

Analysis on the optimization and reform path of the basic course of material engineering in Colleges and Universities

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Abstract: colleges and universities are the cradle of cultivating high-quality talents in China. With the reform process of higher education in the new era, professional teaching in Colleges and universities also needs to constantly optimize the teaching methods and talent training mode, meet the current economic development trend and talent demand, cultivate high-quality innovative talents, and then implement the strategy of strengthening the country with talents, and help realize the Chinese dream. As a basic professional course of materials science and engineering, the course of “Fundamentals of Materials Engineering” is a course that lays the foundation for students’ professional knowledge and skills learning, and has important significance in students’ professional learning and ability development. However, at present, there are still many problems in the teaching of “Fundamentals of material engineering” in Colleges and universities, such as disordered knowledge points, lack of professional teacher team, single teaching methods, lack of practical teaching, which lead to poor teaching efficiency and seriously affect the quality of students’ professional learning. In this regard, based on the current teaching situation of the course “Fundamentals of material engineering” in Colleges and universities, this paper deeply analyzes the characteristics of the course and the problems existing in the teaching, and further puts forward the path of Curriculum Optimization and reform, hoping to be an effective reference.

Key words: colleges and universities; Material engineering foundation; Course teaching; reform

1. Optimize the teaching content and clarify the teaching focus

The rational design of teaching content is the basis for ensuring the effectiveness of teaching. For the course of fundamentals of material engineering, as a transitional course in the process of students’ basic courses changing to professional courses, its teaching content is mostly some professional basic theoretical knowledge. This requires schools and teachers to select appropriate teaching materials according to the talent training programs and objectives of students’ majors, and to reasonably plan teaching contents and clarify teaching priorities in order to achieve talent training objectives. First of all, there are many versions of relevant textbooks for the course of fundamentals of materials engineering, and the contents of textbooks compiled by different editors are quite different. In this regard, schools and professional teachers should fully grasp the teaching materials of fundamentals of material engineering on the market, and select appropriate and high-quality teaching materials according to the actual professional talent training needs and students’ learning needs. On this basis, schools and teachers can further expand the relevant teaching materials as auxiliary materials for teaching, And integrate and plan the contents of the main teaching materials and counseling materials, create school-based teaching materials, clarify the teaching focus, and ensure the richness of teaching content and the perfection of knowledge system. Secondly, the knowledge content of the course “Fundamentals of material engineering” can be divided into two parts, namely, the principle of material preparation and the principle of transmission. In actual teaching, teachers should make scientific class planning for the teaching content according to the class hours of a semester, and reasonably allocate the teaching content of each lesson, Avoid excessive waste of pre class hours, resulting in tight follow-up class hours or inability to complete teaching tasks, and ensure the overall teaching effectiveness.

2. Constructing teaching team and improving teaching effectiveness

The course of fundamentals of materials engineering is mainly about the processing and preparation of different engineering materials. Although there are some similarities between the knowledge points of each part, there are also great differences between the knowledge points due to the large span between the materials. In the actual course teaching, due to the different knowledge reserve and research focus of teachers, it is difficult to explain each part of the course in depth and vividly by relying on only one teacher. Based on this, in order to ensure the overall teaching quality of the course, schools and professional colleges need to change their teaching philosophy and let the most appropriate teachers teach the most appropriate course to achieve the optimization of teaching effect. Specifically, it is necessary to set up special teachers for each part of the course of fundamentals of materials engineering. Teachers with professional knowledge structure and scientific research background can teach the course content separately, which can not only make full use of and allocate teaching resources, but also realize the overall high-quality teaching of the course and promote teaching reform. For example, for the course content related to metal materials, teachers with metal materials research background and in-depth knowledge structure can teach according to the requirements of the actual class hour setting and syllabus, closely link the course teaching work with the teacher’s scientific research direction, and provide students with high-quality Professional teaching and guidance to improve the overall teaching quality and effect of the course. In the course teaching, in addition to teaching students the knowledge content covered in the teaching materials, teachers can also integrate their own scientific research experience and extracurricular related knowledge, show students the new technologies, new discoveries and other scientific research trends in the field of metal materials, strengthen students’ understanding of knowledge, and further expand students’ learning horizons, Improving the cultivation of students’ scientific thinking and innovation consciousness is conducive to

the comprehensive improvement of students' comprehensive quality, scientific research consciousness and self-study ability.

