

MINISTRY OF EDUCATION AND SCIENCE OF UKRAINE

NATIONAL TECHNICAL UNIVERSITY  
"KHARKIV POLYTECHNIC INSTITUTE"

**GUIDELINES**

**for the master's thesis by students  
majoring in 121 "Software Engineering"**

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## INTRODUCTION

A master's qualifying work is a completed independent and original work that contains a set of research results and scientific positions that the author defends publicly. Such a work must have internal unity, which testifies to the author's personal contribution and ability to conduct independent research, using theoretical knowledge and practical skills.

Violations of the ethics of scientific research are unacceptable in a master's thesis, including: falsification of scientific data, incorrect borrowings, violation of the rules of scientific citation, misappropriation of other people's scientific ideas, distortion of scientific facts and ideas of other researchers and the results of one's own research, use of unscientific and academically questionable sources of information, etc.

The content of the work may consist of the results of theoretical and experimental research, development of new technologies, methodological techniques and methods for solving scientific problems in the field of information technology, as well as their theoretical justification.

The master's thesis should demonstrate the author's ability to conduct scientific research independently, using theoretical knowledge and practical skills, to see professional problems, to be able to formulate research tasks, select methods for solving them, plan, organize and conduct research, interpret its results and formulate conclusions.

These guidelines define the general requirements for a master's thesis, its approximate subject matter and structure, the rules of formatting and the procedure for preparing the work for defense.

# 1 REQUIREMENTS FOR WRITING A MASTER'S THESIS

## 1.1 Structure and content of the master's thesis

The structure and content of the master's thesis should be distinguished by the clarity of construction and logical sequence of presentation of the material. When completing the work, the student should pay attention to the accuracy of the wording, which excludes the possibility of subjective and inaccurate interpretation; the specificity of the results presented. The author is obliged to ensure the novelty of the material, its scientific value, completeness of coverage of the issues under consideration, correct citation of the material used and references to sources. In accordance with the existing scientific etiquette, the formulation of opinions in the work is carried out in the third person: "we believe", "in our opinion", etc.

The main stages of preparing and completing a master's thesis are:

- selecting and approving a topic;
- drafting and approval of the master's thesis assignment;
- studying the research problem and reviewing the literature;
- conducting research;
- processing and presentation of research results;
- designing a master's ;
- preliminary defense of the master's thesis at the graduating department and
- admission to the defense before the Examination Commission (EC);
- external review of the master's ;
- defense of the master's thesis at the EC meeting.

## 1.2 Choosing the topic of the master's thesis

The topic of the master's thesis should reflect the main idea, tasks and provisions to be investigated. The criterion for choosing a research topic is its relevance to current trends in the development of science and technology in a particular field of activity.

The title of the topic should be clear, concise, and contain an unambiguous interpretation. The title of the master's thesis should contain no more than 15 words.

Master's thesis topics are considered and approved at a meeting of the department. The approval of the topic of the master's thesis, the appointment of the supervisor and

consultants is approved by the order of the rector of the university. Examples of master's thesis topics are given in Appendix A.

### **1.3 Procedure for completing a master's thesis**

Students who do not have academic debt are allowed to complete and defend their master's thesis in accordance with the curriculum by an order of the university.

A teacher with a doctorate or PhD degree, academic rank of professor or associate professor is appointed as the supervisor of a master's thesis.

The supervisor of the master's thesis, with the active participation of the student, draws up the assignment (Appendix D) for the master's thesis, which is approved by the head of the department.

### **1.4 Components of a master's thesis**

The master's thesis includes an explanatory note and a presentation (illustrative/demonstration material) for a report at the EC meeting, as well as prints of scientific developments [3], [4].

The explanatory note is written in the state language. The recommended volume of the main part of the explanatory note of the master's thesis (Sections 1-4) should be at least 60 pages of printed text (computer typing), which does not include the introduction, conclusions, list of references and appendices.

The thesis must be clearly structured, comply with the requirements for formatting, and include:

- cover sheet (see Appendix B);
- a list of documents (see Appendix C);
- assignments for the master's qualifying work (see Appendix D);
- explanatory note:
  - 1) cover sheet of the explanatory note (see Appendix D)
  - 2) abstract in Ukrainian and English (see Annex E);
  - 3) list of symbols (if necessary) (see Annex G);
  - 4) content (see Appendix K);
  - 5) Introduction (2-3 pages);
  - 6) the main part, which usually includes five sections consisting of

subsections, paragraphs and subparagraphs;

- 7) Conclusions;
- 8) a list of information sources (see Appendix L);
- 9) applications;
- cover sheet of illustrative materials (see Appendix M) and illustrative materials (presentations);
- cover sheet of scientific developments (see Appendix H) and prints of scientific developments.

**The title page** (see Appendix B) is the first page of the master's thesis and contains the following information:

- name of the ministry, educational institution, research institute, department;
- the topic of the master's ;
- the code of the work, which consists of the academic group number and the topic number of the order;
- surname, name, patronymic of the author, course, group;
- name, surname, patronymic of the supervisor, position held;
- place and year of writing.

Page numbering on the title page is not required, but is included in the general numbering.

**The list of documents** (see Appendix C) is the second page of the master's thesis and contains information about the documents of the thesis. Documents are submitted by sections:

- general documents;
- illustrative materials;
- research and development (if any).

If a certain type of document is missing, the corresponding section is not indicated in the List of Documents.

The **assignment for the qualification work** (see Appendix D) is the third and fourth pages of the qualification work and contains the following information:

- information about the topic of the work;
- grounds for the work;

- the purpose and input data for the work;
- expected scientific results;
- requirements for work performance;
- stages of work performance;
- realization of results and efficiency;
- tasks from consultants on additional sections of the work;
- a calendar plan-schedule of work performance;
- additional requirements.

The assignment is signed by the supervisor, master's student, consultants, and approved by the head of the department.

The **abstract** should be written in Ukrainian and English, 1 page in length, and contain a general description of the task, work performed, and a description of the results obtained (Appendix E). The presentation of the material in the abstract should be concise and accurate. You should use syntactic constructions inherent in the language of business documents and avoid complex grammatical phrases. Standardized terminology should be used, and little-known terms and symbols should be avoided.

The abstract should contain:

- information on the length of the document (explanatory note);
- the object of research;
- subject of research;
- the purpose of the research work;
- research methods;
- scientific novelty;
- a list of keywords.

**Information on the volume of the document (explanatory note)** contains information on the total number of pages, number of illustrations, tables, appendices, number of sources according to the list of references (information is given, including data from appendices).

**The object of research** is a process or phenomenon that creates the problem situation studied by the author and exists independently of the researcher.

*Example:*

- The object of research is the process of quality assurance in the creation and production of high-tech products;
- The object of research is the processes of network interaction, characteristics of elements in the infrastructure of a wireless sensor network.
- The object of research is the process of receiving, transmitting and processing information in automated control systems of the gas transportation system.

**The subject of research** is a mathematical model of a problem or regularities of functioning and development of an object, its qualities, properties, etc. The subject of research is contained within the object.

*Example:*

- The subject of the study is models and methods for creating and selecting cloud system architecture;
- The subject of the study is models, methods and information technology for quality assurance in the creation and production of high-tech products.

**The purpose of the research work** is to solve a set of applied problems in accordance with the generalized object of activity based on the application of a system of theoretical knowledge and practical skills acquired during the entire period of study.

*Example:*

- The aim of the work is to increase the availability of cloud services based on client-server and peer-to-peer distributed cloud architecture;
  - The aim of the work is to improve the energy efficiency of using autonomous energy sources of modern portable computers and increase the duration of their autonomous operation;
  - The goal of the work is to increase the efficiency of the e-commerce site as a commercial project, to increase the number of users, potential buyers, and to grow in the TOP according to all the rules of search engines.

