

DANYLO HALYTSKY LVIV NATIONAL MEDICAL UNIVERSITY

Department of Healthcare management, Pharmacotherapy and Clinical Pharmacy



**APPROVED**

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«17» 07 2023

**SYLLABUS ON THE SELECTIVE DISCIPLINE  
RESEARCH METHODOLOGY IN CLINICAL PHARMACY  
ON THE TOPIC OF THE MASTER'S THESIS**

**SB 3.5**

**for V years students  
for training of specialists of the second (master's) degree of higher education  
branch of study 22 «Health Care»  
of the specialty 226 «Pharmacy, Industrial Pharmacy»  
(full-time education)**

Discussed and approved at the meeting of the  
Department of Healthcare management,  
Pharmacotherapy, Clinical Pharmacy  
Minutes № 13, 12<sup>th</sup> June, 2023  
Head of the Department

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Minutes № 3, 27<sup>th</sup> June, 2023  
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## INTRODUCTION

The Syllabus on the educational discipline «**RESEARCH METHODOLOGY IN CLINICAL PHARMACY ON THE TOPIC OF THE MASTER'S THESIS**» was developed according to the

Professional and Educational Programme «*Pharmacy*»  
Higher Education Standard for the *second (master's) degree*  
branch of study 22 «*Health Care*»  
specialty 226 «*Pharmacy, industrial pharmacy*»

**Description of the academic discipline (summary).** The elective course of «Research methodology in clinical pharmacy on the topic of the master's thesis» is one of the educational components within the range of courses oriented towards the training of professional competences of specialists in «Pharmacy, industrial pharmacy» programme subject area. The syllabus lays the foundations for pharmacist professional performance in rational pharmacotherapy procedures and high-quality provision of pharmaceutical care service.

Course Structure	Number of credits/hours				Year of study, semester	Form of assessment
	Total	In-Person (classroom) instruction		Self-study		
		Lectures (hours)	Practice (hours)			
<b>Research methodology in clinical pharmacy on the topic of the master's thesis</b>	<b>15 credits / 450 hours</b>	<b>4</b>	<b>26</b>	<b>420</b>	<b>V year (IX semester) V year (X semester)</b>	<b>Master's thesis defense</b>
<b>By semesters</b>						
<b>Research methodology in clinical pharmacy on the topic of the master's thesis</b>	<b>2 credits / 60 hours</b>	<b>4</b>	<b>26</b>	<b>30</b>	<b>V year (IX semester)</b>	
<b>Research methodology in clinical pharmacy on the topic of the master's thesis</b>	<b>13 credits / 190 hours</b>			<b>390</b>	<b>V year (X semester)</b>	<b>Master's thesis defense</b>

**The subject matter of the academic discipline** is the methodology, organization and conduct of scientific research for the purpose of preparing a Master's thesis in clinical pharmacy.

**Interdisciplinary connections.** Teaching and learning within the elective course framework of «Research methodology in clinical pharmacy on the topic of the master's thesis» as a curriculum educational component is based on the students study of the following science courses: «Anatomy», «Physiology», «Biology with basics of genetics», «Information technologies in pharmacy», «Microbiology with Basics of Immunology», «Ethics and Deontology in Pharmacy», «Pathological physiology» as well as such professionally oriented courses as «Pharmacology», «Pharmacotherapy with pharmacokinetics», «Clinical pharmacy and pharmaceutical care», «Management in Healthcare», «Technology of Drug Preparation», «Organization and economics of Pharmacy».

### **1. The course goal and objectives of the educational discipline.**

**1.1.** The course **teaching goal** in «Research methodology in clinical pharmacy on the topic of the master's thesis» is to develop higher education students' basic knowledge and skills in research methodology, application of scientific research methods and organization of research activity to ensure their professional socialization as researchers and to provide an underlying basis for writing graduate (Master's) thesis.

**1.2.** The course **learning objectives** in «Research methodology in clinical pharmacy on the topic of the master's thesis» are oriented towards the training of professionals able to solve complex tasks and

problems in clinical pharmacy and equipped with necessary knowledge and skills to manage planning, writing and defending a Master's thesis, therefore, demonstrating the ability to analyze advanced scientific evidence-based information in carrying out clinical pharmaceutical scientific research.

**1.3 Competencies and learning outcomes**, the formation of which is facilitated by the discipline (the relationship with the regulatory content of the higher education applicant's professional training in terms of the Higher Education Standard).

According to the requirements of the Higher Education Standard the discipline «Research methodology in clinical pharmacy on the topic of the master's thesis» provides mastering by the students the *competences* as follows:

– **integral competency:**

*The ability to apply the acquired general and professional competencies to solve complex problems in professional pharmaceutical activities, including those of a research and innovation nature; realization of professional activities by the relevant position, including the manufacture/development of drugs, their storage, quality control, delivery, distribution, dispensing, and supplying of drugs, as well as consulting, providing information on drugs, and monitoring side effects and/or ineffectiveness of drug therapy; implementation of innovations.*

- **general competencies:**

GC 1. *The ability to abstract thinking, analysis and synthesis.*

GC 2. *The knowledge and understanding of the subject area; understanding of the professional activity.*

GC 3. *Ability to communicate in the national language both orally and in writing.*

GC 4. *The ability to communicate in a foreign language (mainly English) at a level that ensures effective professional activity.*

