

MINISTRY OF PUBLIC HEALTH OF UKRAINE
NATIONAL UNIVERSITY OF PHARMACY
TECHNOLOGY OF DRUGS DEPARTMENT

**GUIDELINES FOR THE
IMPLEMENTATION
OF THE MASTER'S THESIS
FROM THE PHARMACY-BASED
TECHNOLOGY OF DRUGS**

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Guidelines are designed for English-speaking students of specialty “Pharmacy” of pharmaceutical universities and faculties of full-time and distance learning. Guidelines are provided practical and methodological assistance to graduate students in the performance of master's thesis works from the pharmacy-based technology of drugs.

Guidelines contains modern requirements to perform master's thesis, outlines the subject of scientific research, the basic rules of scientific work, displays requirements for public defense of the master's thesis. Guidelines are based on the requirements of the approved provisions of the master's thesis in the National University of Pharmacy.

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INTRODUCTION

Master's thesis is the final stage of training, which should show willingness and ability to mobilize knowledge, abilities, skills, significant professional and personal qualities of the graduate.

These guidelines are developed under the “Regulations on the organization of educational process in higher educational establishments”, and according to the “Regulations on the implementation and defense of the master's thesis in the National University of Pharmacy”, and determine the requirements for subject, content, scope, design of the master's thesis, the control over its execution, preparation for the defense at the technology of drugs department.

Subjects of the master’s thesis are designed with the specific of training specialists at the technology of drugs department, the requirements of standards for higher education of relevant educational qualification level; own experience of supervising of master's thesis; research and professional interests of the department’s staff, orders and recommendations of production pharmacies, etc.

These guidelines are intended to provide practical and methodological assistance to undergraduates to conduct independent research, collecting and processing information, the justification of practical work in the performance, its preparation and defense.

1. GENERAL PROVISIONS

Master's thesis is a kind of graduate qualification specific educational qualification, which aims to solve urgent scientific, industrial and technical or educational issues or problems. It is associated with the analysis or synthesis, theoretical development of current issues in research processes and objects in a particular area.

For educational qualification of “master” master's thesis must be completed scientific research of certain aspects or production problems.

1.1. Goals, objectives of master's thesis

The main goal of the master's thesis is mastering the methodology of creative solving urgent problems and tasks of scientific or applied nature on the basis of the knowledge and skills according to the standards of higher education.

The main objectives of master's thesis:

- systematization, consolidation and expansion of theoretical knowledge acquired during the training, their practical use in addressing specific scientific or production issues in professional activity;
- development of independent work, mastery of technique research and experimentation;
- determination of the compliance of the graduate's level to the requirements of educational characteristics of “masters” qualification, his willingness and ability to work independently.

1.2. The main stages of the master's thesis

Preparatory

1. The choice of subject and object of research, the approval of the theme.
2. Development of individual task on a thesis.
3. Scheduling of execution.
4. Studying literature and scheduling of work.

Basic

5. Experimental research and processing of results.
6. Writing the first draft of the text, its presentation to review by supervisor.
7. Elimination of shortcomings, writing the final version of the text, design master's thesis.

Final

8. Getting feedback of the supervisor on the thesis.
9. Preliminary defense at the department.
10. Reviewing of the thesis.
11. Obtaining permission of the Head of department to the defense.
13. Defense of the master's thesis.

1.3. Duties of the supervisor of the master's thesis

- prepares and gives tasks to a student;
- gives recommendations for processing relevant literature, regulations and reference materials, scientific publications on the topic, etc.;
- helps make, approves and monitors implementation of the schedule of the thesis performance;
 - the time allotted for guidance uses:
 - ✓ regular (at least once every two weeks) interviews to discuss the state of the thesis, the possible solutions to problems, individual items, etc.;
 - ✓ verification of the thesis (in parts or as a whole);
 - prepares a review with the characteristics of the student during the performance of the thesis and is responsible for its objectivity;
 - together with the executive provide to the Head of the department prepared and verified thesis for its admission to the defense;
 - prepares magistrate to the defense.

1.4. The rights and obligations of a student who performs a master's thesis

The student has the right:

- to choose the theme of the thesis among the proposed by the department or suggest his own theme with the necessary rationale for its development and implementation opportunities;
- to use laboratory and information base of the department, instruments, measuring equipment, etc. for the experiment on the theme of the thesis;
- to be consulted by the supervisor;
- to choose his own solutions to the challenges of the master's thesis.