**Research methods.** This is where you list the scientific approaches used to achieve the goal set in the paper. The description of each method should be related to the content of the work, i.e., it should briefly but essentially describe what tasks were investigated using a particular method.

*Example:*

1 The research methods are based on the basic principles of system analysis, functional analysis, theory of multidimensional data models, and database theory. The methods of structural modeling, theoretical foundations of designing relational and multidimensional databases, theoretical foundations of building data warehouses, the basics of multidimensional and intelligent data analysis were used.

2 Research methods. Methods and tools of set theory were used to model data structures. The methods of probability theory and mathematical statistics were used to evaluate the time efficiency of data structures.

**Scientific novelty** is a scientific result that is evaluated according to the following criteria: first obtained, improved, further developed. The scientific novelty must indicate what the results allow for. Scientific novelty is written in the following sequence: first, improved, further developed.

*Example:*

The scientific novelty is that:

- For the first time, a method of providing access to the services of a distributed cloud system was obtained, which allows to increase the efficiency of response to a request with an increase in the number of users;
- For the first time, a model of autonomous operation of a portable computer for energy-saving planning was developed, which allows planning by solving an optimization problem;
- a mathematical model of network performance was improved, which allows for efficient management of network traffic regardless of the number of network elements;
- the information technology of energy management of portable computers was further developed in terms of creating models and methods for developing energy-saving software.

**A keyword** is a word or a stable phrase from the text of the abstract that carries a semantic load from the point of view of information search. The list of keywords should reflect the main content of the paper out of context. The total number of keywords should be no less than five and no more than fifteen.

Key words are given in the nominative case, printed in a line, separated by commas.

*Example:*

*Keywords:* GENETIC PROGRAMMING, DIRECT CODING, INDIRECT

## CODING, CROSSING, MUTATION, GENETIC OPERATIONS.

**The list of symbols and abbreviations** contains explanations of special designations, symbols, little-known abbreviations, units of measurement, etc. used in the text of the report. This list should be drawn up on a separate sheet of the report in the form of a list, in which the symbols are given in alphabetical order on the left after the paragraph indent, and their full interpretation on the right. The Ukrainian alphabet symbols are given first, followed by the Latin and Greek alphabets.

An example of a list of symbols is provided in Annex G.

**The content of** the master's thesis is determined by its topic and is reflected in the plan approved by the supervisor, placed after the title page.

The table of contents contains the titles of all sections, subsections, and paragraphs, if they have a title (introduction, main body, conclusions, list of references, and appendices) listed in sequence. The table of contents does not include assignments, abstracts, or a list of symbols and abbreviations.

In the table of contents, the names of all structural parts of the report should be written in lowercase letters with the first capital letter, the names of sections, subsections and paragraphs should be written together with their serial numbers, and the names of appendices should be written together with the corresponding designations and titles.

The endings of element names are separated from page numbers by periods.

An example of the table of contents is provided in Appendix K.

The introduction of **a master's thesis** should contain information about the scientific problem to be solved and the current state of its research. On the basis of this information, the relevance of the chosen topic is substantiated, the scientific novelty and practical significance of the work are indicated.

**The relevance of the topic** is presented in the form of a critical analysis and directions for solving the problem, as well as a justification for the need for research.

**The purpose and objectives of the study** should be clearly stated and reflect the subject matter of the study.

**The object of research of** a master's thesis is a process or phenomenon that creates a problem situation selected for study (see page 10).

**The subject of** a master's thesis is a mathematical model of a problem or regularities of the functioning and development of an object, its qualities, properties, etc. The subject

of research is contained within the object (p. 10).

The introduction describes the methods used to find solutions to the tasks set and the research conducted.

The introduction may contain information about the approbation of the results of the work: titles of articles, abstracts prepared on the basis of the work, speeches at scientific and practical conferences.

It is necessary to note the scientific novelty or practical significance of the work. The elements of scientific novelty should be generalized and contain the author's own conclusions and recommendations on the subject of the study.

Practical value should include the results of independently conducted research that can be implemented in production, activities of enterprises, institutions and organizations.

In the introduction, you can describe the structure of the paper, indicating the number of chapters and their brief descriptions.

The length of the introduction should be 2-3 pages and have the following structure:

- relevance of the topic;
- the purpose and objectives (or objectives) of the study;
- the object of research;
- subject of research;
- research methods
- scientific novelty;
- practical significance;
- personal contribution of the author;
- structure and scope of the thesis;

The text of the introduction is not divided into paragraphs. The introduction does not include figures, tables, etc.

**The main part of** the explanatory note of the master's thesis should contain the statement of the problem, a description of the developed mathematical model, justification of the research methodology, a description of the applied algorithms for solving the problem, the results of computational experiments, comparative assessments of the developed algorithms with others known in the scientific literature, as well as a comprehensive analysis of the results and patterns obtained.

The main part of the master's thesis consists of sections (theoretical and

methodological, research and analytical, design and recommendation) and subsections that should be interconnected, and the material should be presented consistently and logically, with a critical analysis of theoretical positions, statistics, information of various kinds, etc.

**The first section of** the main part discusses the theoretical and methodological aspects of the problem under study, an analytical review of the literature on the subject of scientific research, critically analyzes different views, provides their scientific classification, the main factors influencing the state and development of the object under study, etc. The theoretical justification, essence, significance, classification characteristics, history and development trends of the research subject, methodological approaches should have elements of polemicism, reveal the author's own position on the research subject, which creates the preconditions for conducting the author's own research in the next section.

To state and substantiate general theoretical conclusions and trends, it is advisable to use data published in relevant encyclopedias, monographs, reference books, foreign sources and publications. If the work is of a theoretical nature, it is advisable to formulate a mathematical model and review the mathematical methods used to solve the problem in the first section. In addition, you can provide examples of approaches to solving similar problems in the past, drawn from the literature.

If the work is of an applied nature, it is advisable to conduct a systematic analysis of the subject area and a detailed description of the system components in the first section.

**In the second section**, the student, using factual material and collected information, analyzes and reveals the content of the issues to be addressed. In this section, system connections and algorithms for solving local problems are designed. For this purpose, both the author's own research (conducted earlier in the qualification work, research papers, etc.) and ideas, methods and algorithms presented in textbooks, manuals, scientific articles and monographs are used.

If the work is theoretical, it is advisable to provide the latest scientific ideas in this field and examples of relevant calculations in this section.

If the work is of an applied nature (e.g., information and reference or control and training systems), it is advisable to provide a solution algorithm, a sufficient number of tables and diagrams illustrating the problems under study and the methodology for solving them.

**The third section** contains several interconnected subsections, which provide specific scientifically based proposals and innovative projects.

This section of the paper should highlight the essence of the author's original ideas and scientific developments. It is necessary to present the results of your own scientific research that illustrate the practical value of the author's methodology and allow you to compare it with other methods. It is advisable to illustrate the calculations with graphs and diagrams. The developed program should be described in detail, instructions for its use should be given, and the results of the research and numerical experiments should be presented.

**The fourth section** is devoted to the evaluation and research of the approach proposed by the author. It is necessary to present the results of your own research, which illustrate the practical value of the author's methodology and allow you to compare it with other methods. It is advisable to illustrate the calculations with graphs and diagrams.

**The fifth section** is devoted to the assessment of economic efficiency and contains information on market research on the market for sales of performance results.

Each chapter ends with a summary of the conclusions regarding the results of scientific and applied research presented in it.

In the conclusions after the first section, it is necessary to formulate the main tasks to be solved in this paper.

**The conclusions** of the master's thesis should contain the results of the research, the scientific and practical results obtained, and recommendations for their scientific and practical use. If there are any scientific developments, information about them should be indicated in the conclusions.