GC 5. *The ability to assess and ensure the quality of work.*

GC 6. *The ability to work as a team.*

GC 8. *The ability to save and increase moral, cultural, scientific values and achievements of society based on understanding the history and patterns of development of the subject area, its place in the general system of knowledge about nature and society, and the development of society, techniques and technology, to use different types and forms of physical activity for active recreation and a healthy lifestyle.*

GC 9. *The ability to apply information and communication technologies.*

- **Special competencies in profession:**

SC 1. *The ability to integrate knowledge and solve complex pharmacy problems in broad or multidisciplinary contexts.*

SC 3. *The ability to solve pharmacy problems in new or unfamiliar conditions with incomplete or limited information, taking into account aspects of social and ethical responsibility.*

SC 4. *The ability to clearly and unambiguously convey one's own knowledge, conclusions, and arguments in the pharmacy field to specialists and non-specialists, in particular to people who are learning.*

SC 5. *The ability to demonstrate and apply communication skills and fundamental principles of pharmaceutical ethics and deontology in practical activities.*

SC 7. *The ability to conduct sanitary and educational work among the population to prevent common diseases, dangerous infections, viruses and parasitic diseases, as well as to promote the timely determination and maintenance of adherence to the treatment of these diseases according to their medical-and-biological characteristics and microbiological properties.*

SC 8. *The ability to provide rational use and consulting concerning prescription and OTC medicines and other pharmaceutical products, pharmaceutical care when choosing and dispensing of medicines by the evaluation of risk/benefit correlation, compatibilities, in accordance with their biopharmaceutical, pharmacokinetic, pharmacodynamics and physicochemical and chemical properties, indications/contraindications, based on the health condition of a certain patient.*

- SC 9. The ability to provide pre-medical assistance for patients and victims in extreme situations and emergencies.
- SC 10. The ability to monitor the effectiveness and safety of the drug use based on their clinical and pharmaceutical characteristics.
- SC 15. The ability to analyze the socio-economic processes in pharmacy, forms, methods and functions of the pharmaceutical supply system and its components in the world practice, indicators of need, efficiency and availability of pharmaceutical care in terms of healthcare insurance and reimbursement of the drugs.

### The Competence Matrix

Nr	Competences	Knowledge	Skills	Communication	Autonomy and responsibility
		<b>Kn 1.</b> Specialized conceptual knowledge, which includes current scientific achievements in professional activity or field of expertise, is the basis for original thinking and research conducting, critical understanding of problems in the branch, and on the border of areas of knowledge.	<b>Sk 1.</b> Specialized problem-solving skills are required for conducting research and/or implementing innovative activities to develop new knowledge and procedures. <b>Sk 2.</b> The ability to integrate knowledge and solve complex problems in broad, multidisciplinary contexts. <b>Sk 3.</b> The ability to solve problems in new or unfamiliar conditions with incomplete or limited information, taking into account aspects of social and ethical responsibility.	<b>C 1.</b> Clear and unambiguous conveying one's knowledge, conclusions, and arguments to specialists and non-specialists, particularly those learning.	<b>AR 1.</b> Managing work or learning processes that are complex, unpredictable, and require new strategic approaches. <b>AR 2.</b> Responsibility for the contribution to professional knowledge and practice and/or evaluation of the results of the activities of teams and collectives. <b>AR 3.</b> Ability to continue learning with a high degree of autonomy.
<i>Integrative competency</i>					
<i>The ability to apply the acquired general and professional competencies to solve complex problems in professional pharmaceutical activities, including those of a research and innovation nature; realization of professional activities by the relevant position, including the manufacture/development of drugs, their storage, quality control, delivery, distribution, dispensing, and supplying of drugs, as well as consulting, providing information on drugs, and monitoring side effects and/or ineffectiveness of drug therapy; implementation of innovations.</i>					
<i>General competences</i>					
GC 1.	The ability to abstract thinking, analysis and synthesis.		Sk 2		
GC 2.	The knowledge and understanding of the subject and profession.	Kn 1	Ks 1		
GC 3.	Ability to communicate in the national language both orally and in writing			C 1	
GC 4.	The ability to communicate in a foreign language (mainly English) at a level that ensures effective professional			C 1	

	activity				
GC 5.	The ability to assess and ensure the quality of work.	Kn 1	Sk 1 Sk 2 Sk 3	C 1	AR 1 AR 2 AR 3
GC 6.	The ability to work as a team.		Sk 3	C 1	AR 1 AR 2
CG 8.	The ability to save and increase moral, cultural, scientific values and achievements of society based on understanding the history and patterns of development of the subject area, its place in the general system of knowledge about nature and society, and the development of society, techniques and technology, to use different types and forms of physical activity for active recreation and a healthy lifestyle.		Sk 3	C 1	AR 3
GC 9.	The ability to apply information and communication technologies.		Sk 1		Sk 1
<i>Special competencies in profession</i>					
SC 1.	The ability to integrate knowledge and solve complex pharmacy/industrial pharmacy problems in broad or multidisciplinary contexts.	Kn 1	Sk 1 Sk 2		AR 1 AR 2
SC 3.	The ability to solve pharmacy problems in new or unfamiliar conditions with incomplete or limited information, taking into account aspects of social and ethical responsibility.		Sk 3		AR 1 AR 2
SC 4.	The ability to clearly and unambiguously convey one's own knowledge, conclusions, and arguments in the pharmacy field to specialists and non-specialists, in particular to people who are learning	Kn 1	Sk 1	C 1	AR 1 AR 2
SC 5.	The ability to demonstrate and			C 1	