The student should:

- promptly select a theme of the master's thesis and obtain specific tasks from the supervisor for picking up and processing materials;
- get from the supervisor tasks for master's thesis, find their content, features and performance requirements of the individual issues;
- prepare and agree with the supervisor the calendar schedule of thesis implementation with the need to check the materials by the supervisor, getting supervisor's feedback and review, admitting of fully prepared and proven to the defense master's thesis in the state examination commission;
- regularly, at least once in every two weeks, inform the supervisor about the state of the thesis implementation according to the schedule, provide upon request necessary materials for verification;
- implement the thesis by himself;
- be responsible for the correctness of decisions, studies, calculations, quality of results' design;
- follow the calendar schedule of the thesis implementation, respond to comments and recommendations of the supervisor;
- obtain all necessary signatures on the front page, and resolution of the Head of department on admission to the defense;
- personally submit the thesis to reviewer; upon request, provide the nec-

essary explanations on issues that developed in the thesis;

- familiarize with the content of supervisor's and reviewer's reviews and prepare if necessary reasoned response to their comments in defense the thesis in the state examination commission;
- pass the previous defense of the thesis at the department;
- within the period specified by the secretary of the state examination commission give the thesis to the state examination commission;
- arrive on time to the defense.

1.5. The choice of the theme of the master's thesis

Master's thesis should be performed under the scientific direction of the technology of drugs department "Creating original and combined finished and extemporaneous medicines in various dosage forms".

The student in consultation with the supervisor chooses a theme from the recommended list of research or can offer another theme of the thesis with the appropriate rationale for its development. Typically, the performance of the master's thesis is a continuation of student's research at the department.

A theme of the thesis should be relevant, meet the current level of science and be aimed at addressing the needs and challenges of the pharmaceutical industry. The name of a theme should be short, clear and specific reflect the goals and basic content of the thesis.

Recommended areas for research:

1. Improvement of extemporaneous medicines compositions and technology.
2. Pharmaceutical and technological research of extemporaneous and industrial medicines.
3. Physical and chemical research of extemporaneous and industrial medicines.
4. Biopharmaceutical research of extemporaneous and industrial medicines.
5. Microbiological research of extemporaneous and industrial medicines.
6. Studying the range of excipients and their impact on the stability, bioavail-

ability or technology of the medicine.

7. Studying the stability of the medicine (the impact of sealing materials and storage conditions).

8. Analysis of modern extemporaneous compounding in the production pharmacies: validation of technological processes.

9. The legislative framework for the preparation of extemporaneous medicines.

10. Modern computer technology in the preparation of medicines.

11. Modern equipment and means of small mechanization in pharmacies.

12. Historical analysis of the development of drugs technology.

Recommended objects of research:

1. Medicines:

1.1. Extemporaneous medicines.

1.2. Medicines of industrial production.

1.3. Homeopathic medicines.

1.4. Veterinary medicines.

1.5. Geriatric medicines.

1.6. Pediatric medicines.

1.7. Cosmetic medicines.

2. Medicinal substances.

3. Medicinal plant raw material.

4. Auxiliary substances.

5. State register of medicines.

6. Regulatory and legislative documents, Pharmacopeias and other documentation regarding the manufacture of medicinal forms.

7. Historical information on the development of medicinal forms.

Recommended methods of research:

1. System: rationale of direction and selected research methods.

2. Comparison: summarizing and comparing data, the study of dynamics.

3. Analytical: study and analysis of the regulatory and legal framework, prescription formulations etc.
4. Physical and physicochemical: determining pH, loss in weight on drying, structural and mechanical properties, thermal stability, consumer characteristics, thermogravimetric analysis, crystallography, spectroscopy, etc.
5. Pharmaceutical and technological: determining of strength, angle of repose, bulk density, moisture content, resistance to crushing, abrasion, uniformity, average weight, sieve analysis, etc.
6. Biopharmaceutical: determination of solubility, disintegration time, release of active substances, calculations of biopharmaceutical parameters.
7. Microbiological: determination of antimicrobial activity, microbiological purity, efficacy of antimicrobial preserving action.
8. Historical analysis: the stages of dosage forms development.
9. The methods of mathematical planning of experiment.
10. Mathematical and statistical methods, determination of the received results conformity.

