MINISTRY OF EDUCATION AND SCIENCE OF UKRAINE
LUTSK NATIONAL TECHNICAL UNIVERSITY
FACULTY OF DIGITAL, EDUCATIONAL AND SOCIAL TECHNOLOGIES

APPROVED
Dean of the Faculty
_____ Halyna HERASYMCHUK
26.08.2026

APPROVED
First Vice-Rector
_____ Nadiia KOVALCHUK
26.08.2026

SYLLABUS

of the educational component "Methodology of scientific research"
higher education degree – Master
field of knowledge – A Education
specialty – A1 Educational sciences
educational programme – Educational, pedagogical sciences (Inclusive Education)

Department of Digital Educational Technologies

Syllabus developed by Professor, DSc Olha HULAI

The syllabus was approved at the meeting of the Department of Digital Educational Technologies, minutes No. 1 of 26.08.2026

Head of the Department PhD, Associate Professor Vitalii KABAK

Reviewed and approved by the support group of the educational programme "Educational, pedagogical sciences (Inclusive Education)", minutes No. 1 of 26.08.2026

Guarantor of the educational programme "Educational, pedagogical sciences (Inclusive Education)" PhD, Associate Professor Liliia POTAPIUK

Approved by the Scientific and Methodological Council of the University, minutes No. 1 of 26.08.2026

Approved syllabus online:
https://e.lntu.edu.ua/syllabus/4153

Lutsk – 2026

SYLLABUS OF THE EDUCATIONAL COMPONENT "Methodology of scientific research"

Educational programme	Educational, pedagogical sciences (Inclusive Education)
Field of knowledge / Specialty	A Education / A1 Educational sciences
Level of higher education	second (master's)
Course status	compulsory
Language of instruction	English
Workload	4 ECTS credits / 120 hours, semester 1
Form of final assessment	pass/fail test
Lecturer(s)	DSc, Professor Olha HULAI e-mail: o.hulai@lntu.edu.ua

1. Course aim and objectives

Aim: To provide students with basic knowledge of methodology, techniques and organization of scientific activities to ensure their professional socialization as researchers.

Objectives: - familiarization of students with modern methodological concepts, the basics of the methodology of scientific knowledge and the methodology of scientific research;
- formation of a holistic view of the research process;
- mastering the skills of forming and using a conscious methodological position of scientific research;
- improvement of skills in searching, selecting and processing scientific information, in accurately formulating the purpose, objectives and conclusions of the research.

2. Competences

IC — integral competence: Ability to solve problems, tasks of a research and/or innovative nature in the field of educational and pedagogical sciences.

GC01 — Ability to think abstractly, analyze and synthesize.

GC02 — Ability to search, process and analyze information from various sources.

GC03 — Ability to apply knowledge in practical situations.

GC04 — Ability to learn and master modern knowledge.

GC05 — Ability to adapt and act in a new situation.

GC07 — Ability to interpersonal interaction.

GC08 — Ability to act socially responsibly and consciously.

GC09 — Ability to work in an international context.

GC10 — Ability to conduct research at the appropriate level.

SC01 — Ability to design and research educational systems.

SC02 — Ability to apply and develop new approaches to solving research and/or innovation problems in the field of education and pedagogy.

SC05 — Ability to develop and implement new educational tools, projects and integrate them into the educational environment of the educational institution.

SC07 — Critical reflection on problems in the field of education, pedagogy and on the border of knowledge fields.

SC08 — Ability to integrate knowledge in the field of education/pedagogy and solve complex problems in multidisciplinary and interdisciplinary contexts.