	apply communication skills and fundamental principles of pharmaceutical ethics and deontology in practical activities.				
SC 7.	The ability to conduct sanitary and educational work among the population to prevent common diseases, dangerous infections, viruses and parasitic diseases, as well as to promote the timely determination and maintenance of adherence to the treatment of these diseases according to their medical-and-biological characteristics and microbiological properties.	Kn 1	Sk 2	C 1	AR 2
SC 8.	The ability to provide rational use and consulting concerning prescription and OTC medicines and other pharmaceutical products, pharmaceutical care when choosing and dispensing of medicines by the evaluation of risk/benefit correlation, compatibilities, in accordance with their biopharmaceutical, pharmacokinetic, pharmacodynamics and physicochemical and chemical properties, indications/contraindications, based on the health condition of a certain patient.	Kn 1	Sk 1 Sk 2 Sk 3	C 1	AR 1 AR 2
SC 9.	The ability to provide first aid for patients and victims in extreme situations and emergencies.	Kn 1	Sk 1		AR 2
SC 10.	The ability to monitor the effectiveness and safety of the drug use based on their clinical	Kn 1	Sk 1 Sk 2 Sk 3	C 1	AR 1 AR 2 AR 3

	and pharmaceutical characteristics.				
SC 15.	The ability to analyze the socio-economic processes in pharmacy, forms, methods and functions of the pharmaceutical supply system and its components in the world practice, indicators of need, efficiency and availability of pharmaceutical care in terms of healthcare insurance and reimbursement of the drugs.	Kn 1	Sk 1 Sk 2 Sk 3		AR 1 AR 2

The learning outcomes:

The discipline facilitates the formation of integrative and program learning outcomes:

*Identification of future professional activities as socially significant for human health. Application of knowledge from general and special disciplines in professional activity. Compliance with the sanitary regimen and safety requirements in the professional activity. Using the results of independent search, analysis, and synthesis of information from various sources to solve typical tasks of professional activity. The reasoning of data for decision-making, responsibility for the decisions in standard and non-standard professional situations, adherence to the principles of deontology, and ethics in professional activity. Performing professional action using creative methods and approaches. Professional communication in modern literary language, oral communication skills in a foreign language. Performing professional activities using information technologies, databases, navigation systems, Internet resources, software, and other information and communication technologies. Compliance with the standards of communication in professional interaction with colleagues, management, consumers, and effective teamwork.*

Results of the studying for the discipline:

- PR 1. To possess specialized conceptual knowledge in the pharmacy field and related areas, taking into account current scientific achievements and to be able to apply it in professional activities.
- PR 2. Critically comprehend and analyze scientific and applied problems in the pharmacy field.
- PR 3. To possess specialized knowledge and abilities/skills for solving professional problems and tasks, including improving knowledge and procedures in the pharmacy field.
- PR 4. To communicate freely in the national and English languages orally and in writing to discuss professional problems and activity results, presentation of scientific research, and innovative projects.
- PR 5. To assess and ensure the quality and effectiveness of pharmacy activities in standard and non-standard situations; to adhere to the principles of deontology and ethics in professional activity.
- PR 6. To develop and make effective decisions to solve complex pharmacy problems personally and based on the results of joint discussion; to formulate the goals of one's activity and the team activity, taking into account public and industrial interests, the general strategy and existing limitations, determine the optimal ways to achieve goals.
- PR 8. To develop and implement innovative projects in the pharmacy field, as well as related interdisciplinary projects, considering technical, social, economic, ethical, legal, and environmental aspects.



- PR 9. To formulate, make an argument, and clearly and concretely convey to specialists and non-specialists, including students, information based on one's own knowledge and professional experience, the main trends in the development of world pharmacy and related industries.
- PR 10. To carry out sanitary-educational work in professional activity for prevention and in case of outbreaks of infectious, viral and parasitic diseases.
- PR 11. To determine the advantages and disadvantages of medicines of natural and synthetic origin of various pharmacological groups, considering their chemical, physical-and-chemical, biopharmaceutical, pharmacokinetic, and pharmacodynamic features. To recommend over-the-counter drugs and other pharmaceutical products for patients and provide consultation and pharmaceutical care.
- PR 12. To provide first aid to patients in emergencies and victims in extreme situations.
- PR 13. To record cases of side effects when using medicines of natural and synthetic origin; to evaluate factors that can affect the processes of absorption, distribution, deposition, metabolism, and excretion of drugs and are determined by the condition and characteristics of the human body and the pharmaceutical aspects of medicines.
- PR 24. To apply the results of the clinical, laboratory, and instrumental investigations for monitoring the effectiveness and safety of drug use.
- PR 26. To plan and implement professional activity based on normative legislation of Ukraine and recommendations of good pharmaceutical practices.
- PR 27. To promote good health, including disease prevention, rational prescribing and use of medicines.

## 2. Informational scope of the educational discipline

15.0 ECTS credits (450 hours) are allocated for academic discipline.

### **Topic 1. Research methodology and scientific methods. The concept of the development of e-health. Conceptual foundations of the development of digital healthcare. Basic information about the two-level architecture of the digital (electronic) health care system. The central database of the digital (electronic) health care system.**

Science and scientific research in the modern world. Theoretical and methodological principles of science. Types and characteristics of scientific research. Research methods in science. Organizational features of healthcare research activities in Ukraine. General characteristics of scientific research processes in clinical pharmacy. Research problem (topic) formulation, generation and statement of a working hypothesis in clinical pharmacy. Defining the goal, research objectives, the object and subject of research in clinical pharmacy. Carrying out theoretical and applied research in clinical pharmacy.