The formulation of conclusions should be based on the materials of the main part of the work in accordance with the tasks set. In this paragraph, the author analyzes his or her own contribution to the solution of the problem, formulates final conclusions, suggestions and recommendations for the practical use of the results obtained. The conclusions should answer the question: "What has been done in the work?" and "What has it done in comparison with other known results?". The conclusions should indicate the quantitative characteristics of the results obtained. Tables, figures, and formulas are not included in the conclusions.

The **list of information sources**, prepared in accordance with applicable standards,

includes sources referenced in the text as well as those used in the presentation of specific scientific provisions. The sources of information may include articles, dissertations, monographs, regulatory and technical documents, technical and economic standards, information resources on the Internet, etc. The list of references is presented in the original language in the order in which the source is mentioned in the master's thesis.

**Appendices** must contain supporting materials: tables, figures, results of intermediate calculations, program source code, illustrations, copies of documents, etc.

The appendices must be placed in the order in which they are referenced in the text of the master's thesis explanatory note. The appendices are numbered with capital letters of the Ukrainian alphabet in the upper right corner, for example, "Appendix A", except for the letters G, E, Z, I, J, O, Ch, B.

Tables, figures and formulas in the appendices are numbered as follows:

- Tables - in the upper left corner, indicate "Table A.1" - Table 1 of Annex A;
- figures - in the center, under the figure "Figure - A.1";
- formulas - respectively "(A.1)".

**Illustrative materials** are created in electronic format in the form of a presentation. All elements of the presentation, such as numbers, signs, units of physical quantities, formulas, tables, figures, etc., must meet the requirements [3].

The presentation may include illustrations from the materials of the explanatory note, as well as the results of the execution of design, technological or program documents.

It should contain a cover sheet in any form, indicating the topic of the research work, the name of the researcher and the supervisor

When forming a thesis, the cover sheet of the presentation is replaced by the cover sheet of the Illustrative Materials (see Appendix H).

**Scientific developments.** If there are scientific developments, the appropriate cover sheet is drawn up (see Appendix M) and copies of articles, patents, and abstracts presented at scientific and technical or scientific and practical conferences, symposia, congresses, etc. are attached. Scientific developments are part of the thesis.

## 2 REQUIREMENTS FOR THE EXPLANATORY NOTE

### 2.1 General provisions

The explanatory note of a research paper must meet the general requirements for research papers in accordance with state standards:

- DSTU 3008-2015 "Information and Documentation. Reports in the field of science and technology. Structure and rules of preparation";
- DSTU 1.5-2015 "National Standardization. Rules for the development, presentation and execution of national regulatory documents".

The text of the master's thesis is drawn up on a computer in the Microsoft Word text editor, on A4 sheets (210x297 mm) with a line spacing of 1.5 pt.

The following page margins are set: 30 mm on the left, 15 mm on the right, and 20 mm at the top and bottom.

The font used for typing is Times New Roman, size - 14 pt. The font should be clear, the color should be black, and the text density should be the same.

The text of the master's thesis should be clearly marked paragraphs - 12.5 mm. No additional distance between paragraphs, except for the established line spacing, is set. It is not allowed to highlight text fragments in other fonts, colors, underlining, etc., except in specially indicated cases (section titles, subsections, code, footnotes).

The text of the main part of the master's thesis is divided into sections and subsections. Each section should start on a new page.

Titles of the structural parts of the master's : "ABSTRACT", "TABLE OF CONTENTS", "LIST OF SYMBOLS AND ABBREVIATIONS", "INTRODUCTION", "CHAPTER", "CONCLUSIONS", "LIST OF ", "APPENDIX" are printed in capital letters in the center of the page. Headings of structural parts should be bolded.

The distance between the heading of a section and a subsection or subsequent text is 1 free line. The distance between the heading of a subsection and the heading of a paragraph, between the heading of a subsection (paragraph, subparagraph) and the subsequent text should be the same as in the text. The distance between the preceding text and the headings of subsections, paragraphs, subparagraphs is regulated as follows:

- leave one free line between the previous text and the subsection heading;
- the distance between the preceding text and the heading of the paragraph

(subparagraph) should be the same as in the text.

The titles of subsections, paragraphs, subparagraphs are printed in lowercase letters with the first capital letter in bold and indented. Do not put a full stop at the end of the heading. If a heading consists of two or more sentences, they are separated by a period.

Pages, sections, subsections, paragraphs, subparagraphs of figures, tables are numbered in Arabic numerals without the "#" sign.

Page numbering should be through and should be in Arabic numerals in the upper right corner of the page. The font size of the numbering is 14 pt.

The section heading is printed on a new line in the center, in capital letters, in bold. Each section starts on a new page. Sections are numbered throughout the document; no period is placed at the end of the number, for example, "1 ANALYSIS OF THE SUBJECT AREA OF THE INFORMATION SYSTEM PROJECT".

Subsections of the report are numbered within the same section. The subsection number consists of the section number and the subsection number, followed by a dot, for example, "1.1" or "2.1". No period is placed at the end of the subsection number. Accordingly, the paragraphs are numbered within the subsection, for example, "1.1.1", "1.1.2" or "2.1.1", "2.1.2"; subparagraphs are numbered within the paragraphs, for example, "1.1.1.1", "1.1.1.2".

The first page of the paper is the title page, which is included in the general page numbering. The pages are numbered starting with the "TABLE OF CONTENTS" page and ending with the last page of the .

The table of contents should correspond to the work plan. On the page with the table of contents, opposite each component of the master's thesis, page numbers are put, which indicate the beginning of the presentation of the material.

The title page must bear the signature of the author and chapter supervisors, which certifies that the master's thesis has been accepted for defense.

Before the defense, the master's student fully assembles the work in accordance with the structure (p. 7) and binds it together with published articles and conference abstracts in a hardcover book.

## **2.2 Formatting mathematical formulas**

When designing mathematical formulas, the following style should be followed: font

typeface - Times New Roman (Cyr) 14 pt, font - normal, indentation - 0.5 cm, equations - in the center, tabulation - on the right edge.

To set formulas, use the Microsoft Equation 3.0 formula editor, setting the following parameters: uppercase, lowercase Greek letters and symbols - Symbol font, others - Times New Roman Cyr. Sizes: normal - 14 pt, large index - 8 pt, small index - 7 pt, large symbol - 18 pt, small symbol - 14 pt.

When using formulas, you must follow certain technical and spelling rules. You may write simple or auxiliary formulas inside the text. The main formulas are placed on a separate line.

To save space, several short formulas of the same type, separated from the text, can be presented in one line.

If an equation does not fit on a single line, it should be moved after the equal sign (=) or after the plus (+), minus (-), multiplication (x), and division (:) signs. Only those formulas that are referenced in the following text should be numbered; it is not recommended to number the rest.

Formulas are numbered within a section. The formula number is specified in Arabic numerals and consists of the section number and the sequential number of the formula in the section, separated by a period.

The number of the formula is indicated at the level of the formula in round brackets, in the last legal position, for example, (2.1) (the first formula of the second section). The number that does not fit on the line with the formula is transferred to the next line below the formula. The number of the formula when it is moved is placed at the level of the last line. If the formula is in a box, the number of such a formula is written on the outside of the box on the right side opposite the main line of the formula.

References to formulas are given by the serial number of the formula in parentheses, for example: "...in formula (2.1)". Explanations of the meanings of the symbols and numerical coefficients of a formula are given below it in the sequence in which they appear in the formula. The value of each symbol and numerical coefficient is written on a new line, starting with the word "where" without a paragraph and colon.

Each formula is separated from the text by one free line before and after the formula. If the formulas follow one another, the distance between them should be the same as in the text. If the formula is followed by an explanation that begins with the word "where," the

distance between the formula and the explanation and the explanation and the subsequent text should be the same as in the text.

