PRACTICES AND EXPERIMENTS IN TEACHING SOLID STATE PHYSICS

Teacher of Andijan State Pedagogical Institute
O'rinboyeva Kumushoy Sultonbekovna
orinboyevakumushoy@gmail.com
Physics and astronomy course 2nd Stage Student
Fozilova Nasiba Nozimjon daughter

Anotation: *solid-state physics is an important basic specialization course for the relative specialties of physics,materials and electronics. This article summarizes the distribution of class hours, teaching content,textbook selection, procedure for teaching different chapters, and teaching methods according to the authors ' ten-year teaching practices and experiences.solid bodies can have a certain value for teaching physics*.

Keywords: *solid state physics, class hour, textbook, teaching methodology*

INTRODUCTION

"Solid-state physics" is an important basic professional course for related specialties such as physics, materials, and electronics in colleges and Universities [1] [2].Solid state physics mainly studies the crystal structure of solid materials and the physical properties of the interaction between a large number of structural particles (atoms, ions, electrons, etc.) it has.It is used in metal physics, semiconductor physics, crystal physics, magnetic physics, Covers a wide range of effects including conductive physics and solid state electronics.Many topics such as solid luminescence, surface physics, mesoscopic and nano physics mavjud.Va compared to other courses in" quantum mechanics","thermodynamics and Statistical Physics"," solid-state physics " is a course that combines theory and experiment very closely, helping students to understand some practical problems in greater depth.Feel the nature of the phenomenon.Therefore, although it is very theoretical, after graduation, it plays a very important role in the work of students.Author he teaches "solid state physics" for undergraduate and graduate students for over a decade and has gained considerable teaching experience.The following is the practice of teaching "solid state physics" in materials science and engineering combined with materials from Anhui University of technology, let's talk about the author's experience teaching "solid state physics".

PRACTICE AND EXPERIENCE OF TEACHING"SOLID STATE PHYSICS"

The first thing we want to say is the distribution of class hours and the choice of teaching content.The" physics of solid bodies " course covers a wide range of contents, in addition to crystals.In addition to the main composition, such as the structure of the body, Crystal bonding, lattice vibration and thermal properties of the crystal, crystal defects, theory of metal-free electrons, theory of energy bands and the movement of electrons in the electric field, it is also known as magnetism, superconductivity, semiconductor, it also

includes themes such as optics and nano.Today, all schools credit and hours of professional courses when drawing up a new study and study plan will mainly be for different schools and different specialties, if the class hours in"Physics of solids" are limited, it is necessary to choose the appropriate educational content according to your professional characteristics. After the revision of the 2019 edition of the curriculum, the "physics of solids" course of this specialty is taught in a limited hour, due to the limitations of General credits and class hours..Considering that in Professional observation there will be magnetic materials and devices, Electronic Materials, Energy Materials, piezoelectric and ferroelectric materials materials and optoelectronics materials and other related courses, therefore, it is not necessary to train the thematic content mainly in the course "physics of solid objects", you just need to choose the base. The training of this content is sufficient to meet the needs of the profession.In addition, in the course "fundamentals of Materials Science" due to crystal defects and other content, I explained a lot, so I can ignore it [3].Taking into account the above factors, we separated the hours of" solid-state physics " in this way : Introduction 1 hour, crystal structure 8 hours, Crystal compound 2 hours, lattice vibration and thermal properties 7 hours, metal-free electron theory 4 hours of Study, 6 hours Solid Energy Band Theory, 7 hours of electronic movement in the field, 4 hours exercise and debate classes and 1 hour reading Review class.The distribution of class hours in this way can meet the needs of the specialties of materials science and engineering, which are mainly partial. In addition, when teaching, you should not only pay attention to the basic content of the teaching textbook, but also pay attention to the inclusion of appropriate materials and the latest developments in science and technology so that the educational content is not the same. It is not in touch with contemporary and economic development and can avoid boredom and arouse more students ' interest in learning.For example, an interesting content related to quasicrystals, fractals, etc.when explaining the crystal structure during the author's lecture. specially included; interesting content related to quasicrystals, fractals, etc.in explaining the measurement of the phonon spectrum. introduced. The second is the selection of course materials for"physics of solid objects"."Solid - state physics" is the main professional course that many majors must take.For this reason, many local authors have written textbooks on "physics of solid bodies", which give people an eye-catching feeling.But Sirozhiddin Zaynabiddinov academician's " physics of solid bodies "is the first classical textbook recognized in Uzbekistan [4], while most other textbooks have more or less Zaynabiddinov's version of" solid matter".

Shadow of the mind.The author conducted a survey several years ago on the use of the textbook "physics of solid bodies" in a popular local academic forum., The result is shown in Figure 1.Taking into account the real state of slow updating of the content of local educational materials, the survey so far has a good reference value.visible, this

edition of the textbook occupies almost half of the country, which shows its great influence.Therefore, as the author knows, most graduate students of local universities

This version of the textbook is listed as a reference in the entrance exam.Given the real situation, the author also uses Zainabiddinov's publication "physics of solid bodies" as a textbook.However, based on the author's many years of teaching experience, some of the content of this textbook is relatively difficult for undergraduate students.therefore, when the author is teaching, in addition to referring to this version of the textbook, he also refers to a number of other textbooks [5] [6] a comprehensive selection of understandable teaching methods.

Style and content are taught to undergraduate students.For example, in explaining the inverse lattice vector, the author directly gives the definition and physical meaning of the inverse lattice vector, and then gradually explain its physical meaning, which in some textbooks is much simpler and more intuitive than the inverse lattice vector derived from the theory.For example, the reference for crystals explains by drawing macro symmetry [5], which is simpler, more convenient, and easier to understand.