The concept of e-Health development in Ukraine. Electronic health care system as a two-level architecture, including a central database and medical information systems.

### **Topic 2. Methodological aspects of evidence-based searching for clinical pharmaceutical information in clinical pharmacy research.**

Search system services in the main evidence-based medicine databases. Basic approaches to searching MEDLINE for scholarly articles. Benefits of clinical inquiry-based information retrieval. Conceptual framework of the MeSH system of health care indicators. Structured question elements as search terms. Structure of the Cochrane Library. Evidence-based medicine online resources: NICE, SIGN, EMBASE, MEDLINE/PubMed, Cochrane Library, CINAHL, Clinical Evidence databases.

Principles of formulating a clinical pharmaceutical query and interpretation of clinical research results. Evidence rating scale in research, levels of evidence/hierarchy of evidence. Assessment of clinical research methodological quality. Criteria for the assessment of research results and clinical endpoints. Pharmacoepidemiological studies as the main source of information on medicine efficacy and safety.

Evidence-based approach to pharmacotherapy of common diseases as one of the current directions of healthcare service development in Ukraine. Structure of evidence-based research methodology (technically user-friendly and professionally oriented levels). Systematization of evidence-based information by keywords, phrases, authors. Simple and complex information search, authorization and registration on websites and in specific databases. Specific examples of methodology implementation and producing an evidence-based report. Clinical and drug information resources and forms of data retrieval and provision to specialists.

**Topic 3. The nature and scope of clinical pharmaceutical, clinical pharmacological, pharmaco-economic and pharmaco-epidemiological research. Risk management in the implementation of information systems and technologies. Principles of the introduction of cyberculture.**

Principles of conducting and methodological aspects of clinical pharmaceutical, clinical pharmacological, pharmaco-economic and pharmaco-epidemiological scientific research. Research Regulatory Documentation. Guidelines for research planning and conducting. Data sources and information provision for clinical pharmaceutical, clinical pharmacological, pharmaco-economic and pharmaco-epidemiological research.

Risk management of introducing modern medical information systems and technologies. Development of cyberculture in the pharmaceutical educational and scientific environment: novel digital learning tools and principles of academic integrity.

**Topic 4. Interpretation, presentation, forms of implementation and use of research findings in clinical pharmacy. Protection the patient's personal data when using information and communication systems of e-health.**

Types and features of presentation of research findings. Forms of reporting in scientific research.

Presentation of numerical data findings obtained in scientific research. Statistical analysis of scientific research results. Theoretical validation of the results within the framework of a relevant clinical pharmacy branch.

Graphical, tabular and other types of visual presentation of scientific research findings.

Main types of research publications. Methods of preparation and formatting the manuscripts for scholarly publication.

Strategies of research finding implementation into the processes of production industry and health care practices. Acts of implementation, information letters, clinical and pharmaceutical reports.

Key aspects of protecting and processing personal data in the e-health system.

**Topic 5. Graduate (Master's) thesis: preparation, writing, formatting, defense. Text, spreadsheet, and presentation software of the world's leading suppliers.**

Basic principles of Master's thesis, its structure and scope.

General guidelines on Master's thesis preparation. Overview of scientific procedures, techniques and instruments of conducting Master's thesis research in clinical pharmacy (preliminary examination of the source materials and scholarly literature; statement of the research problem and goal; examining the problem while working with literary sources; clarification of the goal, definition of the object and subject of research; development of a thesis plan; systematic accumulation of materials; summary and mathematical processing of the results; theoretical validation of research findings; formulation of conclusions; implementation of research results into health care practices). Master's thesis individual plan: basic requirements and structure. Master's thesis supervision. Standard formatting requirements for writing a Master's thesis. Procedures for thesis reviewing and preparation for defense. Thesis defense policies and formal procedure for a Master's thesis public defense.

### 3. Structure of academic discipline.

Topic	Lectures	Practical classes	Self-study	Personal work
Topic 1. Research methodology and scientific methods. The concept of the development of e-health. Conceptual foundations of the development of digital healthcare. Basic information about the two-level architecture of the digital (electronic) health care system. The central database of the digital (electronic) health care system.	2	4	20	–
Topic 2. Methodological aspects of evidence-based searching for clinical pharmaceutical information in clinical pharmacy research.	1	6	20	–
Topic 3. The nature and scope of clinical pharmaceutical, clinical pharmacological, pharmaco-economic and pharmaco-epidemiological research. Risk management in the implementation of information systems and technologies. Principles of the introduction of cyberculture.	1	6	20	–
Topic 4. Interpretation, presentation, forms of implementation and use of research findings in clinical pharmacy. Protection the patient's personal data when using information and communication systems of e-health.		4	20	–
Topic 5. Graduate (Master's) thesis: preparation, writing, formatting, defense. Text, spreadsheet, and presentation software of the world's leading suppliers.		6	340	–
<b>TOTAL HOURS 450 / 15.0 CREDITS</b>	<b>4</b>	<b>26</b>	<b>420</b>	
<b>Final control</b>	<b>Graduate thesis defense</b>			

