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METHODOLOGY OF STUDYING PHYSICAL AND MATHEMATICAL SCIENCES AT IGOR SIKORSKY KYIV POLYTECHNIC INSTITUTE

Abstract. The Igor Sikorsky Kyiv Polytechnic University (KPI) plays an important role in the development of scientific and engineering education in Ukraine and other countries. Founded in 1898, KPI has become a center of innovation and technological progress. The institute is known for its scientific achievements and training of advanced specialists in the field of physical and mathematical sciences. The methodology of teaching physical and mathematical sciences at KPI is based on a combination of fundamental knowledge and practical skills. Teachers actively use interactive teaching methods that contribute to a deep understanding of theoretical concepts. In particular, the introduction of experimental work and research projects allows students to apply theoretical knowledge in practice and develop critical thinking and analytical skills. Innovative teaching methods play an important role in training highly qualified specialists. The use of modern technologies, such as simulation, virtual laboratories and online courses, increases the efficiency of the learning process. Such methods promote student participation, provide access to the latest scientific discoveries, and expand opportunities for independent learning. KPI pays special attention to international cooperation and experience exchange. Cooperation with the world's leading universities allows students to participate in joint research projects and internships abroad. This will help integrate Ukrainian science into the global scientific field and increase the competitiveness of KPI.
graduates in the international labor market. In general, Igor Sikorsky Kyiv Polytechnic Institute continues to play a leading role in the development of science and technology education. The main goal is to demonstrate the role of Igor Sikorsky Kyiv Polytechnic Institute (KPI) in the development of science and technical education, focusing on the methodology of studying physical and mathematical sciences and the benefits of innovative teaching methods.

**Keywords:** Igor Sikorsky Kyiv Polytechnic Institute, methodology, physical and mathematical sciences, innovative teaching methods.

МЕТОДОЛОГІЯ ВИВЧЕННЯ ФІЗИКО-МАТЕМАТИЧНИХ НАУК У КИЇВСЬКОМУ ПОЛІТЕХНІЧНОМУ ІНСТИТУТІ ІМЕНІ ІГОРЯ СІКОРСЬКОГО

Анотація. Київський політехнічний університет імені Ігоря Сікорського (КПІ) відіграє важливу роль у розвитку наукової та інженерної освіти в Україні та інших країнах. Заснований у 1898 році, КПІ став центром інновацій та технологічного прогресу. Інститут відомий своїми науковими досягненнями та підготовкою передових фахівців у галузі фізико-математичних наук. Методика навчання фізико-математичних наук в КПІ базується на поєднанні фундаментальних знань і практичних навичок. Викладачі активно використовують інтерактивні методи навчання, які сприяють глибокому розумінню теоретичних положень. Зокрема, впровадження експериментальної роботи та дослідницьких проектів дозволяє студентам застосовувати теоретичні знання на практиці та розвивати критичне мислення та аналітичні навички. Інноваційні методи навчання відіграють важливу роль у підготовці висококваліфікованих фахівців. Використання сучасних технологій, таких як імітаційне моделювання, віртуальні лабораторії та онлайн-курси, підвищує ефективність навчального процесу. Такі методи сприяють участі студентів, забезпечують доступ до останніх наукових відкриттів і розширюють можливості для самостійного навчання. КПІ приділяє особливу увагу міжнародній співпраці та обміну досвідом. Співпраця з провідними універси-
Problem statement. The current situation in education requires new approaches. Physical and mathematical knowledge has become key to the development of society. However, one of the problems is the lack of integration of career guidance in physics and mathematics courses. To improve the effectiveness of career guidance, it is necessary to constantly improve the methodological system.

Analysis of recent studies and publications. More and more often we touch upon the topic of the educational process and this topic was studied, in particular, by Glavatskykh I.M., Berestova A. But technology does not stand still and the educational process is constantly improving and the most effective method of teaching has not yet been found.

The purpose of the article. To demonstrate that the Igor Sikorsky Kyiv Polytechnic Institute (KPI) is a leader in higher education in Ukraine in the field of physical and mathematical sciences, offering students modern and innovative teaching methods, access to advanced equipment and international cooperation.

Presentation of the main material. Igor Sikorsky Kyiv Polytechnic Institute is famous for its rich history and traditions of active participation of students in scientific research. For example, there are scientific clubs. Faculties actively support scientific clubs where students can deepen their knowledge and learn research methods. This allows them to actively participate in scientific conferences. Annual conferences are held where students present their research results and receive feedback from experts. Students also publish the results of their research in scientific journals and collections, actively participate in various competitions and contests, where they often win prizes.

