

## **FEATURES TEACHING PHYSICS FOR STUDENTS OF CONSTRUCTION SPECIALTIES**

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**Abstract.** We consider the relevance of the question about the peculiarities of teaching physics for students of construction specialties. The emphasis on some issues of concern to tackle the trend towards deterioration of the quality of education as a result of reducing the number of classroom hours and increase independent work. There is a positive experience of using modern information technology to enhance students' independent work.

Keywords: physics course, site of the department, experience, self-study.

**WORK URGENCY.** Of all the basic sciences that define the modern scientific and technological progress, physics occupies a special place in the preparation of graduates. For effective training of students of technical specialties is necessary to create a system of fundamental physical knowledge, coupled with the ability to apply them in specific production activities, as a fundamental and at the specialized level. Successive studies physics course produces a specific logical method of thinking, scientific intuition, which turns out to be extremely fruitful in other sciences. The aim of the course of physics in high school is to provide students the theoretical foundations of physics, allowing future professionals on the one hand to be guided in the flow of scientific and technical information, on the other - the ability to use physical principles in the areas of technology in which they specialize. To do this,

you must carry out a consistent and seamless presentation of the physics course, using all kinds of studies.

Improving the quality of student learning is one of the major challenges facing academics. It should, however, point to the observed in the recent trend of constant reduction in the number of classroom hours provided the curriculum for the discipline "Physics". In this regard, there is a problem of selection of educational material, its seal and the method of presentation. Thus, the selection of the lecture material can argue in two ways: to present the material in detail, but not all sections, or short, but cover everything. The teacher is faced with a choice: to improve the quality of learning by narrowing the number of the issues, or partially lose quality, but increase the number of examined sections. Naturally, both of these paths ideally unacceptable.

On the other hand, the currently popular practice of transferring the center of gravity on the students' independent work has similar drawbacks. It is known that the independent work of students is an integral part of the learning process, and it is given a significant number of curriculum hours. This work should include preparation for lectures and practical classes, to the protection of laboratory work. Of course, some sections of the course can be given to an independent elaboration, but, unfortunately, it turns out to be ineffective. According to the authors [1, 2] teachers efforts should be concentrated on overcoming the tendency to deterioration of the quality of education due to the increased volume of independent work of students. From the above it is clear that although the teacher can find a reasonable solution to this problem, the nominees reducing the number of classroom hours and an increase in the proportion of independent work is unlikely to improve the quality of training.

**The purpose of work** is to bring the experience and features of teaching the subject "Physics" in the Odessa State Academy of Civil Engineering and Architecture (OGASA), as well as search techniques and the use of modern information technology to enhance the students' independent work.

## **MATERIALS AND RESULTS**

In OGASA discipline "Physics" is read for students of educational level «Bachelor» a discipline: 192 "Budivnitstvo ta tsivilna inzheneriya" 193 "Geodeziya ta zemleustriy" 133 "Galuzeve mashinobuduvannya". The presentation of the course of physics for students of building specialties has some peculiarities. It is necessary to take into account the specifics of a professional institution (faculty) with a view to future professionals have sufficient information to understand the physical phenomena, processes, devices and equipment, which will have to meet in the practical work after graduation.

University profile can be taken into account by the redistribution of material between the individual sections as well as the choice of specific examples and applications that illustrate the effect of the physical laws of the technical area in which students specialize. In connection with this specialization "Hydraulic Engineering", "Water supply and sanitation", "Heat and ventilation" in the lecture course it is advisable to present topics in more detail: the elements of fluid mechanics, laminar and turbulent flow of liquids, the motion of bodies in liquids and gases. For specialization "Roads, airports and transport systems" such topics may include: mechanical properties of solids, sublimation, melting and crystallization of solids, phase transitions of the first and second kind. Accounting for a physics course features the training of engineers of different specializations can also be carried out by appropriate selection of a laboratory practical work and problems considered in practical classes.

By the applied areas of physics, the results of which are used in construction and architecture, should include architectural and building acoustics. The acoustic properties of spaces are defined by its architecture, size, shape, position absorbers and reflectors. [3] In the simplest cases, the analysis of spatio-temporal characteristics of the sound field is enough methods of wave theory and geometric acoustics. However, for complex-shaped space with a large number of obstacles inhomogeneous only possible direct numerical calculation engine. Latest measures to reduce noise generated in the production facilities and sanitary equipment buildings. Therefore, in

the course of physics, are set out for students of building specialties, must be considered in detail topics that describe the propagation of waves in elastic media, the equation plane and spherical waves, transverse and longitudinal components of the velocity of propagation of elastic waves, interference and diffraction of waves, standing sound waves, speed sound waves in the media with different aggregate states. However, again, because of the limited number of classroom hours, these questions remain sparse.

As a promising application of new technologies in physical education is a computer simulation labs and basic physical phenomena and processes [4]. Computer models can easily fit into the traditional class, allowing the teacher to show on the screen, many physical effects and to organize additional learning activities of students.