### 4. Course outline of lectures:

№	Topic	Duration, Hours
1.	Research methodology and scientific methods. The concept of the development of e-health. Conceptual foundations of the development of digital healthcare.	2
2.	Organization and information support of the research in clinical pharmacy.	2
	<b>TOTAL</b>	<b>4</b>

### 5. Course outline of practice:

№	Topic	Duration, Hours
1.	Research methodology and scientific methods. Basic information about the two-level architecture of the digital (electronic) health care system. The central database of the digital (electronic) health care system.	4
2.	Methodological aspects of evidence-based searching for clinical pharmaceutical information in clinical pharmacy research.	6
3.	The nature and scope of clinical pharmaceutical, clinical pharmacological, pharmaco-economic and pharmaco-epidemiological research. Risk management	6

	in the implementation of information systems and technologies. Principles of the introduction of cyberculture.	
4.	Interpretation, presentation, forms of implementation and use of research findings in clinical pharmacy. Protection the patient's personal data when using information and communication systems of e-health.	4
5.	Graduate (Master's) thesis: preparation, writing, formatting, defense. Text, spreadsheet, and presentation software of the world's leading suppliers.	6
<b>TOTAL</b>		<b>26</b>

#### 6. Course outline of the individual student's work:

<b>№</b>	<b>Topic</b>	<b>Duration, Hours</b>	<b>Type of control</b>
1.	Research methodology and scientific methods. Basic information about the two-level architecture of the digital (electronic) health care system. The central database of the digital (electronic) health care system.	15	Current control during practical classes
2.	Methodological aspects of evidence-based searching for clinical pharmaceutical information in clinical pharmacy research.	15	
3.	The nature and scope of clinical pharmaceutical, clinical pharmacological, pharmaco-economic and pharmaco-epidemiological research. Risk management in the implementation of information systems and technologies. Principles of the introduction of cyberculture.	15	
4.	Interpretation, presentation, forms of implementation and use of research findings in clinical pharmacy. Protection the patient's personal data when using information and communication systems of e-health.	15	
5.	Graduate (Master's) thesis: preparation, writing, formatting, defense. Text, spreadsheet, and presentation software of the world's leading suppliers.	360	
<b>TOTAL</b>		<b>420</b>	

#### 7. Individual student's work – are not foreseen.

**8. Teaching methods.** In the process of «Research methodology in clinical pharmacy on the topic of the master's thesis» disciplines studying, the following teaching methods are used for students: explanatory-illustrated (multimedia lectures with elements of discussion communication with applicants of higher education), reproductive, research, part-search (independent work of search character, work with literature); verbal (story, explanation, conversation, instruction, lecture, discussion), visual (demonstration of films, illustrations, schemes, algorithms); practical methods (practical activities, modeling); objective methods (generalization of the results of observations).

The types of educational activities in the process of the discipline «Research methodology in clinical pharmacy on the topic of the master's thesis» mastering according to the academic plan are as follows:

- a) lectures;
- b) practice lessons;
- c) individual student's work (ISW);
- d) graduate thesis;
- e) consultations.

The lecture course topics reveal the problematic issues of the respective chapters of the discipline.

The practice lessons take place in the classrooms of the department following the conventional structure and stages of the conduct as follows:

1. Preparatory stage (arrangement of the class, setting of educational goals and their motivation, control of the initial level of knowledge (multiple-choice test tasks of varying difficulty).
2. The main stage (forming of the professional skills).
3. Final stage – control of the final level of knowledge and skills. Summarizing.

Modern interactive learning techniques are employed to ensure a high level of future specialist training in studying the elective course of Research methodology in clinical pharmacy on the topic of the master's thesis», namely: lectures are delivered in multimedia presentation formats, students are provided with the opportunities of online access to Internet digital learning resources in the classroom, the system of in-process knowledge assessment is fully automated and operates on the basis of open computer testing, access to a specially equipped computer and simulation laboratory facility is available to serve the teaching and learning needs within the course. Students have the opportunity to seek out the library for both focused and collaborative work, and to access digital database and print resources.

Graduate (Master's) thesis involves generalized independent research and experimental work in clinical pharmacy.

**9. Methods of control.** Evaluation of the student's educational activity results is carried out during the current and final control.

Current control includes assessing theoretical knowledge, practical skills, and independent work.

The forms of final control per the educational and professional program are credit and defense of master thesis.

**10. The current control.** Ongoing control is carried out during the practice lesson according to specific objectives. Objective control of theoretical training and practical skills is applied.

*10.1 The current educational activity assessment.* During the topic assimilation assessment, grades for the current educational activity are given to the student according to a 4-point (national) scale. This considers all types of work provided by the discipline program. In addition, independent student's work (ISW) is evaluated during the current control of practical training.

#### **TEST EVALUATION CRITERIA (written, computer), N=20**

<b>Number of the correct answers</b>	<b>Score (according to the 4-point scale)</b>
0-9	2
10-13	3
14-17	4
18-20	5

**11. The forms of the final mastering control and students' knowledge assessment are – Credit / Defense of Master's Thesis.**

Semester credit in disciplines is provided after the corresponding semesters are over before the exam session starts.

A student is considered admitted to take the semester credit in the course if he/she has attended and participated in all the training sessions specified in the course syllabus, as well as has completed successfully all types of academic assignments specified in the course syllabus, and has attained the overall score not lower than the minimum required for positive evaluation while studying the course during the semester.

