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**ВАЖНОСТЬ ИЗУЧЕНИЯ ГРУППОВОГО АНАЛИЗА
ДИФФЕРЕНЦИАЛЬНЫХ УРАВНЕНИЙ ДЛЯ ДОКТОРАНТОВ
СПЕЦИАЛЬНОСТИ 6D010900 - «МАТЕМАТИКА»**

***Аннотация:** В статье рассматриваются основные теоретико - методологические аспекты и содержание такого важного курса как «Групповой анализ дифференциальных уравнений». В работе охарактеризованы основные направления изучения дисциплины, указаны направления совершенствования педагогического мастерства тьютора и предложены пути повышения эффективности усвоения изучаемого материала студентами.*

***Ключевые слова:** педагог, дифференциальная модель, методика, исследование, высшая школа, компетенции, математика.*

***Annotation:** The article deals with the main theoretical and methodological aspects and the content of such an important course as "Group analysis of differential equations". The paper describes the main directions of studying the discipline, the directions of improving the pedagogical skills of the tutor and the ways to improve the efficiency of mastering the studied material by students.*

Key words: *teacher, differential model, methodology, research, higher school, competence, mathematics.*

Differential equations are one of the basic concepts of modern mathematics. Differential equations obtained as a result of the study of a real phenomenon or process, called a differential model of this phenomenon or process. Modern development of mathematics, physics and technology is impossible without the use of differential equations. This course discusses the theoretical information and methods of solving standard, in applications to specific areas of mathematics, differential equations. The course of the theory of differential equations is the development of one of the main sections of modern mathematics – mathematical analysis, which is of fundamental importance both for mathematics itself and for all-natural science disciplines [1].

Suffice it to note that all the basic laws of physics are formulated in the language of differential equations. In the process of studying the course of differential equations, the student must learn the basic concepts of the theory of differential equations, the main types of differential equations and methods of their integration, learn how to apply general methods to solving specific problems in mathematics and physics.

The program of discipline is made in accordance with the curriculum and the state educational standard of higher education in the field of training 6D010900 - "Mathematics" - doctoral PhD and belong to the variable part of the disciplines of mathematical and natural science cycle. To study this course, you need a solid knowledge of the basics of mathematical analysis. The discipline "Group analysis of differential equations" is designed to give students a mathematical apparatus, which will be used in the future in the study of disciplines of the basic cycle, as well as in the study of disciplines of the professional cycle, in educational research and research work.

The process of studying the discipline is aimed at the formation of the following competencies [2]:

- possession of culture of thinking, ability to generalize, analysis, information perception, goal setting and choice of ways of its achievement;

- ability to use knowledge of the modern natural science picture of the world in educational and professional activities, to apply methods of mathematical information processing, theoretical and experimental research;

- the ability to logically, correctly, build oral and written speech;
- willingness to interact with colleagues, to work in a team;
- knowledge of the basics of speech professional culture.

As a result of studying the discipline, the student must:

Know: basic concepts of the theory of differential equations, types and standard forms of recording of basic differential equations, methods of solving basic differential equations.

Be able to: apply differential equations to simulate physical processes, use the tools of differential equations for processing, analysis and systematization of information on the subject of research and use, if necessary, mathematical literature.

Own: methods for solving differential equations of different types.

Methodical recommendations to the teacher:

1. Having studied deeply the content of the discipline, it is advisable to develop a matrix of the most preferred teaching methods and forms of independent work of students, adequate types of lectures and practical classes.

2. It is necessary to provide for the development of forms of independent work, bringing students to the completion of the study of the discipline at its highest level.

3. At the beginning of the semester it is desirable to discuss with students the form of independent work, to discuss the criterion of its evaluation. The package of tasks for independent work can be issued at the beginning of the semester, defining the deadlines for their implementation and delivery.

Tasks for independent work should be composed of mandatory and optional parts.

1. Organizing independent work, it is necessary to constantly teach students the methods of such work.

2. University lecture is the main link of the didactic cycle of education. Its purpose – the formation of students' tentative basis for the subsequent assimilation of the material by the method of independent work.

The content of the lecture should meet the following didactic requirements:

- presentation of the material from simple to complex, from known to unknown;
- consistency, clarity and clarity in the presentation of the material;
- the possibility of a problem statement, discussion, dialogue, with the aim of enhancing students' activities [3];
- support the semantic part of the lecture on true facts, events, phenomena, statistics;
- close connection of theoretical positions and conclusions with practice and future professional activity of students.

Teacher who gives lectures at the university should know the existing in pedagogical science and used in practice versions of lectures, their didactic and educational opportunities, as well as their methodological place in the structure of the learning process. When presenting the material, it is important to remember that almost half of the information in the lecture is transmitted through intonation. Take into account the fact that the first crisis of students' attention comes on 15-20 minutes, the second – on 30-35 minutes [4].

In professional communication to proceed from the fact that the perception of lectures by students of junior and senior courses is significantly different in readiness and ability. The introduction of interactive forms of education is one of the most important ways to improve the training of students in a modern university. The educational process, based on the use of interactive teaching methods, is organized taking into account the involvement of all students of the group in the learning process without exception. Joint activity means that everyone makes a special individual contribution, in the course of work there is an exchange of knowledge, ideas, ways of activity. Individual, pair and group work are organized, project work is used, work with various sources of information is carried out.

Interactive methods are based on the principles of interaction, activity of students, reliance on group experience, mandatory feedback. An environment of educational communication is created, which is characterized by openness, interaction of

participants, equality of their arguments, accumulation of joint knowledge, the possibility of mutual evaluation and control.

Types of such classes can be varied: students discuss projects of term papers, abstracts, analysis of non-standard tasks, design and research activities with the protection of works, etc. [5].

Recommendations for the study of individual topics of the course:

Differential equations of the first order: special attention should be paid to the Cauchy problem, to different types of differential equations of the first order and their solution: with separating variables, linear differential equations, Bernoulli equation, homogeneous equation [6].

Differential equations of higher orders: special attention should be paid to the equations that allow lowering the order, incomplete differential equations, linear homogeneous and inhomogeneous equations of the second order with constant coefficients, the use of differential equations in various fields of knowledge [7].

The teacher should recommend students to study the sections of the discipline by listening and taking notes of lectures and materials of practical classes, as well as by independent work with the recommended educational basic and additional literature, if necessary, use the manuals and recommendations developed by teachers of the Department of mathematics and mathematics teaching methods and additional electronic resources presented in the scientific library of ZHSU n.a. I.Zhansugurov and others.

Methodical recommendations for students.

Students are encouraged to use the literature and guidelines developed by the Department of mathematics and mathematics teaching methods for better learning of educational material presented in lectures and for study material, scheduled for independent work [8].

Students are required to complete individual assignments on the main topics of the course. Tasks submitted for independent work are checked by the teacher during the semester. Grades for individual assignments and independent work are taken into

account when setting off [9]. The purpose of independent work, i.e. the work performed by students in extracurricular time on the instructions and guidance of the teacher is a deep understanding and assimilation of the course of lectures and practical training, preparation for the implementation of control works, to perform semester tasks, to pass the test, mastering professional skills and activity, experience of creative, research activities.

To successfully prepare and pass the test, it is necessary to do the following work [10]:

1. To study the theoretical material relating to each of the sections.
2. Develop sustainable skills in solving common practical tasks.
3. Perform control work carried out during the semester.

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