3. Course structure, distribution of hours, links between topics and competences

No.	Topic	Lectures full-time/ part-time	Pract./ Semin./ lab full-time/ part-time	Self-study full-time/ part-time	Total	Teaching methods	Assessment methods	GC and SC
Content module 1. Fundamentals of scientific knowledge								
1	Topic 1. The concept of science, its essence, purpose and objectives.	2/0	4/1	8/13	14/14	TM1, TM2, TM4, TM5, TM6	AM2, AM6, AM7	GC04, GC01, GC02, GC05, GC08, GC09, GC10, SC07, SC08, SC02
2	Topic 2. The main categories of science.	2/1	4/0	8/13	14/14	TM1, TM2, TM4, TM5, TM6	AM2, AM6, AM7	GC01, GC02, GC04, GC07, GC09, GC10, SC07, SC08
3	Topic 3. The essence and features of the process of scientific knowledge.	2/0	4/1	8/13	14/14	TM1, TM2, TM4, TM5, TM6	AM2, AM6, AM7	GC01, GC02, GC04, GC09, GC10, SC07, SC08, SC02, SC01
4	Topic 4. General scientific aspects of research methodology.	2/1	4/0	8/13	14/14	TM1, TM2, TM4, TM5, TM6	AM2, AM6, AM7	GC01, GC02, GC04, GC07, GC09, GC10, SC07, SC08
Content module 2. Research methodology								
5	Topic 5. The structure of the study.	2/1	4/0	8/13	14/14	TM1, TM2, TM4, TM5, TM6	AM2, AM6, AM7	GC01, GC04, GC10, GC09, SC07, SC08
6	Topic 6. Features of pedagogical research.	2/0	4/1	8/13	14/14	TM1, TM2, TM4, TM5, TM6	AM2, AM5, AM6, AM7	GC01, GC02, GC03, GC04, GC07, GC10, SC05, SC07, SC08, SC01, SC02

No.	Topic	Lectures full-time/ part-time	Pract./ Semin./ lab full-time/ part-time	Self-study full-time/ part-time	Total	Teaching methods	Assessment methods	GC and SC
7	Topic 7. Processing of research data and presentation of results.	2/1	4/0	8/13	14/14	TM1, TM2, TM4, TM5, TM6	AM2, AM6, AM7	GC01, GC02, GC03, GC04, GC07, GC10, SC07, SC08
8	Topic 8. Academic integrity in research.	1/0	2/1	9/11	12/12	TM1, TM2, TM4, TM5, TM6, TM7	AM2, AM7, AM8	GC01, GC02, GC03, GC04, GC05, GC07, GC08, GC10, SC05, SC07, SC08, SC01, SC02
	Individual assignments			10/10	10/10			
	Total	**15/4**	**30/4**	**75/112**	**120/120**			

Legend: GC — general competence (number according to section 2); SC — special (professional) competence (number according to section 2). The full wording of each code is given in the educational programme / standard of the specialty.

Teaching methods: TM1 — verbal method (lecture, discussion, interview, etc.); TM2 — practical method (laboratory and practical classes); TM4 — work with educational and methodological literature (note-taking, abstracts, annotations, reviews, essays); TM5 — video method combined with up-to-date information technologies and computer-based learning tools (distance, multimedia, web-based, etc.); TM6 — independent work (problem solving); TM7 — individual research work of students.

Assessment methods: AM2 — oral or written survey; AM5 — team projects; AM6 — essay; AM7 — presentation of the results of completed tasks and research; AM8 — presentation and speeches at scientific events.

4. Learning outcomes

PLO01. To know the latest achievements of the concepts of education and pedagogy development, methodology of relevant research.

PLO03. Form pedagogically appropriate partnership interpersonal interaction, carry out business communication, clearly and unambiguously convey their own thoughts, conclusions and arguments on education and pedagogy to specialists and the general public, conduct problematic and thematic discussion.

PLO04. Communicate fluently in the state and foreign languages orally and in writing to discuss the results of educational and professional activities, present research and innovative projects.

PLO06. To develop and implement innovative and research projects in the field of education/pedagogy and interdisciplinary level in compliance with legal, social, economic, ethical standards.

PLO07. To create an open educational and scientific environment that is favorable to students and aimed at ensuring learning outcomes.

PLO09. Search for the necessary information on educational/pedagogical sciences in print, electronic and other sources, analyze, systematize it, assessing its reliability and relevance.

5. Sustainable Development Goals

SDG 4 – Quality Education

SDG 9 – Industry, Innovation and Infrastructure

6. Non-formal education

Recommended courses, training programmes, work placements and other activities: learning outcomes achieved through formal, non-formal or informal education may be recognised in accordance with LNTU procedures. Evidence may include certificates from subject-specific training sessions, webinars or online courses, together with a description of the learning outcomes achieved and, where necessary, a short verification task or a portfolio.

7. Assessment criteria and forms of control

Assessment is based on a 100-point scale (national scale / ECTS). Final grade = continuous assessment (50 %) + individual assignments (10 %) + module tests (40 %).

Academic integrity: independent completion of assignments; correct citation of sources; marking parts of the text generated by AI tools. Violations of academic integrity are not tolerated.

8. Content of topics

Topic 1. The concept of science, its essence, purpose and objectives.