The final control is provided as a defense of Master's thesis.

Students who have met all the requirements of the curriculum and programs are considered admitted to defend their Master's Thesis.

The public defense of the Master's Thesis takes place at an open meeting of the Examination Committee and includes:

- report of the student in an arbitrary form, which should reveal the essence of the research, the leading positions, the obtained results, and the degree performance of assigned tasks;
- the student's answers to questions related to the research;
- announcement of reviews of the scientific supervisor and reviewer.

**12. The regularities for grades and score points number gaining by students:**

*The maximum amount of points* that a student can earn for his/her current educational activity while studying the discipline equals 200 points.

*The minimal amount of points* that a student must earn for his/her current educational activity while studying to enroll in the discipline equals 120 points.

*The number of points is calculated* based on the student's grades according to the 4-point (national) scale while studying the discipline, calculating the arithmetic mean (AM) rounded to two digits after the decimal point. Then, the resulting value is converted into points according to the multi-point scale as follows:

$$x = \frac{AM \times 200}{5}$$

For practical reasons the table of converting the score to the 200-point scale is given below.

**Converting of the average score for the current activity into a multi-point scale for the disciplines completed with the credit**

4-point scale	200-point scale	4-point scale	200-point scale	4-point scale	200-point scale	4-point scale	200-point scale
5	200	4.45	178	3.92	157	3.37	135
4.97	199	4.42	177	3.89	156	3.35	134
4.95	198	4.40	176	3.87	155	3.32	133
4.92	197	4.37	175	3.84	154	3.30	132
4.90	196	4.35	174	3.82	153	3.27	131
4.87	195	4.32	173	3.79	152	3.25	130
4.85	194	4.30	172	3.77	151	3.22	129
4.82	193	4.27	171	3.74	150	3.20	128
4.80	192	4.24	170	3.72	149	3.17	127
4.77	191	4.22	169	3.70	148	3.15	126
4.75	190	4.19	168	3.67	147	3.12	125
4.72	189	4.17	167	3.65	146	3.10	124
4.70	188	4.14	166	3.62	145	3.07	123
4.67	187	4.12	165	3.57	143	3.02	121
4.65	186	4.09	164	3.55	142	3.00	120
4.62	185	4.07	163	3.52	141	Less than 3	Insufficient
4.60	184	4.04	162	3.50	140		
4.57	183	4.02	161	3.47	139		
4.52	181	3.99	160	3.45	138		
4.50	180	3.97	159	3.42	137		
4.47	179	3.94	158	3.40	136		

Points of the students who study the same specialty, taking into account the number of points earned from the discipline, are splitted on the ECTS scale as follows:

ECTS grade	Statistical index
A	Top 10 % students
B	Next 25 % students
C	Next 30 % students
D	Next 25 % students
E	Lowest 10 % students

Ranking with the assignment of the grades «A», «B», «C», «D», «E» is made for those students of the educational year, who study the same specialty and have successfully completed the mastering of the discipline. Students who received the «FX» and «F» («2») grades are not included in the ranking list of students. Students with an «FX» score automatically receive an «E» grade upon the re-exam.

The evaluation of the performance of the Master's Thesis is issued based on the assessment of the level of implementation of the content part and the level of its public defense.

№	Evaluation components	Range of assessment	
		%	Points on a 200-point scale
1.	Performance in the Master's thesis preparation and writing (revealing the thesis research content)	60	0-120
2.	The level of the Thesis defense and research findings presentation	40	0-80

Master's Thesis is not allowed to be defended in case the assessment of the content part of the project is less than 51 points.

The assessment grade to be awarded to a higher education seeker for his/her performance in the graduate thesis preparation and writing is estimated in points (from 0 to 120 points), taking into account the scientific supervisor's assessment proposal (0-100 points) and the external reviewer's assessment proposal (0-20 points):

№	Evaluation criteria according to the scientific supervisor's feedback	Score
<b>I. Level of thesis preparation and writing</b>		
1.	Independence in thesis preparation and writing	0-10
2.	Initiative in conducting research	0-10
3.	Adherence to the thesis preparation schedule	0-10
4.	Consideration and taking into account supervisor's proposals, critical remarks and comments	0-10
<b>II. Thesis characteristics to be considered in the evaluation</b>		
5.	Defining the thesis research scope in agreement with the topic, the goal and objectives, conforming to format requirements	0-10
6.	Consistency in framing the thesis research problem, appropriateness, justification and expertise in carrying out the information analysis of the resources	0-10
7.	Validity of the conclusions and their correspondence to the objectives	0-10
8.	Content and expediency of using info visual materials	0-10
<b>III. Other achievements based on the thesis research results.</b>		
9.	Articles, theses, patents, acts of implementation	0-10
10.	Participation in scientific and practical conferences and events	0-10

№	Evaluation criteria for the reviewer's assessment	Score
1.	Relevance and novelty of the thesis research	0-2
2.	Appropriateness of the research problem statement	0-2