*Example:*

$$\pi_k(v_i) = \sum_{j=1}^m \pi_j(x_i, v_j) \quad (2.1)$$

where  $\pi_k(v_i)$ - is the semantic significance for each set  $v_i$

$\pi_j(x_i, v_j)$  -semantic significance of element  $x_i$  in context of set of elements  $v_j$

### **2.3 Design of graphic materials**

Graphic materials include charts, graphs, diagrams, bar charts, etc. These illustrative materials are labeled with the word "Figure" and numbered consecutively within the section. The number, title of the figure, or explanatory caption should be placed sequentially, separated by a dot, for example: Figure 2.1 (the first figure of the second section), except for the figures presented in the appendices. The figure caption is placed in the center, under the figure, and no period is placed at the end. The figure and its caption should be placed on the same page. Figures should be placed immediately after the text where they are mentioned for the first time or on the next page.

All figures in the text of the master's thesis should be referenced either in brackets (Fig. 2.1) or by context, for example, "... as shown in Fig. 2.2". Vertical placement of figures in a clockwise direction is allowed. Figures larger than A4 are recommended to be placed in appendices.

Figures are separated from the main text at the top and bottom by a single blank line.

*Example:*

- illustration design:

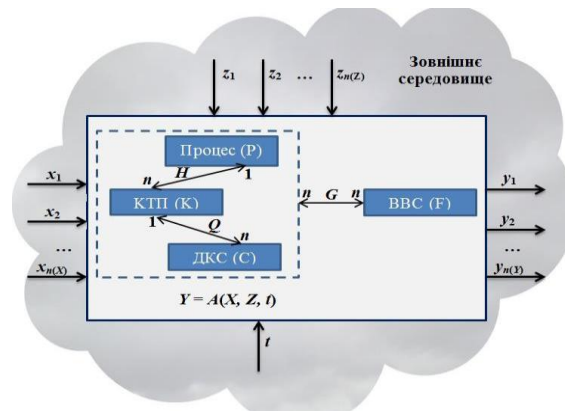


Figure 2.1 - Graphical representation of the mathematical model of diagnostics of the maintenance and SCADA operation

– design of the schedule:



Figure 2.2 - Graphs of the dynamics of changes in the number of states of the TOC control system

## 2.4 Designing tables

As a rule, digital material is organized in tables. The table should be placed immediately after the text in which it is mentioned for the first time or on the next page. When transferring a table to the next page, do not repeat the thematic heading, but write "Continuation of Table 1.1" and repeat the numbering on the next page, above the last part of the table - "End of Table 1.1".

All tables should be referenced in the text. The word "table" is abbreviated in the

text, for example: "...in Table 2.1". In repeated references to tables and illustrations, the word "see" is abbreviated, for example: "see Table 2.1".

Each table has a thematic heading placed above it, which is indented on the left side of the table. If there is no numerical or other data in a certain line of the table, put a dash in it. The numbers in the table cells should be placed so that the corresponding digits in the entire column are located one below the other.

Each table should be accompanied by a brief analysis or commentary. Tables should be separated from the main text by a single blank line at the top and bottom.

*An example of a table with a continuation:*

Table 2.1 - Table of parameters of the object-classification model for diagnosing the SCADA system operation

Model parameter	Description.	№ formulas
2	3	4
$P$	Process (a program module that runs on a system-forming node in the SCADA system software)	2.1
$P$	The set of all processes (software of the agricultural SCADA system)	2.1
$n(P)$	Number of processes of the SCADA software	2.1

End of Table 2.1

2	3	4
$2^P$	The set of all subsets of processes in the software Agricultural SCADA systems	2.12
$P_z$	Some arbitrary subset of processes in the Agricultural SCADA system software	2.12

<i>K</i>	Process control point (PCP)	2.2
<i>K</i>	Multiple process control points	2.2

## **3 PROCEDURE FOR PREPARING AND DEFENDING A MASTER'S THESIS**

### **3.1 Preparing a master's thesis for defense**

The state certification of a graduate student involves the defense of a master's thesis, which is the result of studying in the specialty. Students who have successfully and fully completed the curriculum are allowed to defend their master's thesis.

The master's thesis is submitted to the supervisor for review within the time limits specified in the assignment for its completion. The supervisor provides feedback on the master's thesis (Appendix P), which determines: the relevance of the research; the effectiveness of the methodology used; the level of application of theoretical knowledge acquired in the course of study and preparation for research; the ability to independently solve scientific and practical problems; the ability to logically, consistently, reasonably present the material and draw conclusions; the prospects of the proposed recommendations and conclusions; shortcomings of the work (if any).

The master's thesis must be reviewed by an external reviewer. Reviewers can be practitioners, scientists, university professors, etc.

When reviewing a master's thesis, it is recommended to determine the following:

- the novelty of the task formulation and development;
- use of scientific research methods;
- validity of conclusions and proposals;
- student participation in research, theoretical and analytical processing of the results, formulation of scientific positions, ideas, and methods;
- the student's ability to present the material clearly, competently, and with arguments;
- quality of the material design;
- shortcomings in the content and design of the work.

The review is provided in writing and should contain a general conclusion on the recommendations for defense (recommended or not recommended) before the Examination Committee (EC) (see Appendix P).

Along with the master's thesis, a declaration of integrity is submitted (see Appendix C), which certifies that the master's thesis meets the requirements of academic integrity

and does not contain violations defined in Art. 42 of the Law of Ukraine "On Education".

In order to prevent plagiarism of graduation theses, the master's thesis must be checked for plagiarism using the online service StrikePlagiarism, which checks text documents for borrowed parts of text from open sources on the Internet or the user's internal document database. To check for plagiarism, the student submits an application for plagiarism check to the supervisor (see Appendix T) and prepares a file for checking according to the instructions (see Appendix U).

As a result of checking a document for plagiarism, a corresponding protocol is generated. The originality of the document must be at least 70%.

### **3.2 Preliminary defense of the master's thesis**

The master's thesis undergoes a preliminary defense at the department in accordance with the approved schedule one month before the official defense at the EC meeting. The student must submit the following for consideration by the departmental committee:

- 1 An explanatory note to the master's thesis with the signatures of the student, supervisor, and consultant.
- 2 Key fragments of the work (program implementation) and the results of solving all the tasks (presentation).

After hearing the report and the student's answers to the questions, the departmental commission for the preliminary defense of master's theses determines the degree of readiness of the presented work and decides on the admission of the master's thesis to the defense at the EC meeting.

### **3.3 Master's thesis defense**

The defense of the master's thesis takes place in public at a meeting of the EC, the composition of which is approved in accordance with the established procedure. The student prepares a report and illustrative material for the presentation. Before defending the work, after checking for plagiarism and normative control, the work is prepared for uploading to the institute's repository, according to the instructions (see Appendix F).

The following documents, executed in accordance with the requirements, are attached to the master's thesis defense:

- explanatory note;

- protocol for checking the work for plagiarism;
- a presentation containing illustrations to the report;
- Master's thesis evaluation form (Appendix X);
- feedback from the supervisor of the master's thesis (Appendix P);
- review (Appendix P)
- declaration of integrity (Annex C).

During the defense, the student:

- clearly presents the topic, purpose and objectives of the master's ;
- emphasizes its relevance and novelty;
- formulate the problem statement;
- explains the essence of the methods used to solve the problem and justifies their choice;
- presents and explains the developed algorithm;
- justifies the use of software tools;
- defines the users of the software system, the level of access and system functions provided to each user;
- describes the input and output information for each task implemented in the system;
- demonstrates and explains the key fragments of the dialog between the software system and the user and the results of solving all the tasks;
- formulate conclusions about the work performed.

The student's report at the defense lasts up to 10 minutes. After the report, the student gives comprehensive answers to the questions of the EC, reasonably and persistently defends his or her point of view. The Secretary of the EC reads out the external review, and the master's student responds to the reviewer's comments.