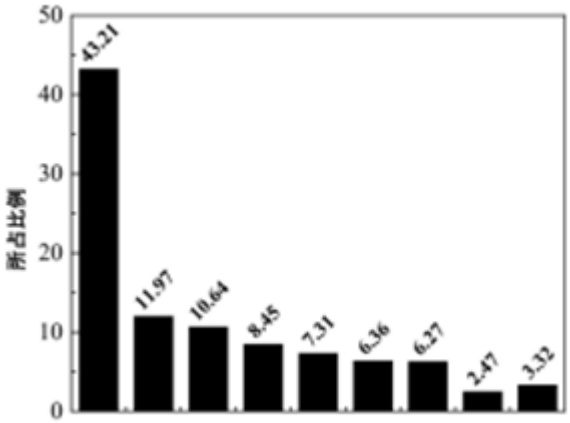

Figure 1. Main textbooks of" hard physics " used in Uzbekistan

Figure 1. The use of basic teaching materials of "physics of solids" in Uzbekistan

This version of the textbook is listed as a reference in the entrance exam.Taking into account the real situation, the author also uses the publication "physics of solid objects" as a textbook.However, based on the author's many years of teaching experience, some of the content of this textbook is relatively difficult for undergraduate students.therefore, when the author is teaching, in addition to referring to this version of the textbook, he also refers to a number of other textbooks [5] [6] a comprehensive selection of understandable teaching methods.

Style and content are taught to undergraduate students.For example, in explaining the inverse lattice vector, the author directly gives the definition and physical meaning of the inverse lattice vector, and then gradually explain its physical meaning, which in some textbooks is much simpler and more intuitive than the inverse lattice vector derived from the theory.For example, the reference for crystals explains by drawing macro symmetry [5], which is simpler, more convenient, and easier to understand. Thirdly, the procedure

for teaching each chapter of" physics of solids". Currently, Uzbekistan has many textbooks on" physics of solid objects", and various authors are interested in different opinions on the regulation of sections, so the order of regulation is not the same. In general, the first few chapters of the" physics of solids "course are" crystal structure"," Crystal compound", and"Lattice". Vibrational and thermal properties of crystals", etc.The problems solved in these three chapters are what particles the crystal is made of and how the crystal is structured. What forces (bonds) are made up of a large number of particles, and how small fluctuations of a large number of atoms in the lattice affect their thermal properties.Starting with these chapters at the level of the atom, the next three chapters are" Theory of electrons without metals"," theory of the energy band", and" movement of electrons in the outer field " one step further.

When it comes to electrons, the three chapters teach that electrons are not subject to force (i.e. free electrons), one force (i.e. lattice force), and two forces.(I.e., lattice strength and applied field strength) is the state of motion in these three states.Obviously, the content of these three chapters is gradually deep, from easy to difficult， the author believes that this arrangement is useful for the content of the course of physiological understanding of this topic hisoblaydi.To ' fourth, about the teaching method.The author is always for different specialties, even if the same course is taught, he believed that teaching methods may not be the same.therefore， some teaching practices and experiences of the author can only be used as a reference for relevant specialties in colleges and universities of the same level.First of all, the author considers "physics of solid objects".

For such a course, it is necessary to organize post-class homework."Solid-state physics" is highly theoretical and it is difficult for students to understand physical models at the same time in class. During the course of the lesson, it takes a long time to show and explain singonies to students.But in the qualitative Organization of the course process, there is no way to hurry.

Teaching methods [7].Of course, we cannot carry out individual training for each student, but we can remind students with different levels of needs.The depth of mastering the course.For example, the author often reminds students who are studying in graduate school and who are not in graduate school separately, what content and skill they should acquire.

To what extent, what information you need to refer to, it is possible to reduce and to some extent alleviate the burden of students who are not in graduate school.

Understand the boredom of these students with more theoretical courses.

CONCLUSION

In short, "solid - state physics" is a course inherited from top to bottom.The teaching of this course is considered very important in order to give students modern knowledge in our institute and to be able to show themselves in various fields. Currently, one of the directions that can recognize a person in the world is precisely the field of Science and

education. For the areas of physics and astronomy, different areas of physics are taught. The qualitative Organization of lesson processes and the cultivation of qualified personnel is an urgent issue of the present day.

LIST OF LITERATURE USED:

1. V. I. Fistul," physics I khimiya tverdogo Tela "(two volumes), Moscow " Metallurgy* 1995 g.

2. DJ. Zaimam. Principle teorii tverdogo Tela. Moscow, "Mir", 1974 G.

3. Ch. Kipel. Vvedenie V fiziku tverdogo Tela. Moscow, Fizmatgiz, 1993 G.

4. B. N. Bushmanov, Yu. A. Khromov "Physics tverdogo Tela", Moscow,"Visshaya Shkola". 1971 G.

5. N. Aiicroft. N. Mermin," Physics tverdogo Tela", (two-jilled) Moscow. "Mir". 1979 G.

6 . G. S. Zhdanov. A. G. Khundjua. Lektsii po fizike tverdogo Tela. Moscow, MGU. 1988 G.

7 s Chaynabiddinov, X. S. Daliev. De (/>ektoobrozovanie V kremnii. Tashkent, " University* 1993.

8 . S. 3. Zainobiddinov, A. Teshaboev. Physics of semiconductors. Tashkent. "The reader", 1999.

9. DJ. Blakemore. Physics tverdogo Tela. Moscow," Mir", 1988

10. Zada president of the physics tverdogo telni po (G. DJ. Goldsmid Ta\under RiRi). Moscow, "Nauka",.1976 G