3.	Benefits and practical significance of the research outcomes	0-2
4.	Importance and applicability of research findings, advantages and interest to a wide range of professionals	0-2
5.	Focus on research objectives	0-2
6.	Evaluation of the application of research methods	0-2
7.	Clarity and consistency in reporting and justifying the research scope, methodology and results	0-2
8.	Content and expediency of using graphic materials (graphs, diagrams, photos)	0-2
9.	Content and expediency of using tabular data	0-2
10.	Consistency, credibility and clear reasoning in formulating conclusions	0-2
<i>Depending on the content value of each of the 10 criteria, the student may be evaluated with a low level of its value (0 points), average one (1 point) or the highest one (2 points).</i>		

The level of public defense of the Master's Thesis is assessed by the examination commission in points (from 0 to 80 points), taking into account the following main criteria: conciseness and the logic of the report, the quality of the demonstration material, the answers to questions, and the ability to lead a discussion on the topic of work:

<b>Criteria for thesis defense evaluation</b>	<b>Criteria content description</b>	<b>Score</b>
Conciseness, consistency and coherence of reporting on the thesis research findings (0 -15)	the report is not in agreement with the research content of the graduate thesis, it is constructed illogically and presented in reading aloud a previously prepared text	0-5
	the report is in agreement with the research content of the graduate thesis, but it is constructed illogically and presented in reading aloud a previously prepared text	6-9
	the report is clear, logical, consistent with the research content of the graduate thesis, presented fluently, but certain shortcomings are admitted	10-12
	the report is clear, logical, accurate, concise, in complete agreement with the purpose and research content of the graduate thesis, presented in fluent scholarly language	13-15
Quality of visual aids (0 – 15)	visual materials are not presented or do not represent the thesis research content	0-5
	visual materials partially represent the thesis research content, their selection is not always justified and reasonable	6-9
	visual materials are in agreement with the goal and represent the thesis research content, although they contain inaccuracies	10-12
	visual materials are in complete agreement with the goal and the thesis research content, their selection is appropriate and reasonable	13-15
Answers to questions, skills to lead a discussion on the thesis research subject matter (0 - 50)	the student does not answer the questions relevant to the research subject matter, the answers are fragmentary, skills of using professional language and knowledge of terminology are insufficient	0-12
	not all the answers to comments and questions are correct and comprehensive, significant inaccuracies and inconsistencies are found in reasoning the decisions and explaining conclusions	13-25
	the answers to comments and questions are mostly correct, but the student makes insignificant mistakes and inaccuracies	26-37



	correct, reasoned answers to all the questions, the student is fluent in discussing the research subject matter, providing argumentation and reasoning according to the research problems or questions	38-50
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If the Master's Thesis defense is evaluated with the score of less than 50 points, the thesis is considered not to be defended.

The overall grade for the graduate thesis on a multi-point scale is calculated as the sum of the score components listed in the table:

Thesis research content (0 – 120)		Thesis defense (0 – 80)		
Feedback from the scientific supervisor	Review	Conciseness, consistency and coherence of reporting on the thesis research findings	Quality of illustrative materials	Answers to questions, ability to dispute and provide arguments
0-100	0-20	0-15	0-15	0-50

The grade score achieved by the student for the thesis research performance in points on a 200-point scale is converted to a four-point scale:

Course assessment grades	Assessment grade on a four-point scale	ECTS assessment grade
200 – 180	5	A
179.9 – 160	4	B
159.9 – 140	4	C
139.9 – 120	3	D
119.9 – 100.1	3	E
100 – 0	2	FX

### 13. Methodical providing:

- Educational content.
- Lecture presentations.
- Tables.
- Thematic plans of lectures and practice lessons.
- Practice guidelines for teachers and student tutorials to prepare for practical lessons.
- Control questions, MCQ test questionnaires, problem and situational cases.
- Electronic expert systems.
- Prescription sheets.
- Prescriptions for medicinal products.

### 14. Recommended literature

#### MAIN SOURCES

1. Documentation. Reports in the field of science and technology. Structure and rules of formatting. DSTU 3008-95. [Online source]. – Access mode: <http://surl.li/rvct>
2. Information and documentation. DSTU 8302:2015. [Data file]. Retrieved from <http://surl.li/rvcx>
3. Law of Ukraine on higher education, №1556-VII, 01.07.2014. [Online source]. – Access mode: <http://surl.li/rvcz>
4. Law of Ukraine on protection of rights to inventions and utility models, №3687-XII, 5.12.2012. [Online source]. – Access mode: <http://surl.li/rvda>
5. Law of Ukraine on innovative activity, №40-IV, 5.12.2012. [Online source]. – Access mode: <http://surl.li/rvdb>
6. Law of Ukraine on scientific and scientific and technical activity, №848-VIII, 26.11.2015. [Online