Science as a system of knowledge, social institution and research activity. The ideals and norms of scientific research as a component of the system of principles of science. Historical change in the system of foundations of science as a change in the types of scientific rationality. The purpose of science, its tasks. STP and science. The system of scientific knowledge. Basic and applied sciences. Natural, social and human sciences. Interdisciplinary research. The main issues of scientific activity regulated by the laws of Ukraine "On Scientific and Scientific-Technical Activity" and "On Higher Education". The concept of sustainable development. Principles and practices of Open Science (UNESCO). Science and sustainable development of society.

Topic 2. The main categories of science.

The main structural elements of science: principles, postulates, concepts, definitions, categories, axioms, regularities, laws. Scientific hypothesis. The concept of methods (ways) of research. Mathematization and computerization of science. Modeling. The concept of science is an algorithm for solving a modern scientific problem. The essence of the methodology of science as a set of theoretical and methodological aspects of science. Four levels of methodology: 1) the highest - the philosophical method; 2) the level of general scientific principles and forms of research; 3) specific scientific methodology; 4) research methods and techniques. Scientific paradigm.

Topic 3. The essence and features of the process of scientific knowledge.

The process of cognition: observation - accumulation of facts - abstract thinking - practice. Systematisation, generalised logical understanding. Structural elements of cognition: fact - simple abstraction - category (complex abstraction). General methods of cognition: empirical and theoretical. Observation, experiment, logical schemes (method of induction, deduction, analogies). Analysis and synthesis. Completeness, homogeneity, comparability, accuracy and reliability of facts, their critical evaluation, ranking. Abstraction, formalisation, modelling. Heuristic methods.

Principles of scientific knowledge: the principle of objectivity; the principle of explaining a set of phenomena under study with the help of a few general ideas; the principle of sufficient completeness of justification; the principle of systematicity; the principle of unity of analysis and synthesis; the principle of unity of historical and logical; the principle of ascent from the abstract to the concrete.

Topic 4. General scientific aspects of research methodology.

The main methodological principles of scientific research (objectivity, comprehensiveness, essential analysis, unity of historical and logical, evidence, alternative, systematic). The general structure of the research work: 1) formation of the research topic; 2) formation of the research goal and objectives; 3) theoretical research; 4) experimental or empirical research; 5) analysis and design of the research; 6)

implementation and effectiveness of the research. Choosing a research topic: scientific direction, problem, topic, subtopics, questions. The concept of information and its role in scientific research. The main properties of scientific information: adequacy, relevance, correctness, accuracy, relevance. Search and processing of scientific information. Inventive and design activities. Patenting.

Topic 5. The structure of the study.

Development of the conceptual framework and research apparatus. Understanding the relevance of the research and determining the degree of its scientific development. Defining the object, subject, and topic of the study. Collection and selection of information for the study. Formulation of general and intermediate research objectives. Choosing a methodology, basic theoretical provisions of the study. Determining the course and expected results of the study. Building a research hypothesis, choosing research methods. Formation of conclusions and proposals. Evaluation of the effectiveness of the research. Relevance, novelty, effectiveness (theoretical and practical significance) of the topic. Analysis and presentation of scientific research. Methods of analysis. Implementation of the research, its testing. Practical application.

Topic 6. Features of pedagogical research.

General scientific and empirical methods of pedagogical research. Reliability of research results. Methods of mathematical processing in pedagogy. Measuring scales. Grouping of research data. Statistical processing of pedagogical research data. Practical significance of research results and their implementation.

Topic 7. Processing of research data and presentation of results.

Basic requirements for writing a paper: brevity, logic, specificity. Design standards (text, typing, references to sources, illustrations, abbreviations, formulas, etc.). Formatting rules and requirements for articles, research reports, abstracts, monographs, student papers, dissertations, reports, etc. Scientific publication as a structured presentation of scientific research,

Topic 8. Academic integrity in research.

Academic integrity according to the Law of Ukraine "On Education". Basic principles of ethics of scientific activity: objectivity and impartiality; responsibility for research results; respect for intellectual property; avoidance of conflicts of interest. The concept of plagiarism, criteria for determining it. Plagiarism checking services. Recommendations for preventing academic plagiarism in the preparation of scientific articles, master's theses and dissertations. Application of artificial intelligence in scientific research.

9. Individual assignments

A Complex practical individual task (IT) in the discipline "Methodology of scientific research" is completed during the semester. Completion of the assignment is a prerequisite for successful completion of the course and obtaining a positive grade.