2. THE STRUCTURE OF THE MASTER'S THESIS

2.1. The volume and content of the master's thesis

Master's thesis is made on one side of a standard sheet of white A4 paper and accompanied by the necessary tables, graphics and illustrations.

The volume of the master's thesis should be not less than 60 printed pages excluding applications.

The thesis should include:

1. Title page.
2. Content.
3. Introduction.
4. The main part.
5. Conclusions.

6. References.

7. Applications (if necessary).

In the master's thesis should concisely, logically and argued provide contents and research results, avoid common phrases, unsubstantiated allegations tautology, distortion of facts.

When writing the thesis, student is obliged to make references to the publication of other authors and sources from which materials or individual results were borrowed. When using borrowed material without reference to the author and source the thesis is not allowed to the defense.

2.2. The title page, content, introduction

The title page is the first page of the master's thesis and is made according to the established form (Appendix A).

On the next page is placed *content* with marking pages on which each of the elements of the plan, described in the thesis, are placed. All sections and units that are in the plan should be marked in the text headings and subheadings.

Introduction includes in a concise manner all the fundamental provisions grounding which is dedicated the thesis. Introduction is advisable to written once the main part of the thesis is ready.

In the introduction:

- ✓ the relevance of the theme, its practical significance are substantiated;
- ✓ object, subject, aim and objectives of the study are defined;
- ✓ the methods by which it was conducted are considered;
- ✓ the practical significance of the results is indicates;
- ✓ the structures of the thesis, its basic content are revealed.

If a student decided not to deal with certain aspects of the theme, it should be noted in the introduction.

2.3. The main part

Typically, the first part of the master's thesis is a *literature review* of the research theme, which provides:

- the analysis of fundamental scientific works, literature, regulatory and legal documents, official statistics;
- the main range of domestic and foreign scientists who have studied the subject, their contribution to the development of the problem;
- interesting, but not enough research areas covered, different perspectives on the problem;
- formulation of the main areas of the thesis: their relevance and ultimate goal, tasks, solving aspects.

It is desirable to illustrate the text using figures, graphs, charts and more.

When writing a literature review it is necessary to affix the number of each bibliographic source according to bibliography.

To finish literature review it is recommended by short conclusion about the extent of disclosure in the literature the main aspects of the theme and feasibility of the research.

The second section describes the research object and a brief theoretical justification for conducting various studies, develops the general scheme of the study.

The third section is based on the results obtained in research. The results should be properly processed and presented in the form of tables, graphs and diagrams accompanied by explanations and conclusions.

The thesis should observe accepted terminology, abbreviations and symbols, it is not recommended to use words and phrases, clichés, presentation of first person: “I watched”, “I think”, “I believe”, “I get”, “I see”. It should be avoided in the text frequent repetition of words or phrases.

It is recommended to perform the first draft of the thesis. This allows to make the necessary amendments in the text as to the initiative of the author, so according to the remarks of the supervisor.

Before submit a draft to the supervisor, it is necessary to review whether the material is logical, is there a connection between paragraphs and chapters. This apparent structural analysis of the thesis will help to see better the illogic in its structure or content.

Making the text of the thesis, it is necessary to find time for review of primary sources. It helps to see everything of value that was missed in the early study of the theme, start a curious thought, and deepen understanding of the problem.

It is advisable to postpone the text and return to it after a while, to see the thesis through the eyes of another person. All this time it is not necessary to read anything from the theme of the thesis, but to think of it. During this period, when the theme was studied and described, there are own thoughts, our own assessment and understanding of the problem - a necessary condition to improve the structure and content of the thesis.

When editing the text, it is desirable to read aloud a thesis that will help to see the possible weakness of the evidence and phrases and avoid it. Do not be afraid to cut written - text will only benefit. In preparing the draft it is necessary to edit carefully every sentence, pay attention to the selection of appropriate language that would simply, clearly and briefly express the content of set issues.

It is advisable not to delay registration of draft in the last days of the deadline. The task of the student is as soon as possible submitting a draft to the supervisor. It is normal when the thesis is processed several times. Even experienced authors are repeatedly finalizing their thesis.