- source]. – Access mode: <http://surl.li/rvdc>
7. Clinical Pharmacy (pharmacy care): a textbook / Edited by V.P. Chernih, I.A. Zupanets. – Golden Pages, 2011. 703 p.
  8. Clinical Pharmacy / Zupanets I.A., Chekman I.S., Popov S.B., Nalyotov S.V., Propisnova V.V. et al. – Golden Pages, 2010. 183 p.
  9. Code of academic ethics of Danylo Halytsky Lviv National Medical University, 2019. [Online source]. – Access mode: <http://surl.li/rvdd>
  10. Methodological guidelines on supporting the principles of academic integrity, 2018. [Online source]. – Access mode: <http://surl.li/rvdg>
  11. Regulations on the organization of scientific, scientific and technical activities in higher educational institutions of III and IV levels of accreditation, Order of the Ministry of Education of Ukraine №422, 1.06.2006. [Online source]. – Access mode: <http://surl.li/rvdh>
  12. Dhikav V. Principles and Practice of Clinical Pharmacy. – CBS Publishers & Distributors Pvt Ltd, 2019. – 264 p.
  13. Zimenkovsky B.S., Grzegotsky M.R., Hromovyk B.P., Lesyk R.B., Solonynko I.I., Vashchenko O.O., Kaminsky D.V., Kostyshyn L.P. Regulations on the preparation and defense of the graduate qualifying thesis by the students of the Faculty of Pharmacy of Danylo Halytsky Lviv National Medical University. Lviv, 2019. 31 p.
  14. Regulations on the procedure for preparing and publishing of scientific papers, educational and teaching-methodological literature resources at Danylo Halytsky Lviv National Medical University, 2019. [Online source]. – Access mode: <http://surl.li/rvdl>
  15. Protocols of a pharmacist on dispensing over-the-counter medicines: doctor's guide / Compiled by Bezditko N.V., Blicher V.Ye., Zimenkovsky A.B., Zupanets I.A., Lishchyshyna O.M. et al. – Doctor-Media LLC, 2011. 250 p.
  16. Khukhlina O.S., Tkach E.P., Chursina T.Ya. et. al. Pharmaceutical Care: Selected Issues. – New Book, 2011. 424 p.

#### ADDITIONAL LITERATURE

1. Mokin B.I., Mokin O.B. Methodology and organization of scientific research. Study guide. – Vinnytsia, 2015. – 317 p.
2. Vazhynskyi S.E., Shcherbak T.I. Methodology and organization of scientific research. Study guide. – Sumy, 2016. 260 p.
3. Aghaebe O.R., Azuka C.O. Assessing the quality of pharmaceutical care in an outpatient pharmacy. – Lambert Academic Publishing, 2016. 176 p.
4. Davtian L.L., Zahorii H.V., Voronenko Yu.V., Korytniuk R.S., Voitenko H.M. Drug interactions and drug safety. Study guide. – Kyiv: Bludchyi M.I. 2011. 744 c.
5. Denisyuk V.I., Denisyuk O.V. Evidence-Based Internal Medicine: A Textbook for Higher Medical Students. – SC SCF, 2011. 928 p.
6. Thomas D. Clinical Pharmacy Education, Practice and Research: Clinical Pharmacy, Drug Information, Pharmacovigilance, Pharmacoeconomics and Clinical Research. – Elsevier, 2018. 540 p.
7. Zatserkovnyi V.I., Tishaev I.V., Demydov V.K. Methodology of scientific research. Study guide. – Nizhyn. [Online source]. – Access mode: <http://surl.li/rvdo>
8. Kornatsky V.M., Silantieva O.V. Ethical aspects of drug research in Ukraine. – Kyiv, 2010. 264 c.
9. Zimenkovsky A.B., Dumenko T.M., Matveyeva O.V., Boretska O.B., Nastyukha Yu.S., Zayats M.M., Yeremeyeva T.V., Shybinsky V.Ya., Zarembo N.I., Rohovyk N.V. Management of the patient's medication behavior: methodological guidelines. – Lviv: Danylo Halytsky Lviv National Medical University, 2015. 59 p.
10. Zimenkovsky A.B., Morozov A.M., Stepanenko A.V. et al. A unified method for pharmacotherapy evaluation based on prescriptions: methodological guidelines, Danylo Halytsky Lviv National Medical University, 2011. 38 p.
11. Pharmacovigilance and approaches to its implementation. Guidelines. / O.V. Matveeva, I.S. Chekman, S.V. Nalyotov et al. – Kyiv: Ukrainian Center of Scientific Medical Information and

Patent Licensing Activity, 2013. 85 p.

12. Chmylenko F.O., Zhuk L.P. A guideline to studying the course of «Methodology and organization of scientific research». 2014. 48 p.
13. Yurynets V.E. Methodology of scientific research: Study guide. – Lviv, 2011. 178 p.

**15. Information resources:**

1. Compendium online. [Online source]. – Access mode: <https://compendium.com.ua/bad>
2. Internal diseases: a web portal for doctors [Online source]. – Access mode: <http://empendium.mp.pl/ua>
3. State Register of Medicinal Products of Ukraine. [Online source]. – Access mode: <http://surl.li/rvdq>
4. State Drug Formulary. Issue 1, Issue 2, Issue 3, Issue 4, Issue 5, Issue 6, Issue 7, Issue 8, Issue 9, Issue 10, Issue 11, Issue 12 / edited by V.T. Chumaka, V.I. Maltsev, A.M. Morozov, V.D. Pariy, A.V. Stepanenko. – K .: Morion.
5. <http://drugs.com>
6. Order of the Ministry of HealthCare of Ukraine «On approval of pharmacist's protocols» from 05.01.2022 № 7. – Access mode: [https://www.dec.gov.ua/wp-content/uploads/2022/01/2022\\_7\\_pf.pdf](https://www.dec.gov.ua/wp-content/uploads/2022/01/2022_7_pf.pdf)
7. <https://www.webmd.com>
8. Cochrane Library search database. [Online source]. – Access mode: <https://www.cochranelibrary.com>
9. MEDLINE search database [Online source]. – Access mode: <https://www.nlm.nih.gov/bsd/medline.html>.
10. Medscape search database [Online source]. – Access mode: <http://www.medscape.com/pharmacists>.