KPI faculties provide students with comprehensive support for the development of their scientific potential. All the necessary conditions have been created for this: modern laboratory equipment, access to scientific libraries and information resources, support from teachers and supervisors. [5],[1]

The modern world is developing rapidly, and education is actively adapting to these changes. Traditional teaching methods are losing their relevance, so
innovative approaches that make the learning process more interesting, effective, and flexible are becoming increasingly popular. An example of such are online courses, where students have the opportunity to study anytime and anywhere thanks to online learning, which makes education more accessible to everyone. (The KPI mail platform provides free access to many online courses in various fields). In addition, students can communicate with each other and with teachers through interactive platforms, which makes learning more active. In KPI, this is implemented through the Moodle system and messengers. [2]

The advantages of innovative teaching methods include increasing students' motivation and interest in learning, improving learning efficiency and better knowledge acquisition, developing critical thinking, analytical and creative abilities, and preparing students to work in a dynamic environment. At the same time, innovative teaching methods require special equipment and software, training of teachers in the use of modern technologies, and possible barriers for students to adapt to new conditions. Despite the difficulties, innovative teaching methods have great potential to improve the educational process. [3],[1]

KPI has a variety of educational programs, as well as access to additional courses and internships. These opportunities help students gain practical experience, acquire knowledge and increase their competitiveness in the labor market, and develop professional skills. Studies confirm the positive impact of these opportunities on career preparation. In addition, the electronic system Campus, which operates at the university (KPI), provides support to graduates in finding a job. [2]

NTUU "KPI" has a long and strong tradition of international cooperation in the field of physical and mathematical sciences. The university actively cooperates with leading universities and research institutions of the world. In particular, with the University of Oslo (Norway), the University of Ulm (Germany) and the University of Iowa (USA) in the field of algebra, analysis, differential equations and mathematical modeling; with the University of Karlsruhe (Germany), the University of L'Aquila (Italy) and the National Center for Scientific Research (France) in the field of nuclear physics, condensed matter physics, optics and astrophysics. [4]

International cooperation of Igor Sikorsky Kyiv Polytechnic Institute in the field of physical and mathematical sciences includes joint research with partners from other countries, exchange of scientists and students, joint educational programs such as master's and doctoral degrees. This contributes to improving the quality of education and research, raising the international profile of the university and creating new opportunities for cooperation. The result of which is, for example, the development of a new method for solving differential equations with the participation of KPI scientists and the University of Oslo (Norway), the discovery of a new type of semiconductor materials together with colleagues from the University of Karlsruhe (Germany), the victory of KPI students at the International Mathematics Olympiad. [5],[4]
The Igor Sikorsky Kyiv Polytechnic Institute (KPI) offers various programs to support talented students, particularly in the physical and mathematical sciences. These include a scholarship of the President of Ukraine, a scholarship of the Cabinet of Ministers of Ukraine for young scientists, and scholarships of prominent scientists. Students can also receive grants, such as the Erasmus+ program. In this program, KPI participates in the European program that allows students to receive grants for study and research at leading European universities. It promotes academic mobility and exchange of experience. These monetary payments encourage students to work for the development of science and achieve important goals.

There are also summer schools and workshops where KPI organizes events in various fields of science and technology. For example, the Summer School of Mathematics and Physics, where students have the opportunity to deepen their knowledge and skills under the guidance of leading scientists. When students acquire more skills, they have the opportunity to participate in an internship and practice program in leading scientific institutions, as KPI cooperates with leading scientific institutes and companies, such as the Institute of Physics of the National Academy of Sciences of Ukraine, providing students with the opportunity to undergo internships and practice, which is an important component of their professional development.

NTUU (KPI) is known not only for its educational programs, but also for its alumni who have made significant contributions to various fields of science, including physical and mathematical sciences. For example, Ihor Sikorsky (KPI graduate of 1907) is a famous aircraft designer and inventor, developer of multi-engine airplanes and helicopters. Yevhen Paton (KPI graduate of 1894) is a well-known scientist in the field of bridge construction and welding. Valentyn Hlushko (graduated from KPI in 1929) is an outstanding rocket engine designer. Sergiy Korolev (graduated from KPI in 1930) - an outstanding designer of rocket and space systems, one of the main organizers of the Soviet space program. Borys Paton (graduated from KPI in 1941) - a prominent scientist in the field of electric welding, metallurgy and materials science, son of Yevhen Paton. Viktor Glushkov (graduated from KPI in 1952) - a prominent mathematician and cybernetician, one of the founders of the Soviet school of cybernetics. Graduates of the Igor Sikorsky Kyiv Polytechnic Institute have made a significant contribution to the development of physical and mathematical sciences and technology. Their achievements in the fields of astronautics, aviation, welding, cybernetics and rocketry had a significant impact on scientific progress and technological development. KPI continues to educate talented professionals who make significant achievements in their fields, contributing to the development of science and technology in Ukraine and around the world."
Conclusion. NTUU KPI is a leader of higher education in Ukraine with a rich history in training specialists in the field of physical and mathematical sciences. Using an integrated approach to education, the university:

- Provides a high level of education in the fields of engineering, technology and natural sciences, which contributes to the development of modern technologies.
- Uses active interaction between teachers and students, practical orientation and innovative teaching methods in the physical and mathematical sciences.
- It engages the university community in research in various fields, which enriches knowledge and raises the level of technical education.

This approach helps to graduate highly qualified specialists with deep knowledge, practical skills and research potential. KPI opens up opportunities for quality education and a successful career in the physical and mathematical sciences.

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