# CATALOGUE OF ELECTIVE DISCIPLINES MASTER'S LEVEL
## "7M01501 - training of teachers in natural science subjects»

| The abbreviated name of the cycles of disciplines | Name of disciplines and their main sections | Labor intensity of total credits (ECTS) |
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| **CCh** | **COMPONENT OF CHOICE (CC)** | **15** |
| 1. | **Technology of research work on methods of teaching mathematics** | **5** |
| | The discipline "Technology of research work on the methodology of teaching mathematics" will acquaint undergraduates with the methodological foundations of conducting master's research, with the main directions of research work at the school, as well as with the basic methodological techniques of the organization of research work of schools. The discipline forms the students ' skills to develop a plan of research, work with scientific, educational and reference literature. Undergraduates learn to master the methods and forms of research training, methods of laboratory study of the object of study, the main methods of experimentation and processing of measurement results. | |
| *2.* | **Methodology of updating the content of mathematical education in school and pedagogical University** | 5 |
| | The discipline "Methodology of updating the content of mathematical education in school and pedagogical University" will acquaint undergraduates with the role of mathematical education in the system of continuous education at the present stage of development of society, with the main problems facing in the field of methodical science and mathematical education, the Course also covers topics such as the relationship of methods of teaching mathematics with other Sciences; issues related to reforms in science and education of Kazakhstan, in particular in the field of mathematical education; the content of the school course of mathematics, principles of content, basic didactic principles and methods of teaching mathematics. As a result of the development of the discipline undergraduates will improve their skills in the use of knowledge in different areas of mathematics and professional activity, skills in the development and implementation of methodological models, methods, technologies and teaching methods, as well as the analysis of the results of their use in the educational process of schools and universities. | |
| *3.* | **History of methods of teaching mathematics** | 5 |
| | The discipline "History of methods of teaching mathematics" studies the development of methodological and mathematical science in different historical periods, from ancient times to the present day and reveals the historical patterns of development of methodological and mathematical science. The purpose of the discipline: to give an idea to the undergraduate-future scientist about the development of methodological and mathematical science and to show that knowledge of this experience will contribute to the performance of their professional duties. The course content covers such topics as: the origins of methodological and mathematical Sciences, the establishment of the methodology of mathematics, origin of mathematics methodology in Kazakhstan, the first textbook in mathematics for Kazakh primary, secondary and higher education, the formation and development of mathematical termi-technologies, the development of methodological and mathematical Sciences in the 1940-1990 gg, especially the development of the methodical-mathematical science in Kazakhstan. | |

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| | The study of the discipline contributes to the increase of the creative potential of future scientists in terms of further independent work on the deepening and expansion of historical and mathematical knowledge. | |
| **PD** | **CYCLE OF PROFILE DISCIPLINES (PD)** | |
| *4* | **Theoretical basis of teaching to solve mathematical problems in high school** | 5 |
| | Discipline "Theoretical foundations of learning to solve mathematical problems in high school" forms knowledge of theoretical and methodological foundations of learning to solve mathematical problems of school mathematics. The content of the course covers topics such as: the role and functions of problems in the learning process of mathematics, classification of problems, methodological foundations for solving school mathematical problems, didactic stages of work with theorems, rules, regulations and algorithms, as well as stages of work with mathematical problems. As a result of the development of the discipline, undergraduates will learn how to organize training in solving mathematical problems; modeling of the educational process; monitoring the activities of students at various stages of solving problems; will own traditional and active methods of teaching problem solving; skills of effective choice of forms of organization of the educational process to achieve this goal. | |
| *5* | **Applied aspects of solving text problems in mathematics** | 5 |
| | The discipline "Applied aspects of solving text problems in mathematics" is aimed at preparing a graduate of a pedagogical University to work in high school in terms of the use of applications of mathematics in its teaching. The discipline includes the following content: "Historical and modern approach to the use of applications of mathematics in regulations, programs of secondary education, teaching complexes in mathematics. Content, techniques and methods of use of practical applications in teaching mathematics. Teaching elements of the method of mathematical modeling in the school course of mathematics. Construction of programs for the study of additional sections of mathematical training associated with the use of applications in pre-profile training of students. Training in the construction and solution of practice-oriented text problems of school mathematics course and tasks of international research PISA, TIMSS. Methods of solving geometric problems with practical content". | |
| *6* | **Teaching methods for solving non-standard and Olympiad problems in mathematics** | 5 |
| | The discipline "Methods of teaching to solve non-standard and Olympiad problems in mathematics" includes basic information about the ability to self-organization and self-education; possession of fundamental mathematical knowledge and theories; As a result of the development of the discipline, the student must: Know: -the concept of "mathematical problem", the qualification of tasks and the possibility of their use in the educational process; -school program in mathematics; -various technologies for solving problems, the use of mathematical techniques and methods; -forms of organization of educational work of students in solving problems in mathematics. Be able to: -solve problems of high complexity in all areas of mathematics for high school; -identify and calculate errors in calculations; -conduct circles in different classes of the school to solve problems of high complexity; -allocate talented students; -conduct lessons in solving problems in different classes. | |