The purpose of the individual assignment is to apply theoretical knowledge of the discipline to solve problems and exercises, develop independent work skills, systematise knowledge, and study individual issues in depth. The individual assignment is defended during the semester during the hours allocated for individual work. When completing and submitting an individual assignment, a student may use the recommended literature, guidelines, and Internet resources. The IT is assessed on a 100-point scale. Completion of the ICP is one of the mandatory components of the credit modules.

Tasks of the discipline "Methodology of Scientific Research":

1. Determine the field of science, purpose, objectives, object, subject of the future thesis.
2. Development of questionnaires, questionnaires, methods for obtaining empirical data on the topic of the thesis.
3. Make an abstract (up to 200 words) of the thesis.
4. Write and format the an article or conference proceedings on the topic of the thesis.

10. General requirements

The educational process is governed by the academic regulations of LNTU. Students are required to read the requirements set out in the LNTU Code of Academic Integrity and the LNTU Policy on the Ethical Use of Artificial Intelligence, and to adhere to the principles of academic integrity and the ethical use of artificial intelligence in their educational activities.

Academic integrity. Participants of the educational process must comply with the Law of Ukraine “On Academic Integrity” of 18.12.2025 No. 4742-IX and the internal regulations of LNTU. Academic plagiarism, fabrication, falsification, misappropriation of authorship, non-independent completion of assignments, as well as dishonest use of results generated by artificial intelligence are not allowed.

Use of artificial intelligence. Artificial intelligence tools may be used to search for ideas, explain methods, provide preliminary structuring, language editing and auxiliary analysis of non-confidential data, unless a specific assignment requires fully independent work. Students must indicate the tool used, the purpose and the stage of its use, check facts and calculations, and justify their conclusions independently.

11. References

I. Teaching and methodological materials

Works by the syllabus author:

1. Methodology of Scientific Research: Guidelines for practical sessions and independent study for students pursuing a second (Master’s) level of higher education within the educational and professional programme Educational and Pedagogical Sciences (Inclusive Education) field of study A Education specialisation A1 Education full-time and part-time modes of study / Compiled by O. I. Hulai. Lutsk: LNTU, 2026. 34 p. URL: https://repository.lntu.edu.ua/handle/123456789/6263

2. Потапюк Л. М., Тулашвілі Ю. Й., Кошелюк В. А. та ін. Освітні науки: магістерський курс : навч. посіб. Луцьк : Вежа-Друк, 2025. 312 с. URL: https://repository.lntu.edu.ua/handle/123456789/5202

Works by other authors:

3. Відкриті наукові практики : навчальний посібник / за заг. ред. Жежнича П., Березка О. Житомир : ТОВ «Видавничий дім «Бук-Друк», 2024. 400 с.

4. Основи наукових досліджень. Курс лекцій. [Електронний ресурс]: навч. посіб. для здобувачів ступеня магістра / О. Б. Шарпан (уклад.); КПІ ім. Ігоря Сікорського. Київ: КПІ ім. Ігоря Сікорського, 2023. 89 с.

5. Reproducibility and Replicability in Science. National Academies of Sciences, Engineering, and Medicine 2019. Washington, DC: The National Academies Press. https://doi.org/10.17226/25303.

II. Scientific works

Works by the syllabus author:

6. Hulai O. Interdisciplinary approach in pedagogical research: methodological foundations, challenges and prospects. Zhytomyr Ivan Franko State University Journal. Series : Pedagogical Sciences. 2025. Vol. 3 (122). P. 36-53. URL: https://repository.lntu.edu.ua/handle/123456789/2367

7. Hulai O., Shemet V., Moroz I. Design and Organization of Assessment Using the MOODLE. Communications in Computer and Information Science. 2025. Vol 2467/ https://doi.org/10.1007/978-3-031-94002-6_23

8. Kabak V., Hulai O., Martseniak I. Digital psychological support for students under martial law using a chatbot, as an analog of signal filtering in communication systems. Proc. SPIE 13813: Seventeenth International Conference on Correlation Optics, 1381329 (10 Nov 2025); https://doi.org/10.1117/12.3092576

9. Hulai O., Kabak V., Savaryn P. Blended Learning with MOOCs: An Example of Use in the Training of Computer Science Students. Communications in Computer and Information Science. 2025. Vol 2467. https://doi.org/10.1007/978-3-031-94002-6_20

10. Hulai, O., Herasymchuk, H. Principles of Open Science in the Activities of a Technical University.

Economics Education. 2024. № 9(1). P. 28-34. URL: https://repository.lntu.edu.ua/handle/123456789/3877