Throughout the defense, the minutes of the EC meeting are kept, which record the conclusions of the EC members about the scientific value of the results and their practical implementation.

After the defense, the EC members discuss its results at a closed meeting and make a decision on the assessment of each master's thesis defense.

### **3.4 Evaluation criteria for the master's thesis**

The author of the master's thesis must demonstrate the skills:

- present material in a logical and reasoned manner;
- correctly use statistical, mathematical and other methods; conduct their own research; have the skills of generalization; formulate conclusions
- work with information sources;
- initiate and justify innovative approaches and directions for solving the problem under study.

The quality of its execution and design, the novelty and significance of the results obtained, the presentation of the master's thesis and the completeness of its answers to the questions are taken into account when evaluating the work.

A high grade of a master's thesis can be an argument for recommending a graduate for admission to a postgraduate program.

Graduates who fail to defend their thesis are expelled from the university and receive a certificate. They may be allowed to defend their master's thesis again in a year.

The master's thesis, together with illustrative material and scientific developments, is transferred to the archive and posted on the official website of the university.

## LIST OF INFORMATION SOURCES

- 1 Requirements for the preparation of dissertations and dissertation abstracts // Bulletin of the Higher Attestation Commission of Ukraine. - 2011. - No. 9/10. - P. 2-10.
- 2 DSTU GOST 7.1:2006. System of standards for information, library and publishing. Bibliographic record. Bibliographic description. General requirements and rules for compilation (GOST 7.1-2003, IDT)". Effective as of July 01, 2007.
- 3 STVO-HPI-3.01-2021 SSONP. Text documents in the field of educational process. General requirements for implementation. Valid from 01.01.2022.
- 4 STVO-KHPI-2.01-2021 SSONP. Diploma projects and theses. General requirements for execution. Effective from 01.01.2022.
- 5 Methodical recommendations for writing, designing and presenting student research papers of students - members of the Small Academy of Sciences of Ukraine / G.G. Pivnyak, L.M. Korotenko, I.M. Udovyyk, E.M. Holovnya - D.: SHEI "National Mining University", 2017. - 24 p.
- 6 Methodical recommendations for the performance of qualification works of bachelors of the training direction 6.050101 "Computer Science and /, L.M. Korotenko, O.S. Shevtsova; National University of Dnipro Polytechnic - D : NTU "Dnipro Polytechnic", 2018. - 65 p.
- 7 Methodical recommendations for master's qualification work for students of specialty 122 "Computer Science" In: O.I. Artemenko, B.M. Gatz, V.G. Vershyhora, S.I. Osadchuk - Chernivtsi: 2022, Bukovinian University, 2022. - 46 p.
- 8 Methodical recommendations for the performance of qualification works of bachelors of **the** training direction 6.050103 "Software Engineering" / O.S. Shevtsova, I.M. Udovyyk, L.M. Korotenko; National University of Dnipro Polytechnic - Dnipro: NTU "Dnipro Polytechnic", 2018. - 65 p.
- 9 Methodical recommendations for master's theses by students majoring in 121 "Software Engineering" and 122 "Computer Science" / M.O. Alekseev, O.I. Syrotkina, I.M. Udovyyk, O.S. Shevtsova; Ministry of Education and Science of Ukraine, National Technical University "Dnipro Polytechnic." - Dnipro: NTU "DP", 2018. - No. 3. - 57 p.
- 10 Methodical instructions for master's thesis by students majoring in 113 "Applied Mathematics" and 122 "Computer Science" of the second (master's level) of

higher education of full-time and part-time forms of education / O.P. Ostapchuk, T.P. Tsvetkova - Rivne: NUHPG, 2018. - 28 p.

11 Basic Requirements for Writing a Research Paper // [http://dvman.dnepredu.com/uploads/editor/4165/353853/sitepage\\_62/files/vimogi\\_do\\_oformlennya\\_ndr.docx](http://dvman.dnepredu.com/uploads/editor/4165/353853/sitepage_62/files/vimogi_do_oformlennya_ndr.docx), 3.12.2017.

12 On Approval of the Requirements for Dissertation Preparation: Law of Ukraine as of January 12, 2017 No. 40 // <http://zakon2.rada.gov.ua/laws/show/z0155-17>, 12.12.2017.

13 SVO NSU IMZ - 14. Organization of publication of information and methodological support of the educational process / A.F. Kosolapov, V.O. Salov, A.K. Gorenko, O.N. Ilchenko, O.N. Nefedova, O.I. Dodopko, T.O. Pysmenkova, O.V. Zhurunova ; National Mining University - D. : NSU, 2014. 50 p.

14 SIS NSU NMZ - 05. Regulatory and methodological support of the educational process. 2005 - 08 - 05. - D. : NSU, 2005. - 139 p.

15 SVO NMU IMZ - 09. Organization of publication of information and methodological support for the educational process / Developed by: V.O. Salov, O.I. Dodopko, T.O. Pysmenkova - D.: National Mining University. - 2009. - 60 p.

## APPENDIX A

### Examples of topics for master's theses in the specialty 121 "Software Engineering"

- 1 Research, design and development of software components for a software quality assessment system
- 2 Design and development of a software solution for the implementation of the European competence matrix for the learning management system
- 3 Designing, developing and researching a software solution for recording class attendance in distance learning
- 4 Research of a model and development of a software component for evaluating the effectiveness of the semantic core in the Internet promotion channel
- 5 Research, design, and development of software solutions for comprehensive assessment of automated testing
- 6 Research of models and software components of image classification software system
- 7 Development and research of a software component for detecting SQL injections in HTTP traffic based on machine learning algorithms
- 8 Research, design, and development of software components for a personal identification system
- 9 Development and research of software components for the implementation of a competency-based approach in the learning management system
- 10 Study of the model for planning the development of a subset of processes of the SPICE maturity model
- 11 Study of software components for searching and extracting bibliographic data
- 12 Research, design and development of software components for assessing the reliability of mobile applications

**APPENDIX B****An example of the title page of the work**

MINISTRY OF EDUCATION AND SCIENCE OF UKRAINE

**NATIONAL TECHNICAL UNIVERSITY  
"KHARKIV POLYTECHNIC INSTITUTE"**

Institute of Computer Science and Information Technology  
Department of Software Engineering and Intelligent Control Technologies  
121 Software engineering  
Educational Software engineering

I admit to the defense  
 Head of the Department

Andriy KOPP

(first and last name)

\_\_\_\_\_  
(signature, date)**THESIS**second (master's) level of higher education

Theme of work Research, design and development of software components  
components to ensure the integrity and safety of data in the system eLearning

Code of work KN-N221.1

(group, topic number by order)

Hnidenko Anastasiia Petrivna

(last name, first name, patronymic)

Head of the department Associate Professor Shmatko Oleksandr  
Vitaliiovich (position, surname, name, patronymic)

Kharkiv 2024



## APPENDIX D

### An example of a master's thesis assignment

MINISTRY OF EDUCATION AND SCIENCE OF UKRAINE

**NATIONAL TECHNICAL UNIVERSITY  
"KHARKIV POLYTECHNIC INSTITUTE"**

Institute of Computer Science and Information Technology  
Department of Software Engineering and Intelligent Control Technologies  
 Level of higher education second (master's) level  
121 Software engineering  
 Educational Software engineering

**I APPROVE**

Head of \_\_\_\_\_ (signature)

Andriy KOPP  
 (first and last name)

" \_\_\_\_ " \_\_\_\_\_ 20\_\_

### TASKS FOR A STUDENT'S THESIS

Anastasia Petrovna Hnidenko  
 (last name, first name, patronymic)

1 Theme of Research, design and development of software components  
components to ensure the integrity and safety of data in the system eLearning

The head of the work Shmatko Oleksandr Vitaliyovych, Associate  
Professor, Ph.

