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Guidance Course Design of Physics Major

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Abstract: Many misunderstandings about physics major will seriously mislead freshmen. Therefore, it is necessary to set up physics major guidance course in the first semester of freshman year to eliminate misunderstandings and guide the direction. Lectures are mainly arranged in four aspects: learning methods and university planning, the development and employment of physics, the structure and training plan of physics, and a brief history of physics.

Keywords: Physics; Training Program; Curriculum Design

1. Current situation of physics

Physics is a subject that studies the most general law of motion and the basic structure of matter. It is the basis of natural science. Physical thoughts and methods have important contributions to the development of the whole natural science and even social science. The Five-hundred-meter Aperture Spherical radio Telescope (FAST), the "Jiuzhang" quantum computing prototype, and the "tianwen-1" Mars probe, all of China's major scientific and technological achievements embody the contributions of physicists and inspire physics students.

Physics majors cultivate the all-round development of morality, intelligence, physique and beauty. Physics graduates have a solid physical foundation and physical thought, master the basic knowledge, basic theories and research methods in some important modern technology fields (such as materials, electronic technology, optics, etc.), have a good mathematical foundation and experimental skills, and can engage in scientific research, teaching and high quality applied talents in technology application.

However, the enrollment situation of physics is grim. The implementation of the new college entrance examination policy has led to a reduction in the number of physics candidates by half. As a difficult basic subject, physics is not a popular specialty in the country and even the world. When changing majors, physicsis also in a disadvantageous position. The information of changing majors shows that most of the transferred students have turned to popular majors such as computer and automation. In addition, physics, as a basic discipline, belongs to the "long-distance running" major. For most physics majors, the best way is to enter a higher school and go abroad. Therefore, a few graduates choose to fight again because of their failure in the postgraduate entrance examination, and a very few are waiting for offers to go abroad. These have reduced the employment rate. Many colleges and universities adjust their enrollment plans based on the employment rate. This is extremely unfavorable for physics majors. Most of the students admitted to physics major are transfer students, and they go through a round of selection and elimination when changing their majors, which objectively leads to the relatively low quality of students majoring in physics and will have an adverse impact on the employment rate at graduation.

Physics is a basic discipline, which cannot be lacked. Physics is also very important to social development. College physics, the basic course of science and engineering, is a compulsory course, and the construction of physics specialty is conducive to the reserve of well-trained physics teachers with deep foundation, which is very important for the good teaching of college physics. The enrollment rate and overseas rate of physics graduates are still good, and the employment situation is only lower than that of popular

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majors. According to the statistics on the Internet, in fact, the physics major ranks fourth among the 36 science majors.

2. Curriculum objectives

Because many misunderstandings about physics will seriously mislead freshmen, it is necessary to set up physics guidance course in the first semester of freshman year to eliminate misunderstandings and guide the direction. This course introduces the development status and prospects of physics, the professional directions and corresponding contents of physics, the employment situation of physics, the training scheme of physics and the learning methods of physics. The purpose is to make students really understand physics and physics majors, and stimulate their interest and confidence in physics.

Through the study of this course, students can correctly view their major and make a practical choice on whether to change their major. Students can scientifically plan their college life and set small goals in line with their actual situation. Students can find the right learning methods and can study fully and efficiently. The most important thing is to make them full of confidence in the future and work hard with practical actions.

Not only that, but also through this class to tell them some basic requirements that should be met during college. They should have a sense of reform and innovation, international competition, dedication and team spirit. They should also have correct outlook on life and values, develop good moral sentiment and personal code of conduct, and have the awareness of honesty, law-abiding and fair competition. They should master rich scientific and cultural knowledge, solid basic knowledge of physics, systematically master the necessary basic theories of their major, and preliminarily master the ideas and methods of educational innovation and scientific and technological innovation. They also need to understand the development trend, application prospect and industry demand of this discipline. They should have strong computer application ability and master the basic methods of literature retrieval, data query and using modern technology to obtain relevant information. They should have certain preliminary abilities in designing, creating experimental conditions, summarizing, sorting and analyzing experimental results, writing papers and participating in academic exchanges. They should have the ability to analyze and solve problems by using professional knowledge and theory.