11. Hulai O., Shemet V., Moro, I., Savaryn P., Kabak V. USING THE LABSTER VIRTUAL LABORATORY TO STUDY CHEMISTRY AT A TECHNICAL UNIVERSITY. Information Technologies and Learning Tools. 2024. № 102 (4). C. 95-107. https://doi.org/10.33407/itlt.v102i4.5737

12. Hulai, O. I., Herasymchuk, G. A., Bandura, I. O. The implementation of the educational process under martial law. Bulletin of Science and Education. 2023. Issue 10 (16). pp. 509–520. URL: https://repository.lntu.edu.ua/handle/123456789/3882

13. Hulai, O. I., & Kabak, V. V. Google's digital tools as a means of improving the educational process in higher education institutions. Scientific Notes of the Volodymyr Hnatiuk Ternopil National Pedagogical University. Series: Pedagogy. 2022. № 2. C. 14-23. DOI : 10.25128/2415-3605.22.2.2. URL: https://repository.lntu.edu.ua/handle/123456789/4576

14. Savaryn P., Hulai O., Kabak V. Impact of the "Elements of AI" Course on Students' AI Literacy and Critical Thinking. Higher Education Learning Methodologies and Technologies Online. HELMeTO 2025. Communications in Computer and Information Science. 2027. Vol. 2959. P. 372–385. DOI: https://doi.org/10.1007/978-3-032-31853-4_24.

15. Hulai O., Shemet V., Furs T. Integrating ChatGPT into Student Research Practices. In: Adamoli M., Amato D., Schicchi D., Fulantelli G., Rondonotti M., Taibi D., Ciasullo A., Santoianni F. (eds.). Higher Education Learning Methodologies and Technologies Online : 7th International Conference, HELMeTO 2025, Naples, Italy, September 23–25, 2025, Revised Selected Papers. Part II. Communications in Computer and Information Science. Cham : Springer, 2027. Vol. 2959. P. 246–257. DOI: https://doi.org/10.1007/978-3-032-31853-4_16.

Works by other authors:

16. Cotton, D. R., Cotton, P. A., & Shipway, J. R. (2023). Chatting and cheating: Ensuring academic integrity in the era of ChatGPT. Innovations in Education and Teaching International, 1-12.

17. Boon, W., de Haan, J., Duisterwinkel, C. et al.: Meaningful public engagement in the context of open science: reflections from early and mid-career academics. Research for All 6(1), (2022).

18. Griffen L., Ryzheva N., Nefodov D., Hryashchevskaya, L. Historical stages in the formation of the scientific knowledge system in a theoretical and methodological context. Linguistics and Culture Review. 2021. Vol. 5(S2). P. 96-107. https://doi.org/10.21744/lingcure.v5nS2.1333

19. Holden, O. L., Norris, M. E., & Kuhlmeier, V. A. (2021, July). Academic integrity in online assessment: A research review. In Frontiers in Education (Vol. 6, p. 639814). Frontiers Media SA.

20. Motwani J., Katatria A. Organization agility: a literature review and research agenda. International Journal of Productivity and Performance Management, 73(9), 2709-2754.

21. Perig, A. V., Gribkov, E. P., Gavrish, P. A., Zavdoveev, A. V., Mikhieienko, D. Y., Subotin, O. V., ... & Vasylieva, L. V. (2022). Technical Paper Engineering Pedagogy Course Mapping. Acta Metallurgica Slovaca, 28(1), 49-67.

22. Prathapan, K. (2022). Research Methodology for Scientific Research, 2/E. IK International Pvt Ltd.

23. Theoretical foundations for increasing the research capacity of universities of Ukraine in the context of implementation of the "Open science" concept: preprint (analytical materials) Technical Report. Institute of Higher Education of NAES of Ukraine, Kyiv, Ukraine (2021).

24. The Essence of Science: What Is The Philosophy Of Science? 2023. https://mindthegraph.com/blog/what-is-the-philosophy-of-science/

III. Information resources

25. Офіційний сайт Міністерства освіти і науки України. URL: http://mon.gov.ua/

26. Офіційний сайт Національної бібліотеки України імені В.І. Вернадського. URL: http://www.nbuv.gov.ua/

27. Пошукова система і база даних наукових цитувань Open Ukrainian Citation Index (OUCI). URL: https://ouci.dntb.gov.ua/about/how-it-works/.