(last name, first name, patronymic, academic degree, academic title)

approved by the order of the higher education institution dated " \_\_ " \_\_\_\_\_  
 202\_\_ p. № \_\_\_\_\_

2 Deadline for submission of the student's work \_\_\_\_\_

3 Initial data for \_\_\_\_\_

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4 List of issues to be developed in the explanatory note

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5 List of graphic material (with precise indication of the required drawings \_\_\_\_\_)

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6 Consultants of work sections

Section.	Name, initials and position consultant	Signature, date	
		task issued	task accepted

---



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7 Date of issue of the task \_\_\_\_\_

---

### CALENDAR PLAN

Stage number	Name of the stages of the thesis	Term. fulfillment stages of work	Notes.
1	Selecting and approving the topic of the graduation thesis		
2	Development and approval of the work schedule		
3	Overview of methods for .....		
4	Algorithmic and software development		
5	Testing of the developed software		
6	Preparing a report		
7	Development of demonstration posters		
8	Compilation of a list of documents (LD)		
9	Registration and completion of DRs		
10	Submission of the completed thesis for admission to defense		
11	Review of the thesis		
12	Protection of the DR		

**Student** \_\_\_\_\_ Anastasiia Hnidenko

(signature) (last name and initials)

**Head of the work** \_\_\_\_\_ Alexander Shmatko

## APPENDIX D

### An example of the cover page of the explanatory note of the master's thesis

MINISTRY OF EDUCATION AND SCIENCE OF UKRAINE

**NATIONAL TECHNICAL UNIVERSITY  
"KHARKIV POLYTECHNIC INSTITUTE"**

Institute of Computer Science and Information Technology  
Department of Software Engineering and Intelligent Control Technologies  
121 Software engineering  
Educational Software engineering

### EXPLANATORY NOTE

#### to the thesis

second (master's) level of higher education

on the topic Research, design and development of software components  
components to ensure the integrity and safety of data in the system eLearning

Performed by a 6th year student, group KN-H221

Anastasia Gnidenko

(signature, surname and initials)

The of Alexander Shmatko

(signature, surname and initials)

Reviewer Alexander MILOV

(signature, surname and initials)

control Oksana IVASHCHENKO

(signature, surname and initials)

Kharkiv 2024

## APPENDIX E

### An example of an abstract

#### ABSTRACT

Explanatory note to the DR: 86 pages, 36 figures, 2 tables, 4 appendices, 63 sources.

*Keywords:* VEHICLE IDENTIFICATION. ARTIFICIAL INTELLIGENCE, MACHINE LEARNING. TRAFFIC ANALYSIS

Object of study: car traffic recorded by a camera from a dashboard camera installed on a vehicle.

Subject of research: methods of artificial intelligence, neural networks and models from combinations of neural networks used to identify physical objects, in particular vehicles, which can be uniquely identified by means of a license plate, and neural networks and methods that can be used to determine the text of a license plate as accurately as possible.

The aim of the research work is to improve the accuracy of vehicle recognition and identification using license plates by designing and developing software components for a traffic analysis system using machine learning algorithms.

Research methods. To solve the tasks, we used the following methods: data analysis, pattern recognition theory from the field of computational intelligence, fuzzy set theory, object-oriented analysis and design.

The scientific novelty of the obtained results of the research work is determined by the fact that the pattern recognition model for classifying vehicles in a video stream has been improved, which has increased the accuracy of vehicle recognition and identification using license plates.

## ABSTRACT

Explanatory Note to the DW: 86 pages, 36 figures, 2 tables, 4 appendices, 63 references.

*Keywords:* VEHICLE IDENTIFICATION, ARTIFICIAL INTELLIGENCE, MACHINE LEARNING, TRAFFIC ANALYSIS.

*Object of the Research:* Automotive traffic recorded using a video camera mounted on a vehicle's dashboard camera.

*Subject of the Research:* Artificial intelligence methods, neural networks, and models combining neural networks used for identifying physical objects, particularly vehicles that can be uniquely identified via license plates, as well as neural networks and techniques that can enhance the accuracy of license plate text recognition.

*Objective of the Research Work:* To improve the accuracy of vehicle recognition and identification via license plates by designing and developing software components for a traffic analysis system using machine learning algorithms.

*Research Methods:* The tasks were addressed using methods of data analysis, pattern recognition theory from the field of computational intelligence, fuzzy set theory, and object-oriented analysis and design.

*Scientific Novelty:* The scientific novelty of the research outcomes lies in the enhancement of a pattern recognition model for classifying vehicles in video streams, which has led to improved accuracy in the recognition and identification of vehicles via license plates.

## APPENDIX G

### Example of a list of symbols and abbreviations

#### LIST OF SYMBOLS AND ABBREVIATIONS

DB - database;

GA is a genetic algorithm;

GIS is a geographic information system;

GISDMS is a geographic information system for decision support;

Least-squares method is a method of least squares;

DPO - decision maker;

DMS is a decision support system;

ERD - Entity Relationship Diagram

HTTP - HyperText Markup Protocol

PSO - Particle Swarm Optimization

UML - Unified Modeling Language.

## APPENDIX K

## Example of a table of contents

## TABLE OF CONTENTS

List of symbols and abbreviations .....	<b>Ошибка! Закладка не определена.</b>
Introduction .....	<b>Ошибка! Закладка не определена.</b>
1 Basic concepts, the task of automatic license plate recognition	<b>Ошибка! Закладка не определена.</b>
1.1 Images and neural networks. Basic concepts	<b>Ошибка! Закладка не определена.</b>
1.2 Relevance and problem statement .....	<b>Ошибка! Закладка не определена.</b>
1.3 Features of the task .....	<b>Ошибка! Закладка не определена.</b>
1.4 History of ANPR systems development	<b>Ошибка! Закладка не определена.</b>
1.5 Common stages of solving a problem .	<b>Ошибка! Закладка не определена.</b>
1.5.1 Quantization .....	<b>Ошибка! Закладка не определена.</b>
1.5.2 Filtering .....	<b>Ошибка! Закладка не определена.</b>
1.5.3 Recognizing numbers .....	<b>Ошибка! Закладка не определена.</b>
2 Theoretical information .....	<b>Ошибка! Закладка не определена.</b>
2.1 Convolutional neural networks .....	<b>Ошибка! Закладка не определена.</b>
2.1.1 The rolling layer .....	<b>Ошибка! Закладка не определена.</b>
2.1.2 Aggregate layer .....	<b>Ошибка! Закладка не определена.</b>
2.1.3 Full bonding layer .....	<b>Ошибка! Закладка не определена.</b>
2.2 Comparative characteristics of convolutional networks and technologies that can be used to solve the problem	<b>Ошибка! Закладка не определена.</b>
*3 Building an information system .....	<b>Ошибка! Закладка не определена.</b>
3.1 Choosing a model .....	<b>Ошибка! Закладка не определена.</b>
3.2 RetinaNet. Theoretical information.....	<b>Ошибка! Закладка не определена.</b>
3.2.1 Pyramid Network feature .....	<b>Ошибка! Закладка не определена.</b>
3.3 Focal Loss.....	<b>Ошибка! Закладка не определена.</b>
4 Experimental research .....	<b>Ошибка! Закладка не определена.</b>
4.1 Results of automatic license plate detection	<b>Ошибка! Закладка не определена.</b>
4.2 Text recognition.....	<b>Ошибка! Закладка не определена.</b>

- 4.3 Information system..... **Ошибка! Закладка не определена.**
- 4.4 Example of information system operation**Ошибка! Закладка не определена.**
- Conclusions. .... **Ошибка! Закладка не определена.**
- List of information sources..... **Ошибка! Закладка не определена.**

## APPENDIX L

### Creating a list of information sources

Bibliographic descriptions of information sources are made in the form in which they are presented in the source (on the title page, back of the title page, or other elements of the document containing the original or similar information), taking into account the requirements of DSTU GOST 7.1.