One of the peculiarities of teaching physics course in OGASA is that it precedes the rate of electrical disciplines building profile. This fact gives special importance to the physics section of the course "Electricity and magnetism" as a binder between these disciplines. The subject of the study of virtual lab, developed by the authors, is the flow of electric current in the conductors of the first kind. Lab was created using Borland C ++ Builder 6.0 software environment. This work continues a series of virtual laboratory works, created in the Department of Physics. Binaries laboratory works on such topics as thermal radiation physics of semiconductors and nuclear physics are present on the department website, and are thus part of the distance learning. It is also possible the generation of diverse variants of numeric data.

We have developed a software package that can be used both for training and research purposes. The complex allows making numerical calculation of the first boundary value problem for the one-dimensional non-stationary temperature field isotropic construction materials. Necessary to calculate the values of the thermal diffusivity can be selected as a proposed set of (brick, concrete, coquina, gypsum board, etc.), or directly specified in the form of software. In addition, students can investigate the effect of sample thickness on its inner temperature field. The program

allows you to set the warm-up and limit values and the initial internal temperatures. Investigation of the dynamics of the temperature field during heating of samples taking into account the impact of external factors on the thermal parameters of the samples is of significant scientific interest and has been the subject of writing scientific papers [4, 5]. On the other hand, the complex can be seen as a virtual laboratory work dedicated to the field of physics "Molecular physics and thermodynamics".

Modern society demands that higher education institutions prepare smart, enterprising and competitive specialists. One way to improve mental abilities is to engage students in the subject Olympiads. For students 1 and 2 courses at the department annually Olympiads in physics. Our experience shows that the Olympic Games will undoubtedly increase the interest in the study of physics, it contributes to the identification and development of creative abilities, as well as the search for talented youth.

Another problem lies in the fact that in recent years the level of knowledge of physics students has decreased markedly. Further study of physics begins with a 1 - second semester, when students do not yet have the necessary mathematical background. Although it is clear that in order to use in the course of physics apparatus of higher mathematics appropriate to begin the study of the physics course not before the second semester of study at the university. Under these conditions, to improve the quality of teaching physics in OGASA introduced in teacher workload individual classes with students of first course.

Individual lessons with students are carried out in several ways: 1) the elimination of deficiencies in the theoretical and practical training of students, 2) development of material, undigested due to absenteeism or lack of training, 3) the assimilation and knowledge on certain complex issues of the course of physics, 4) strengthening and development of interdisciplinary connections (electromagnetism to study electrical engineering disciplines, the dynamics of rotational motion - for theoretical mechanics). In our opinion, this kind of training allows you to set aside

time for preparing for the Olympics, as well as considered as an element of independent work of students.

Materials created on the site of the department of physics reflect the main aspects of the educational, scientific and organizational activity of the department. Day-time and correspondence forms of training are presented subjects: "Physics", "Electronics", "Electrical Engineering in Construction", "Electricity and electrical equipment in the building", "Electric drive cars", "Electrical engineering, electronics and microprocessor technology", "Physical basis of laser and microwave "biomedical information systems. Each of these disciplines accompany the page "Programs" "Lectures", "Lab", "Workshops", "Private lessons". Site materials allow for remote training of students. Boot modules contain basic courses, both in physics and electrical engineering, far beyond the theoretical and practical material, provided the working program of courses. Complement the training materials many video lectures on all sections of the disciplines.

The site also focuses on work with foreign students. This is particularly evident in the presence of specialized bilingual dictionaries. In addition, the department's website contains a link to the video lectures in almost all branches of physics and electrical engineering German, English, French and Spanish. Work with students (programs, lectures, practical exercises, examples and test the basic UPE, video lectures on physics for students, reference materials) in a separate subpage.

One of the results of extra-curricular component of independent work in physics and electrical engineering is the creation of the site "Students OGASA and physics." Construction of the site and its active replenishment is performed by the students themselves. In our opinion, the creation of the website of the Department certainly improved the quality of training and allowed to activate the students' independent work.

## CONCLUSIONS

1. Computer models at the rate of general physics allow students to organize various kinds of activities like training and research.

2. The organization of the competition and individual lessons students can be considered as elements of independent work.
3. Creation of a site of the Department of Physics has improved the quality of education and enhances students' independent work.

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**Особливості викладання фізики для студентів будівельних спеціальностей**

**Анотація.** Розглянуто актуальність постановки питання про особливості викладання дисципліни «Фізика» для студентів будівельних спеціальностей. Зосереджено увагу на деяких проблемних питаннях, спрямованих на подолання тенденції до погіршення якості навчання внаслідок скорочення кількості аудиторних годин та збільшення обсягу самостійної роботи студентів. Відзначається позитивний досвід використання сучасних інформаційних технологій з метою активізації самостійної роботи студентів.

**Ключові слова:** курс фізики, сайт кафедри, досвід, самостійна робота.