| 7 | **The method of solving applied problems on extrema in mathematics** | 5 |
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| | The purpose of the discipline – an introduction to the modern apparatus of school mathematics related to the solution of extreme problems. The discipline provides armament of the students with the theoretical apparatus of the analysis of extreme problems, the basics of the theory of methods of their solution and practical skills of teaching methods of students to solve problems on extrema. | |
| | The course content covers the following topics: basic concepts of the theory of extremal problems, classical extremal problems, history of development of extremal problems, basic methods of solving problems on extrema, mathematical modeling of extremal problems, extremal problems of arithmetic, algebra cal, geometric and physical con-traffickers, a remarkable inequality, isopure-metric problem, the problem of brachistochrone, applications of the derivative to the solution of extremal problems, introduction to linear programming, basic concepts of calculus of variations. | |
| | As a result of studying the discipline, the student must know: the basic methods of solving extreme problems, the principles of mathematical models of extreme problems, the history of the theory of extreme problems; be able to: use the basic methods of the theory of extreme problems, apply them to solving problems from various fields of science and technology; own: General methods of solving the problem, basic ideas and methods of the theory of extreme problems. | |
| 8 | **Modern trends in teaching geometry in high school** | 5 |
| | The discipline "Modern trends of teaching the course of geometry in high school" is aimed at providing undergraduates with methodological training in teaching geometry in high school and for independent activity in the field of geometry, as well as its applications in future professional activities. The content of the discipline includes the following topics: "the History of the formation and development of geometric education. The logical structure of the school geometry course. Methodical approaches to the construction of school geometry course. Substantial lines of geometry course in high school. Features of teaching geometry in grades 7-9 and 10-11 in terms of updating the content of school education. The main components of the methodical system of teaching geometry course at school. Technology of teaching geometric concepts and theorems of school geometry course. Classification of geometric problems. Learning the solution of problems of a school course of geometry. Methods for the solution of geometrical problems on the calculation, proof, construction, research a course of plane geometry and solid geometry. Using ICT to teach geometry in high school." | |
| 9 | **Fundamentals of mathematical literacy** | 5 |
| | Discipline "Fundamentals of mathematical literacy" to acquaint undergraduates with the methodological foundations of the formation of functional literacy and the main directions of the formation of research on functional literacy at school and at University. The discipline forms students ' skills of solving mathematical problems on the formation of functional literacy and work with scientific, educational and reference literature on the topic. Undergraduates learn to master the methods and forms of the formation of functional literacy in mathematics. | |

| 10 | **Modern methods of evaluation of learning mathematics** | 5 |
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| | The discipline "Modern methods of assessing the results of teaching mathematics" focuses on teaching, scientific and methodological types of professional activity, its study contributes to the solution of the following typical tasks of professional activity: to use modern means of evaluating the results of teaching mathematics; to use information and computer technology to control the teaching of mathematics; to analyze their own activities in order to improve and improve their skills; to perform methodical work as a part of school methodical associations for the purpose of creation of system of control of results of training. The discipline includes the following content: "Control and evaluation of the quality of teaching mathematics. Functions, types and forms of control. Evaluation, its functions. Traditional and modern means of control. The system of criteria-based assessment of educational achievements of students. Summative and formative assessment. Methods of teaching the preparation of tasks and their criteria for formative and summative assessment". | |
| 11 | **Mathematical methods of processing the results of pedagogical experiment** | 5 |
| | The main purpose of the course is to provide a quality level of professional training of the master, due to the social order of society at the present stage of its development. The aim of the course is to reveal the main internal mechanisms of application of statistical and mathematical methods in methodological and mathematical research on specific examples.<br><br>The content of the course covers such topics as: pedagogical experiment and methods of its implementation, the concept of measurement, the possibility of using mathematical methods in a pedagogical experiment, forms of representation of experimental data, methods for assessing the normality of distribution, simple, descriptive, inductive and correlation methods of processing the results of pedagogical experiment, General principles of statistical hypothesis testing, statistical criteria for differences.<br><br>The content of the course and the sequence of consideration of the material contribute to the creative potential of the novice researcher in terms of the final qualifying wor | |
| | **Research practice** | |
| | The purpose of the research practice is the formation of undergraduates professional competence necessary for successful research activities in modern conditions. Research practice contributes to the consolidation and deepening of theoretical knowledge of undergraduates obtained in training, acquisition and development of skills of independent research and teaching. Practice provides continuity and consistency in the study of theoretical and practical material, provides an integrated approach to the subject of study. | |