The abbreviations of words in the bibliographic description should correspond to: in Ukrainian - DSTU 3582, in foreign European languages - DSTU 7093.

In general, a bibliographic description of an information source (IS) can be presented as follows [3]:

*Main title: information related to the title/responsibility information. - Information about the publication. - Area of specific information. - Place of publication: Name of publisher, year of publication. - Issue number (for serial publications). - Physical characterization area.*

The elements of bibliographic description and punctuation are drawn up in accordance with DSTU GOST 7.1, taking into account the simplifications defined in DSTU 8302, in particular:

- the title should contain information about one, two or three authors, and the names of these authors should not be repeated in the information about responsibility (with a slash);
- if necessary, you can specify more than three names of authors in the title;
- instead of the dot and dash (";-") sign that separates the zones of a bibliographic reference, it is recommended to use the full stop sign (punctuation marks should be unified within the same document);
- information not taken from the title page of the document may not be enclosed in square brackets;
- it is allowed not to indicate the general designation of the material after the title ("Text", "Electronic resource", "Maps", "Notes", etc.);

- the name of the publisher may not be indicated in the source data;
- in the information about the physical characteristics of the document, you can specify either the total volume (for example: 285 p.) or the page number where the reference object is located (for example: P; 19);
- information about the series and the International Standard Number (ISBN, ISMN, ISSN) may be omitted.

Some examples of bibliographic references in a list:

- 16 Methodical instructions for the implementation of the economic feasibility study of the project for the development of software for the bachelor's degree thesis / V. Moskalenko, O. Shmatko, N. Fonta - Kharkiv: NTU "KhPI", 2022. - 35 p.
- 17 STVO-HPI-3.01-2021 SSONP. Text documents in the field of educational process. General requirements for implementation. Valid from 01.01.2022.
- 18 Vyshniakov I.V. Models and methods of commercial banks evaluation under conditions of uncertainty : Cand: 08.00.13 : defended 12.02.02 : approved. 24.06.02 / Vishnyakov Ilya Vladimirovich. M., 2002. C.234. 04200204433.
- 19 Titov P.S. Analysis and synthesis of dynamic processes in vibration devices for robots : master's thesis : 7.080303: defended on 12.02.09 / Titov Petro Semenovych - Kharkiv, 2009. C. 104. I-13A.05.
- 20 Matviykyv M. D. Interrelation of shear and tear strengths of surface coatings / M. D. Matviykyv, A. I. Stashko // Bulletin of the National University "Lviv Polytechnic" - 2008. - No. 618: Radioelectronics and telecommunications. - P. 203-206.
- 21 Petrunya Y.E., Pasichnyk T.O. Influence of the latest technologies on logistics and supply chain management / Petrunya Y.E., Pasichnyk T.O. // Marketing and management of innovations, 2018. № 1. C. 130-139.
- 22 Sharaya A.A. Principles of civil service under the legislation of Ukraine. Legal scientific electronic journal. 2017. № 5. PP. 115-118. // [http://lsej.org.ua/5\\_2017/32.pdf](http://lsej.org.ua/5_2017/32.pdf), 20.02.2020
- 23 Sáiz-Manzanares M.C. Improve teaching with modalities and collaborative groups in an LMS: an analysis of monitoring using visualization techniques / M. C. Sáiz-Manzanares // Journal of Computing in Higher Education. - 2021. - Vol. 33. - P. 747-778.
- 24 Arqoub M. A. Extending Learning Management System for Learning Analytics/ M. A. Arqoub // 2022 International Conference on Business Analytics for

Technology and Security (ICBATS). - 2022.//  
[https://www.researchgate.net/profile/Abdulkarim-Albanna/publication/360231474\\_Extending\\_Learning\\_Management\\_System\\_for\\_Learning\\_Analytics/links/6298ef806886635d5cb861d8/Extending-Learning-Management-System-for-Learning-Analytics.pdf](https://www.researchgate.net/profile/Abdulkarim-Albanna/publication/360231474_Extending_Learning_Management_System_for_Learning_Analytics/links/6298ef806886635d5cb861d8/Extending-Learning-Management-System-for-Learning-Analytics.pdf), 18.04.2024

## APPENDIX M

### Example of the cover page of the master's thesis illustration materials

MINISTRY OF EDUCATION AND SCIENCE OF UKRAINE

**NATIONAL TECHNICAL UNIVERSITY  
"KHARKIV POLYTECHNIC INSTITUTE"**

Institute of Computer Science and Information Technology  
Department of Software Engineering and Intelligent Control Technologies  
121 Software engineering  
Educational Software engineering

### ILLUSTRATIVE MATERIALS

Theme of Research, design and development of software components  
components to ensure the integrity and safety of data in the system eLearning

Work code KN-N221.1  
(group, topic number by order)

Performer Anastasia Hnidenko  
(surname, name, patronymic)

The head of Alexander Shmatko  
(position, surname, name, patronymic)

Kharkiv 2024

## APPENDIX H

### An example of the cover page of a master's thesis

MINISTRY OF EDUCATION AND SCIENCE OF UKRAINE

**NATIONAL TECHNICAL UNIVERSITY  
"KHARKIV POLYTECHNIC INSTITUTE"**

Institute of Computer Science and Information Technology  
Department of Software Engineering and Intelligent Control Technologies  
121 Software engineering  
Educational Software engineering

### SCIENTIFIC DEVELOPMENTS

Theme of Design, development and research of a software solutions for the  
formation of extracts from the plan of study load of scientific and pedagogical  
staff of the department

Code of work KN-N221.2.3  
(group, topic number by order)

Dmitry Sergeevich Korkhovoy  
(last name, first name, patronymic)

Head of the department Associate Professor Dmytro Eduardovych  
Dvuhlavov (position, surname, name, patronymic)

## APPENDIX

### GENERAL SCHEME OF THE SUPERVISOR'S FEEDBACK

#### NATIONAL TECHNICAL UNIVERSITY "KHARKIV POLYTECHNIC INSTITUTE"

Institute of Institute of Computer Science and Information Technology

Department of Software Engineering and Intelligent Control Technologies

Specialty 121 Software engineering

Educational program Software engineering

#### REVIEW

**for a master's thesis of the second (master's) level of higher education on the topic "**\_\_\_\_\_

**student(s) of the group** \_\_\_\_\_

(last name, first name'me, patronymic)

The author of the master's thesis must receive a written review from the department's supervisor. It is recommended to print the review of the supervisor of the master's thesis in the following form:

- relevance of the topic;
- the degree of scientific and practical significance of the work;
- the level of student's preparation for professional duties;
- the degree of independence in the course of completing the thesis;
- the novelty of the issues raised and the originality of their solution;
- degree of mastery of research methods;
- completeness and quality of the topic development;
- logical, consistent, reasoned, literary literacy of the material presentation;
- the possibility of practical application of the qualification work and its individual parts;
- a conclusion on the possibility of admitting the master's thesis to defense in the examination committee.

Master's thesis supervisor \_\_\_\_\_

(first and last name)

**APPENDIX P**

**General scheme of reviewing a master's thesis**

**NATIONAL TECHNICAL UNIVERSITY  
"KHARKIV POLYTECHNIC INSTITUTE"**

Institute of Institute of Computer Science and Information Technology

Department of Software Engineering and Intelligent Control Technologies

Specialty 121 Software engineering

Educational program Software engineering

**REVIEW**

for a diploma thesis of the second (master's) level of higher education  
студента(ки) \_\_\_\_\_

Тема

роботи

1 Relevance of the work topic

2 Depth of research topic development

3 Assessment of the quality of technical solutions and calculations

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---

---

4 Evaluation of the practical significance of the thesis as a whole and its individual parts

---

---

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5 The main shortcomings and errors found in the thesis

---

---

6 Assessment of the quality of the explanatory note

---

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In general, the master's thesis of student (s) \_\_\_\_\_ deserves a grade of \_\_\_\_\_, and student (s) \_\_\_\_\_, the qualification of \_\_\_\_\_.