After finalization of the draft with supervisor it is possible to draw fair option. All pages are numbered from the title to the latter without spaces or letter applications. The first page is considered a title page, on it number 1 is not placed, second page is considered that contains the "content", on it number 2 is not placed, on the next page number 3 is placed and further in accordance with the order.

2.4. Conclusions

The logical end of the master's thesis is conclusions. Their main goals are the results of the thesis. Conclusions are submitted as separate concise provisions. It is important to match the task.

In conclusion it should be noted not only the positive things that could detect from the study of the topic, but gaps and challenges, as well as specific recommenda-

tions to address them. The main requirement for general conclusions is not to repeat the content of introduction, the main part of the thesis and conclusions in sections.

2.5. References

References is based on the working card files and displays the amount of the resources and degree of scrutiny of the subject, is the “hallmark” of the author, his professional face, demonstrates the level of working skills with the scientific literature. References should contain the bibliographic description of the sources used by the student while working on the theme. Concluding it is necessary to follow the requirements of the Standard.

Every bibliographic record should begin with a new line; literature should be arranged in alphabetical order of the names of authors and works.

Literary design of master’s thesis is an important element of its performance and one of the many factors that notes the Commission in assessing during the defense.

2.6. Applications

In applications are available:

- the extract from the order of the University of approving themes;
- the extract from the minutes of the department on the approval of the theme at the department,
- the task for thesis,
- the feedback of the supervisor,
- the review of a leading specialist,
- the submission to the Chairman of the State examination commission about the defense of the master's thesis,
- State examination commission’s meeting minutes.

A printed presentation of the report is given separate.

During the defense primarily it addresses on the substantive aspects of presentation (logic and consistency, completeness and representativeness, breadth of scientific sources, total literacy and compliance with standards and accepted rules), as well

as on the text of the thesis, references and applications, correct execution of the thesis.

State Commission may be submitted and other materials describing scientific and practical value of the thesis done: printed articles on the theme of the thesis, documents that confirm the practical application of the work.

2.7. Common mistakes in writing and designing the thesis

When working on a master's thesis may have some errors. Often they can be:

1. The contents of the thesis does not comply with the plan or does not fully disclose the subject.
2. Formulated sections do not reflect the real situation, the state of the object.
3. The aim of the study is not related to the problem, is formulated abstract and does not reflect the specific object of study.
4. The author found no autonomy; the thesis is a compilation or plagiarism.
5. Is not done thorough and comprehensive analysis of the current and official regulations, a new professional literature (last 5-10 years).
6. Analytical review of domestic and foreign publications on the subject of the thesis is shaped annotated list and does not reflect the level of investigated problem.
7. Do not reveal the content and organization of private pilot study (the nature, duration, location, equipment, etc.).
8. The end result is not consistent with the objective research; conclusions do not correspond to the task.
9. In the thesis there are no references to primary sources or not these ones of which material was borrowed.
10. The bibliographic description of the sources in the list of references is given arbitrarily, without compliance with state standards.
11. As illustrations are used tables, charts, diagrams, borrowed not from primary sources, but from textbooks.
12. The scope and design of the thesis do not meet the requirements.

3. RULES AND REQUIREMENTS TO THE DESIGN OF MASTER'S THESIS

Master's thesis should be designed in accordance with the requirements of State Standard of Ukraine "Documentation. Reports in science and technology. Structure and design rules".

3.1. Design of the text

Master's thesis is printed on one side of a sheet of white A4 paper (210 x 297 mm). Executes the main text by computers using font text editor Word - Times New Roman Cyr size 14 with Bastard (1.5) spaced thirty lines on the page. Margins: left - at least 2 cm, right - at least 1 cm, top - at least 2 cm, bottom - at least 2 cm. The new line begins indentation on the top line 1.25 cm.

Printing errors, spelling errors, which were at the time of writing, can be fixed and painted with white paint while application to the same place the corrected text. No more than two patches on one page are allowed.

Headers of structural parts "CONTENT", "INTRODUCTION", "SECTION", "CONCLUSIONS", "REFERENCES", "APPLICATIONS" are printed as large capital letters symmetrically to the set. Headers of units are printed in small letters (except the first big) with indentation. The point at the end of the title does not call. If the title consists of two or more sentences, they should be shared with the point.