3. Main contents of the course

3.1 Learning methods and university planning

We'll introduce the development status of physics, the development prospect of physics and the learning methods of various courses of physics. We'll introduce how to make community selection, how to arrange time and how to set small goals. In particular, the examples of outstanding physics graduates are cited to set an example, hoping that freshmen can get inspiration and plan their college life. Examples include competition talents, postgraduate entrance examination talents, entrepreneurship talents, and loser counter attack.

3.2 The development and employment of physics

We'll introduce the teaching staff, teaching achievements, scientific research achievements and laboratory conditions of physics specialty. We'll introduce the physics association and competition, and introduce the employment and development of physics graduates. We want to let freshmen have a comprehensive understanding of their major. Almost all teachers in physics have doctoral degrees from key universities, and many teachers have overseas visiting experience. They have rich teaching and scientific research experience. There are all kinds of laboratories, including general physics laboratories, modern physics laboratories, professional laboratories for scientific research purposes, and even demonstration experiments and college students' practice bases. Graduates majoring in physics have a high enrollment rate. Many have gone to famous domestic universities to study for postgraduates, and even go abroad for further study. Most students are employed in high-tech companies and educational institutions.

3.3 The structure and training scheme of physics specialty

We'll introduce the structure of physics specialty and the training program of physics specialty. Explain the original intention of the training program and the curriculum. We'll introduce the credit setting and course selection, and give guidance to freshmen. The cultural quality education courses in the elective courses of general education are divided into human civilization and cultural inheritance, economic, political and social development, literature, art and aesthetic appreciation, healthy life and life care, scientific thinking and scientific and technological progress, practical innovation and entrepreneurship education. Students are required to take the required credits from six types of courses. Among them, practical innovation and entrepreneurship education also has the minimum credit requirements. Tell them that practical courses are very important.

Let them know what core courses are available and how to learn them. It is suggested that their elective courses should be selected according to modules as much as possible. This major has two course modules. One direction is the optoelectronic direction, focusing on optoelectronic technology and applications, optoelectronic materials and devices. The other direction is functional

materials and devices, mainly material physics, semiconductor materials and devices.

3.4 A brief history of the development of physics

We'll introduce the development history of physics, the main theories and classical experiments of physics, and the stories of famous physicists, so that freshmen can have a comprehensive understanding of physics and stimulate their interest in physics. Experts can be invited to make special reports, such as "Ten classical physics experiments", "Introduction to the Nobel Prize in physics in recent years", "Ancient physics" and "Stories of famous physicists".

4. Course arrangement

There are 16 class hours in this course, and 4 class hours are arranged for each part. According to the course content, appropriate teachers are arranged to complete it in the form of lectures. The specific arrangement will be written into the teaching schedule at the beginning of the semester. Learning methods, university planning and the development and employment of physics major are arranged in the front because freshmen urgently need to know this information, which can make them feel at ease and build confidence as soon as possible, and prevent blindly changing majors. For learning methods and university planning, teachers with affinity and appeal can be arranged to give lectures, while teachers with a good understanding of professional development data can be arranged for physics professional development and employment, and students can be arranged to visit the laboratory. For the structure and training plan of physics specialty, the personnel training plan makers are arranged to give lectures. A brief history of the development of physics, this part can be divided into two or three special lectures. Professors in relevant fields are invited to give lectures respectively.

In addition, students are encouraged to actively participate in various lectures arranged by the school, especially expert reports related to physics.

5. Conclusion

The course of physics major guidance is offered to freshmen, which mainly introduces: learning methods and university planning, the development and employment of physics major, the structure and training scheme of physics major, and a brief history of physics. This course has achieved good results, greatly enhanced students' confidence and interest, and made students' goals more clear.

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