РЕЦЕНЗЕНТ

\_\_\_\_\_  
*(academic degree and title, position, surname, name, patronymic of the reviewer)*

\_\_\_\_\_ 2024 p.  
*(signature)*

## APPENDIX C

### DECLARATION OF INTEGRITY

MINISTRY OF EDUCATION AND SCIENCE OF UKRAINE

**NATIONAL TECHNICAL UNIVERSITY  
"KHARKIV POLYTECHNIC INSTITUTE"**

#### **Declaration academic integrity**

Я, \_\_\_\_\_

6th year full-time student of the Educational and Research Institute of Computer Science and Information Technologies, specialty 121 Software Engineering - I confirm that the master's thesis written by me on the topic "  
\_\_\_\_\_

\_\_\_\_\_ " meets the requirements of academic integrity and does not contain violations specified in Art. 42 of the Law of Ukraine "On Education", with the content of which I am familiar;

- I declare that the electronic version of the work submitted for review is identical to its printed version;
- I agree to verify my work for compliance with the criteria of academic integrity in any way, including through a specialized software system;
- I agree archive my work in the NTU KhPI repository.

#### **Student(s)**

\_\_\_\_\_  
(date)

\_\_\_\_\_  
(signature)

\_\_\_\_\_  
(first and last name)

e-mail address \_\_\_\_\_

## APPENDIX T

### Application for plagiarism check

To Andriy KOPPU, Head of the Department of the Polytechnic Institute

(Name unit, name head (unit))

Margarita Lykova, NTU "KhPI"

((full name) (applicant) (applicants), (place of  
work (study))

### Z A I V A

I, the author of a master's thesis on the topic:

(Type of work)

"Research and development of a software system for forecasting market segments  
in the strategic period using neural networks"

(Title and volume of the work)

I certify that the work submitted for defense was performed independently. All borrowings identified in the work are legitimate.

The author gives permission to check the work for originality in order to prevent plagiarism.

The author guarantees that he or she has obtained all necessary permissions to use copyrighted materials in the work.

Author's signature \_\_\_\_\_

Date 02.12.2024

## APPENDIX U

### Instructions for preparing a paper for plagiarism check

#### Instructions for checking qualification (certification) exams works of higher education students at the National Technical University "Kharkiv Polytechnic Institute for signs of academic plagiarism using the Unicheck service

1) Requirements for the file to be verified:

*<https://support.unicheck.com/hc/uk/articles/360004110474-Типу-файлівта-мови-які-підтримує-Unicheck>*

2) File size and word limit: The maximum file size is 70 MB

Maximum number of words 125,000 (approximately 454 pages of text; 1 page - 275 words) Minimum number of words - 30 words

3) File types supported by Unicheck:

Adobe PDF (.pdf)

Microsoft Word (.docx, .doc) - OpenOffice files (.odt, .ods, .odp) are recommended

4) the file name is formed in Latin (according to the rules of transliteration, see: <http://ukrlit.org/transliteratsiia>) according to the scheme:

*document title\_year of defense\_surname\_first initial\_second initial.*

5) The qualification work is uploaded in one file - the file name should be formed according to the sample - *Poiasniuvalna\_zapyska\_2021\_Ivanov\_I\_I.pdf*

Explanatory Note (starting with the Table of Contents), List of References.

**WITHOUT such SECTIONS: Title page, List of documents of the qualification work, Task for the diploma project or work, Section 5 "Economic justification", Appendices.**

6) **The files for verification are sent by the manager.**

## APPENDIX F

### Instructions for preparing the work for uploading to the repository

#### **Instruction on the technology of archiving documents in the Electronic Repository of Qualifying Graduate Works of Higher Education Applicants at the National Technical University "Kharkiv Polytechnic Institute" (eNTUKhPIIRGT)**

#### 1. Prepare files for uploading

1.1 Check the availability of all files in accordance the list of qualification work documents.

1.2 Check that the **file format, name, and size of** the qualifying final theses meet the following requirements:

##### 1.2.1 **file formats:**

- for text files - OCR PDF (with a text layer)
- for applications - PDF;

1.2.2 the **file name** is formed in Latin (according to the rules of transliteration, see: <http://ukrlit.org/transliterationsia>) according to the scheme:

*document title\_year of defense\_surname\_first initial\_second initial.*

1.3. The qualification work is uploaded in one file - the file name is formed according to the sample - Poiasniuvalna\_zapyska\_2021\_Ivanov\_I\_I.pdf (in the following sequence: Title page, List of documents of the qualification work, Tasks for the diploma project or work, Explanatory note, List of information sources). Appendices (if any) - uploaded as separate PDF files (the name of the appendix files is formed according to the scheme Dodatok\_1\_2021\_Ivanov\_I\_I.pdf, where the letter in the name of the appendix is replaced by the serial number).

Table F.1

	Sequence of sections	Explanation	Example of a file name
1.	Cover page		Poiasniuvaina_ zapyska_2021_Ivanov_I_I.pdf
2.	List of documents qualification work		
3.	Assignment for the completion of a graduation project or Works.		
4.	Abstracts		
5.	Explanatory note		
6.	List. Source. information		
7.	Annexes ( <i>if any</i> )	<p>Application file names is formed according to the sample, where the letter in the name of the application is replaced by a serial number number, namely:</p> <p>A - 1 Б - 2 B - 3 Г - 4 Г - 5 Д - 6 E - 7 more...</p> <p>The LAST application is <b>Declaration of academic integrity</b> (scanned with a signature!)</p>	<p>Dodatok_1_2021_Ivanov_I_I.pdf Dodatok_2_2021_Ivanov_I_I.pdf Dodatok_3_2021_Ivanov_I_I.pdf Dodatok_4_2021_Ivanov_I_I.pdf Dodatok_5_2021_Ivanov_I_I.pdf Dodatok_6_2021_Ivanov_I_I.pdf Dodatok_7_2021_Ivanov_I_I.pdf</p> <p>Dodatok_№_2021_Ivanov_I_I.pdf</p>
8.	Presentation with a title page sheet		Prezentatsiia_2021_Ivanov_I_I.pdf

## APPENDIX X

## Master's thesis evaluation form

## MASTER'S THESIS EVALUATION FORM

student(s) \_\_\_\_\_

(last name, first name, patronymic)

<b>Evaluation criterion</b>	<b>Points.</b>	<b>Member points EC</b>
<b>Preliminary defense of the master's thesis</b>	<b>5 points</b>	
<b>Compliance with the requirements for a master's thesis:</b>	<b>55 points</b>	
Structural and logical organization of the work, relevance and novelty	5	
Design of the work (diagrams, tables, formulas, codes, figures, literature) in accordance with the requirements of the standard	5	
Chapter 1 (level of theoretical research)	10	
Section 2 (depth and quality of the case study)	15	
Section 3 (level of program implementation, developments and proposals)	15	
Section 4 (depth and quality of the experimental study)	5	
Conclusions.		
<b>Protection of work:</b>	<b>25 points</b>	
Quality of the report (clarity, logical presentation of the material)	10	
Quality of answers to questions (knowledge of the material)	10	
Quality of visual materials (presentations)	5	
<b>Manager's assessment</b>	<b>5 points</b>	
<b>External review</b>	<b>5 points</b>	
<b>Participation and prizes in competitions, availability of scientific publications</b>	<b>5 points</b>	
<b>Total (maximum number):</b>	<b>100 points</b>	

Educational edition

**GUIDELINES**

for completion of thesis  
educational qualification level – Master's degree in knowledge area  
12 "Information technology"  
for students majoring in 121 "Software Engineering"

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