3. Enrich teaching methods and activate classroom atmosphere

In the process of higher education reform, optimizing teaching methods and means has always been a key step in curriculum teaching. In this regard, in the teaching of materials engineering foundation, teachers should actively introduce advanced teaching concepts and diversified teaching methods, constantly stimulate students' learning enthusiasm and classroom participation, create a harmonious and efficient classroom atmosphere, and promote the comprehensive development of students' knowledge and ability. In recent years, information technology, Internet technology and other advanced technologies have shown great advantages in education and teaching, and effectively promoted the process of education reform. Based on this, first of all, teachers of the basic course of materials engineering can further enrich classroom teaching by relying on information technology and Internet technology. By introducing vivid pictures, animations, audio and video resources, they can create a dynamic classroom, better attract students' attention, activate their interest in learning, and help students understand abstract theoretical knowledge with vivid resource content, Achieve in-depth teaching. Secondly, teachers adopt the life teaching method, introduce life examples in the course teaching, and use actual cases to help explain the nature and form of relevant engineering materials, so as to further help students understand abstract problems and solve key and difficult problems. At the same time, teachers can combine interactive teaching method, cooperative teaching method, task driven teaching method and other teaching methods in teaching, strengthen teacher-student interaction and student-student interaction in the classroom, fully highlight the main role of students, guide students to explore independently according to the task issues issued by teachers in the form of cooperation, and further stimulate students' subjective initiative, It can expand the thinking horizon in the process of independent exploration, communication and cooperation, which not only promotes students' mastery of knowledge, but also helps to cultivate students' self-study ability, cooperation ability, thinking ability and problem-solving ability, which can achieve twice the result with half the effort.

4. Promote the combination of theory and practice and deepen knowledge understanding

The course of fundamentals of materials engineering has certain practical characteristics. Therefore, in the process of teaching its theoretical knowledge, it should also integrate practical teaching and promote the combination of theory and practice. By guiding students to carry out experiments related to engineering materials or participate in relevant scientific research projects, students' theoretical foundation can be further consolidated and their practical ability can be improved, Promote the comprehensive development of students. For the implementation of the teaching mode of combining theory with practice, teachers need to prepare experimental guidance according to the course content of fundamentals of material engineering, and arrange experimental teaching contents such as plastic standard sample preparation experiment, metal heat treatment, alloy melting, powder particle size determination, ceramic powder preparation, vacuum hot pressing sintering of powder according to different theoretical knowledge content, The deep integration of theoretical teaching and experimental teaching enables students to carry out experiments and practical activities in time after completing theoretical knowledge learning, further consolidate theoretical knowledge, and improve students' scientific research literacy and practical problem-solving ability.

5. Concluding remarks

To sum up, as a basic professional course for materials science and engineering related majors, the course of "Fundamentals of Materials Engineering" has certain characteristics of comprehensiveness, professionalism, practicality and abstraction. It has high requirements for students' thinking ability, logical ability and learning ability, and its theoretical knowledge is difficult for students who have just started to contact professional knowledge. Based on this, universities and professional teachers should deeply grasp the characteristics of the course, combine the learning characteristics and learning needs of students, and carry out all-round optimization and Reform on the teaching of materials engineering foundation from the perspectives of teaching content, teaching methods, teaching team, class hour setting and course evaluation, so as to continuously improve the teaching quality and efficiency of the course, While ensuring students' in-depth understanding and mastery of the course knowledge, we should strengthen the comprehensive cultivation of students' innovative consciousness, thinking ability and application ability, and further promote the cultivation of high-quality innovative talents.

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