Headers of items are printed in small letters (except the first big) with indentation in the selection of the text. At the end of the title, printed in the text selection, a point is placed. The distance between the header (excluding title points) and the text should be 2 intervals. Each block of the thesis should begin on a new page.

Thesis should be stitched in soft or hard cover.

3.2. The numbering of pages and sections

The first page of the master's thesis is a title page that includes the overall pagination. The page number on the title page is not raised. On the subsequent pages of the thesis the number should be placed in the lower right corner without a point at the end.

Numbers of pages, sections, subsections, paragraphs, sub-paragraphs, tables, figures, formulas are indicated with Arabic numerals following the continuous numbering of all documents.

Such structural parts of the thesis as “CONTENT”, “INTRODUCTION”, “CONCLUSIONS”, “REFERENCES”, “APPLICATIONS” do not have serial numbers. The number of the section is placed after the word “SECTION”, after the number point is not set, and then from a new line header section is typed.

Subsections are numbered within each section. At the end of the subsection number should stand point, for example: “2.3.” (Third division of second section).

Items are numbered within each unit. Number consists of the sequence numbers of section, subsection, paragraph, between which point is set. At the end of the number should stand point, for example: “1.3.2.” (Second paragraph of the third unit of the first section). Then, in the same line item title suggests.

3.3. Graphic material

Graphic material or illustrations (graphs, charts, drawings, diagrams, and photographs) should be placed in the master's thesis immediately after the text where they are mentioned for the first time, or on the next page, if the specified location, they do not fit.

Illustrations are denoted by the word “Fig.” and numbered sequentially within the section, with the exception of figures submitted in the application.

Number of illustrations should consist of section number and serial number of illustrations, among which a point is set. For example: Fig. 2.1 (first figure of second section). Each illustration should necessarily have a name that is type symmetrical to the text. The name of illustration is printed by the plain type. Number of illustration, its title and explanatory captions are placed consistently under the illustration. On all illustrations should be a reference in the thesis.

3.4. Tables

Digital material is recommended to place as tables. Tables should be placed immediately after the text where they are mentioned for the first time, or on the next

page, if the specified location they do not fit.

Tables are numbered consecutively (except tables provided in the application) within the section. In the upper right corner of the table heading accordingly the inscription “*Table*” is placed with indication it’s the number. Table number should consist of section number and the serial number of the table, between which a point is set. For example: Table 2.1 (the first table of second section).

Each table should have a name that is placed below the word “*Table*” and typed the text symmetrically. The name of the table is printed in bold. The word “*Table*” and the title begins with a capital letter, full stop at the end of the header is not raised. Count titles of the table should begin with capital letters, subheads with small, if the latter are subject of the header. Headers of graphs are indicated in the singular. Count “No.” should not be included in the table.

The text in the table is recommended to print a size not less than 8, single spaced. If the numbers or other data in any row of the table are not available, it is necessary to put a dash. If all indicators are shown in the table are expressed in the same unit, its designation is placed in the header.

Replace by pads repeating table numbers, mathematical signs, rate, refer to trademarks, designations, regulations etc. are not allowed.

All tables should be referenced in the text with the word “Table”, for example: “...is presented in Table. 1.2”. If there are repeated references to the table it is necessary to specify the abbreviated word “see”, for example: “see Table. 1.2”.

3.5. Rules of the references design

At the end of the main text of the thesis entitled “REFERENCES” is provided a list of all literature sources that were used in carrying out the thesis. References include not only cited publications, but also those which the author worked out in preparation of the manuscript.

Information on literary sources that were used when writing the master's thesis is drawn up in accordance with international and national standards in force in the library and publishing with obligatory guided the work's title.

4. PREPARATIONS FOR THE DEFENSE AND DEFENSE OF THE MASTER'S THESIS

To the defense are allowed students, who fulfilled all the requirements of the curriculum. Dean submits in the State examination commission lists of students admitted to the defense of the master's thesis and summary about performance curriculum by students and estimates they have received of theoretical subjects.

The defense of the master's thesis is conducted according to the schedule approved by the university. Commission members are previously acquainted with the maintenance of the thesis.

The procedure of the defense involves:

- student's report about the content of the thesis;
- questions to the author;
- student's answers on the questions of the commission members;
- Commission's decision on the assessment of the thesis.

