numbers in the binary number system.

Decode from binary notation of a number to the decimal system the number

"1010110" What types of sign "=" do you know in MathCAD?

Write down Hartley's formula for the amount of information. Explain what the quantities present in the formula mean.

Decode the number "110101101" from the binary notation of the number to the decimal system.

How do I declare variables and their types in VBA? Give examples for different types. How do constants differ from variables?

How do you set an array in MathCAD? Give an example. Write the number "75" in binary code

Describe the syntax of conditional statements in VBA

Determine using the Hartley formula how many iterations must be performed to guess a positive integer that is in the series of numbers from 1 to 100. Perform a solution check. Decode from binary number writing to decimal number "1110010"

How do you integrate a function into MathCAD?

Create a flowchart for calculating the expression $y = 2x$ at $x \leq 0$ and $y = -x$ at $x > 0$

How many concepts can be encoded with three-bit binary code? Confirm the answer with a formula.

Decode the number "111011001" from the binary notation to the decimal system.

How do you perform function differentiation in MathCAD?

Write a program in MathCAD for calculating the sum of natural numbers from 1 to n

Perform the addition of the numbers 6 and 9 written in binary code.

Decode from binary notation of a number to decimal the number "1100011"

Which loop operator is used for loop with counter in MathCAD? Write down its syntax.

Write a program to determine the value of the expression $y = x^2$ at $x \leq 0$ and $y = \sqrt{x}$ at $x > 0$ if x is given from cell A3

Encode from decimal to binary the number "31".

Write down the rules for subtracting numbers in the binary number system. How is a conditional statement written in the MathCAD

programming unit? Describe the syntax of an array declaration in VBA.

Decode from binary notation of a number to decimal the number "1110010" Write a sequence and graphically represent the method of simple iterations. What are the built-in functions for finding the roots of equations in MathCAD?

What condition operator is used in MathCAD? Write down its syntax. Decode the number "110101101" from the binary notation of the number to the decimal system.

How to set a programming block in MathCAD?

When is the otherwise operator used in MathCAD? Write down its syntax. Add the numbers 11 and 4 written in the binary code.

Write down the sequence, represent the formula and graphically solve the equations using Newton's method.

How to define in MathCAD a function that is defined: $y = 2x$ at $x \leq 0$ and $y = -x$ at $x > 0$? What types of presentations are distinguished, give each type a characteristic.

Decode the number "100110" from the binary notation of the number to the decimal system. What will be equal to the number of cycles in the program:

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FOR i = 1 TO 16 STEP 4
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s = s + 1
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NEXT i
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Make a flowchart for a program for adding numbers from 1 to n , if the sum at the beginning is taken

$S=0$.

Write a program to determine the value of the expression $y = 3 \cdot x$ at $x \leq 0$ and $y = x^2$ at $x > 0$, if x is specified from the window.

Make a flowchart for a program that defines the function $y = 3 \cdot x$ at $x \leq 0$ and $y = x^2$ at $x > 0$ if x is specified from a window.

Write a program to determine the value of the expression $y = 5 \cdot x^2$ at $x \leq 0$ and $y = \sqrt{x}$ at $x > 0$, if x is set from cell A2, and the function y is output through the window.

Write a program module in MathCAD for functions that are defined: $y = 12 \cdot x^2$ at $x \leq 0$ and $y = 4 - x$ at $x > 0$

Work program of the educational component (syllabus):

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