

SYLLABUS

Discipline	Mathematical Methods in Psychology
Lecturer	Olena Vyshnevskya, PhD in Psychology, Associate Professor at the Department of Tourism, Social Sciences and Humanities
Lecturer's profile	QR Code:
Consultations: On-campus / online consultations	Monday from 12 p.m. to 2 p.m. Friday from 11 a.m. to 1 p.m.
Contact number	+30955020160 Viber
E-mail	olenavyshnevskya@ie.u.edu.ua
Discipline page	QR Code:
Form of final control	Exam
Brief discipline annotation	Mathematical methods in psychology are an interesting, complex, but essential practical discipline for every psychologist. They allow us to apply methods of mathematical statistics and analyze empirical data to study various mental and psychological factors. Researchers use mathematical sampling indicators, correlation analysis, regression analysis, and factor analysis for this purpose. All of these are necessary for obtaining diverse indicators for further research and diagnosis.
Background for studying discipline	Certificate of Complete General Secondary Education, External Independent Testing Certificates. Entrance exams in the specialty. The rest of the requirements are defined by the admission rules of the Bachelor's educational and professional program.
Goal and objectives of the discipline	The goal of the discipline is to study the general principles of mathematical processing of empirical data obtained as part of psychological research. Besides, students should explore methods of data collection, systematization, and interpretation for computer-based processing. Objectives of the discipline: - to develop a system of theoretical and practical knowledge in data processing; - to study the fundamental principles of conducting psychological experiments and subsequent processing of results; - to develop skills for independent work and research of mental phenomena; - to enhance practical thinking and its creative application.

Learning outcomes	<p>The acquired knowledge will allow students to:</p> <p>Know:</p> <ul style="list-style-type: none"> - basics of using mathematical statistics methods to analyze empirical data obtained during research; - differences between forming the gender cohort and sample when studying a large volume of respondents; - behavioral characteristics of the researcher and subjects during experimental activities. <p>Be able to:</p> <ul style="list-style-type: none"> - use knowledge of the basic concepts of mathematical methods in psychology within the educational and professional program; - develop and enhance psychological competence in mathematical research; - utilize and identify appropriate psychological techniques for examinations; - Analyze the alignment/relationship between the research goal and methods for achieving it. 																																																							
ECTS credits	<p>The discipline consists of 4 credits, 2 content modules and an exam as a form of final control. Total amount of hours – 120 (including 48 class hours and 72 hours of students’ independent work).</p>																																																							
Discipline structure	<table border="1"> <thead> <tr> <th data-bbox="392 1021 960 1093">Topics</th> <th data-bbox="973 1021 1107 1093">Lectures</th> <th data-bbox="1120 1021 1311 1093">Practical classes</th> <th data-bbox="1324 1021 1506 1093">Independent work</th> </tr> </thead> <tbody> <tr> <td data-bbox="392 1102 960 1218">Content module I. Key aspects of mathematical research in psychology.</td> <td data-bbox="973 1102 1107 1218"></td> <td data-bbox="1120 1102 1311 1218"></td> <td data-bbox="1324 1102 1506 1218"></td> </tr> <tr> <td data-bbox="392 1227 960 1308">Topic 1. Key concepts of mathematical statistics</td> <td data-bbox="973 1227 1107 1308">2</td> <td data-bbox="1120 1227 1311 1308">1</td> <td data-bbox="1324 1227 1506 1308">5</td> </tr> <tr> <td data-bbox="392 1317 960 1397">Topic 2. Estimation of central tendency</td> <td data-bbox="973 1317 1107 1397">2</td> <td data-bbox="1120 1317 1311 1397">1</td> <td data-bbox="1324 1317 1506 1397">5</td> </tr> <tr> <td data-bbox="392 1406 960 1451">Topic 3. Measures of variability</td> <td data-bbox="973 1406 1107 1451">2</td> <td data-bbox="1120 1406 1311 1451">1</td> <td data-bbox="1324 1406 1506 1451">5</td> </tr> <tr> <td data-bbox="392 1460 960 1505">Topic 4. Normal distribution</td> <td data-bbox="973 1460 1107 1505">2</td> <td data-bbox="1120 1460 1311 1505">1</td> <td data-bbox="1324 1460 1506 1505">5</td> </tr> <tr> <td data-bbox="392 1514 960 1594">Topic 5. Statistical hypotheses and their testing</td> <td data-bbox="973 1514 1107 1594">2</td> <td data-bbox="1120 1514 1311 1594">1</td> <td data-bbox="1324 1514 1506 1594">5</td> </tr> <tr> <td data-bbox="392 1603 960 1720">Content module II. Main methods of mathematical and psychological research.</td> <td data-bbox="973 1603 1107 1720"></td> <td data-bbox="1120 1603 1311 1720"></td> <td data-bbox="1324 1603 1506 1720"></td> </tr> <tr> <td data-bbox="392 1729 960 1809">Topic 6. Parametric methods. Student's t-Test</td> <td data-bbox="973 1729 1107 1809">4</td> <td data-bbox="1120 1729 1311 1809">2</td> <td data-bbox="1324 1729 1506 1809">7</td> </tr> <tr> <td data-bbox="392 1818 960 1863">Topic 7. Fisher's F-Test</td> <td data-bbox="973 1818 1107 1863">2</td> <td data-bbox="1120 1818 1311 1863">1</td> <td data-bbox="1324 1818 1506 1863">5</td> </tr> <tr> <td data-bbox="392 1872 960 1917">Topic 8. Rosenbaum Q-Test</td> <td data-bbox="973 1872 1107 1917">2</td> <td data-bbox="1120 1872 1311 1917">1</td> <td data-bbox="1324 1872 1506 1917">5</td> </tr> <tr> <td data-bbox="392 1926 960 1971">Topic 9. Mann–Whitney U-Test</td> <td data-bbox="973 1926 1107 1971">2</td> <td data-bbox="1120 1926 1311 1971">1</td> <td data-bbox="1324 1926 1506 1971">5</td> </tr> <tr> <td data-bbox="392 1980 960 2038">Topic 10. Pearson's Chi-Square (χ^2) Test (Goodness-of-Fit Test)</td> <td data-bbox="973 1980 1107 2038">4</td> <td data-bbox="1120 1980 1311 2038">2</td> <td data-bbox="1324 1980 1506 2038">7</td> </tr> </tbody> </table>	Topics	Lectures	Practical classes	Independent work	Content module I. Key aspects of mathematical research in psychology.				Topic 1. Key concepts of mathematical statistics	2	1	5	Topic 2. Estimation of central tendency	2	1	5	Topic 3. Measures of variability	2	1	5	Topic 4. Normal distribution	2	1	5	Topic 5. Statistical hypotheses and their testing	2	1	5	Content module II. Main methods of mathematical and psychological research.				Topic 6. Parametric methods. Student's t-Test	4	2	7	Topic 7. Fisher's F-Test	2	1	5	Topic 8. Rosenbaum Q-Test	2	1	5	Topic 9. Mann–Whitney U-Test	2	1	5	Topic 10. Pearson's Chi-Square (χ^2) Test (Goodness-of-Fit Test)	4	2	7			
Topics	Lectures	Practical classes	Independent work																																																					
Content module I. Key aspects of mathematical research in psychology.																																																								
Topic 1. Key concepts of mathematical statistics	2	1	5																																																					
Topic 2. Estimation of central tendency	2	1	5																																																					
Topic 3. Measures of variability	2	1	5																																																					
Topic 4. Normal distribution	2	1	5																																																					
Topic 5. Statistical hypotheses and their testing	2	1	5																																																					
Content module II. Main methods of mathematical and psychological research.																																																								
Topic 6. Parametric methods. Student's t-Test	4	2	7																																																					
Topic 7. Fisher's F-Test	2	1	5																																																					
Topic 8. Rosenbaum Q-Test	2	1	5																																																					
Topic 9. Mann–Whitney U-Test	2	1	5																																																					
Topic 10. Pearson's Chi-Square (χ^2) Test (Goodness-of-Fit Test)	4	2	7																																																					