Report of the student should not exceed the time in 10 minutes. The report should be prepared in advance in the form of speech, which it is advisable to cover important issues:

- justification the relevance of research theme;
- aim, tasks, research object;
- what was found, detected, proved;
- by what methods it was reached;
- novelty items in the results obtained;
- the difficulties encountered in the study,
- provisions not confirmed.

For a better perception of present material might create multimedia support (in the form of slides) of the report, which reflect own tables, charts, graphs.

When defending the master's thesis the student should give satisfactory answers to all questions.

In determining estimates draw attention to the quality of all parts of the thesis,

on the level of scientific and practical competences of a graduate and on the level of the master's thesis defense. Results of master's thesis are estimated in scores on a scale ESTS. Scores are recorded in the student academic records (credit book) and exam sheet. Assessment of the master's thesis is exhibited at a closed meeting of the State examination commission and declared by its head to all present at the public meeting.

Defended master's thesis are given to library (1 copy) and stored in the library for 5 years.

5. THE LIST OF RECOMMENDED LITERATURE SOURCES

1. Research journal of pharmacy and technology [Electronic resource]. – Access mode: <http://www.rjptonline.org>.
2. American journal of health-system pharmacy [Electronic resource]. – Access mode: <http://www.ajhp.org>.
3. Journal of pharmacy and pharmaceutical sciences [Electronic resource]. – Access mode: <http://www.cspscanada.org>.
4. International journal of clinical pharmacy [Electronic resource]. – Access mode: <http://www.escpweb.org>.
5. Journal of pharmacy practice and research [Electronic resource]. – Access mode: <http://jppr.shpa.org.au>.
6. African journal of pharmacy and pharmacology [Electronic resource]. – Access mode: <http://www.academicjournals.org>.
7. International journal of pharmacy and pharmaceutical sciences [Electronic resource]. – Access mode: <http://www.ijppsjournal.com>.
8. Pharmacy practice [Electronic resource]. – Access mode: <http://www.pharmacypractice.org>.
9. Australian journal of pharmacy [Electronic resource]. – Access mode: <http://www.appco.com.au>.
10. Hacettepe university journal of the faculty of pharmacy [Electronic resource]. – Access mode: <http://www.eczfakder.hacettepe.edu.tr>.
11. European journal of hospital pharmacy: science and practice [Electronic resource]. – Access mode: <http://ejhp.bmj.com>.
12. Journal of dispersion science and technology [Electronic resource]. – Access mode: <http://www.tandfonline.com>.
13. Iranian journal of pharmaceutical research [Electronic resource]. – Access mode: <http://ijpr.sbm.ac.ir>.
14. Tropical journal of pharmaceutical research [Electronic resource]. – Access mode: <http://www.tjpr.org>.
15. Journal of international pharmaceutical research [Electronic resource]. – Access mode: <http://www.ijpronline.com>.

16. Asian journal of pharmaceutical research and health care [Electronic resource]. – Access mode: <http://www.jprhc.in>.
17. Drug development and industrial pharmacy [Electronic resource]. – Access mode: <http://informahealthcare.com>.
18. Drug development research [Electronic resource]. – Access mode: <http://www.ijddr.in>.
19. Drugs of today [Electronic resource]. – Access mode: <http://journals.prous.com>.
20. Assay and drug development technologies [Electronic resource]. – Access mode: <http://www.liebertpub.com>.
21. Current drug delivery [Electronic resource]. – Access mode: <http://www.benthamscience.com>.
22. Nauka i studia [Electronic resource]. – Access mode: <http://www.rusnauka.com>.

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Методичні рекомендації призначені для англомовних студентів спеціальності «Фармація» фармацевтичних вузів і факультетів денної і заочної форми навчання. Рекомендації розроблені для надання практичної і методичної допомоги студентам-випускникам при виконанні ними магістерських робіт з аптечної технології ліків.

У методичних рекомендаціях містяться сучасні вимоги до виконання магістерських робіт, окреслена тематика наукових досліджень, наведено основні правила оформлення і друку наукової роботи та відображено вимоги до прилюдного захисту магістерських робіт. Методичні рекомендації складені з урахуванням вимог затверджених положень про магістерські роботи НФаУ.

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АПТЕЧНОЇ ТЕХНОЛОГІЇ ЛІКІВ**

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