	Topic 11. Sign Test G	2	1	5	
	Topic 12. Paired t-Test – Wilcoxon Test	2	1	5	
	Topic 13. Basics of correlation analysis	4	2	8	
List of obligatory tasks	Students are expected to perform several obligatory and additional types of tasks, including: preparing reports on specific issues within the discipline; advanced study of selected lecture topics or questions; preparing for ongoing knowledge assessments involving working through control questions, self-diagnostic questions, and independently studying theoretical material on the designated topics; systematizing the studied material in preparation for the exam; completing obligatory written individual educational and research tasks (chosen by the student).				
List of selective tasks	Independent study of prospects of psychodiagnostics as a science in Ukraine.				
Discipline features	Period of teaching	Semester	Interdisciplinary integration	Year of study	Courses: general training/professional training/elective
	1 st semester	3 rd semester	available	2 nd year	Professional training
Technical and software support / equipment	Access to the Internet, laptop, tablet, smartphone, or PC.				
Assessment system and requirements	As part of discipline teaching, one carries out current and final control of students' knowledge. The final grade is given according to the total rating of students. QR Code: https://ieu.edu.ua/docs/pol-mark-esb.pdf				
General system of discipline assessment	According to the results of current control during a semester, students can obtain 100 points maximally, the minimum sum of points allowing students to pass the discipline is 60 points. Maximum amount of points for the following types of assessment: <ul style="list-style-type: none"> ✓ module 1 = 30 points; ✓ module 2 = 30 points; ✓ semester exam = 40 points. Correlation between national and ECTS grades and student rating: QR Code: https://ieu.edu.ua/docs/pol-mark-esb.pdf				

<p>Admission to final control</p>	<p>The minimum amount of points that should be obtained by students for current educational activities during a semester to be admitted to the final control is 36 points. The grade for the discipline is defined as a sum of the final points for current activities and the points for the final control and is expressed due to the multipoint scale.</p> <p>The overall points of the discipline are 100. The total grade for the discipline is given according to the national and European scale.</p> <p>The final control in the form of an exam is carried out after learning all the topics of the discipline and is taken by students during the examination session. The exam takes place according to the schedule.</p> <p>QR Code: https://ie.u.edu.ua/docs/050.pdf</p>
<p>Discipline policy</p>	<p>The teaching of the academic discipline implies the use of the latest educational technologies aimed at: increasing students' interest in studying the course; mastering theoretical and practical knowledge of the discipline. When performing tasks, violations of academic integrity are not allowed: when using online resources and other information sources, students should indicate the source used in the task. Cheating during exams (including using mobile devices) is prohibited. Mobile devices are only allowed during online testing.</p>
<p>Policy of absence and late task performance</p>	<p>Students who miss the current control for valid reasons confirmed by documents have the right to take current control within two weeks after returning to studying.</p> <p>Students who have missed classes without valid reasons, have not participated in current control activities, have not liquidated academic failure are not admitted to the final semester control of this discipline. In this case, an academic staff member puts a mark 'non-admission' in the exam record.</p> <p>Repeated taking of the exam in the discipline is appointed in case of accomplishing all types of educational, independent (individual) work stipulated by the working program of the academic discipline and is carried out according to the approved schedule of academic failure liquidation.</p> <p>QR Code: https://ie.u.edu.ua/docs/050.pdf</p>
<p>Academic integrity policy</p>	<p>Participants in the educational process rely on the academic integrity principles: QR Code: https://ie.u.edu.ua/docs/011.pdf</p>

<p>Recommended sources of information</p>	<p style="text-align: center;">Primary literature:</p> <ol style="list-style-type: none"> 1. V.V. Vdovenko. <i>Mathematical Methods in Psychology: Educational and Methodical Guide</i>. – Kirovohrad: Avangard Center of Operational Printing, 2017. – 112 p. 2. V.K. Horkavyi, V.V. Yarova. <i>Mathematical Statistics: Study Guide</i>. – Kyiv, 2004. – 384 p. 3. V.O. Klymchyk. <i>Cluster Analysis: Application in Psychological Research // Practical Psychology and Social Work</i>. – 2006. – No. 4. – P. 30-36. 4. V.O. Klymchuk. <i>Mathematical Methods in Psychology. Study Guide for Psychological Students</i>. – Kyiv: Education of Ukraine, 2009. – 288 p. 5. O.V. Kolesnikov. <i>Fundamentals of Scientific Research. Study Guide</i>. Kyiv: Center for Educational Literature, 2011. – 144 p. 6. O.H. Riepina, D.A. Dehtiarov. <i>Procedures for Improving the Quality of Statistical Processing in the Analysis of Empirical Data in Psychological Research // Bulletin of Dnipropetrovsk University. Series: Psychology</i>. 2010. Issue 16. No. 9/1. P. 87–92. 7. V.M. Rudenko, N.M. Rudenko. <i>Mathematical Methods in Psychology</i>. Kyiv: Akademvydav, 2009. – 384 p. 8. A.B. Teleiko. <i>Mathematical and Statistical Methods in Sociology and Psychology: Study Guide / A.B. Teleiko, R.K. Chorney</i>. Kyiv: IAPM, 2007. – 418 p. <p style="text-align: center;">Additional literature:</p> <ol style="list-style-type: none"> 1. A.O. Tatianchykov. <i>Methodical Recommendations for Laboratory Work in the Course: Methods of Psychological Research: Mathematical Methods in Psychology</i>. Odesa: Publishing House of Ushynskiyi University, 2019. – 38 p. 2. T.O. Fadieieva. <i>Practical Classes for the Course: Mathematical Methods in Psychology / T.O. Fadieieva</i>. – Kirovohrad: Publishing House of Volodymyr Vynnychenko Central Ukrainian State University, 2011. – 76 p. 3. Foster, G., Lane D.; Scott D., Hebl M. and other. <i>An Introduction to Psychological Statistics</i>. University of Missouri, St. Louis. 2018. 271 p. <p style="text-align: center;">Internet information resources:</p> <ol style="list-style-type: none"> 1. https://stud.com.ua 2. https://pidruchniki.com 3. http://www.nbu.gov.ua/ 4. Vernadsky National Library of Ukraine: http://www.nbu.gov.ua/ 5. V. Sukhomlynskyi State Scientific and Educational Library of Ukraine www.dnpb.gov.ua/
<p>Tips on successful study during the course</p>	<p>Regular attendance of lectures and practical classes. Preparation for practical classes based on lecture materials with mandatory review of additional literature. Timely individual completion of independent work tasks using recommended computer programs and submission of them via the Google Classroom platform within the specified deadlines.</p>