

Curriculum Reform of Materials Science from the Perspective of "International Mutual Recognition Agreement of Higher Engineering Education"

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Abstract: *Based on the characteristics of the college and taking the material science specialty as the research object, this paper analyzes the work done by this specialty in the certification of engineering education specialty, and focuses on the related issues of continuous improvement in the training process of undergraduate talents in materials science. The professional certification of engineering education refers to the specialized certification carried out by the professional certification institution for the engineering professional education offered by higher education institutions. It is carried out by professional professional or industrial associations (federations), professional associations, together with education experts in this field and enterprise experts in related industries, and aims to provide quality assurance of preparatory education for relevant engineering and technical talents to enter the industry. The professional certification of engineering education is simply to say whether the quality of engineering education in China can be recognized by the international community. Its certification basis is the Washington Agreement.*

Keywords: Engineering education; Materials science; Research.

1. INTRODUCTION

In the face of engineering education certification, this major has made innovations and explorations in the following aspects when applying for engineering education certification.

1.1 Revision of training objectives

According to the level and orientation of the school, the specialty has put forward the professional training objectives and tasks of the Training Program for Machine-free Non-metallic Materials Engineering Professionals through the full demonstration of the professional work committee. Clarify the orientation of the school and its talent training objectives, the orientation of the school type and the orientation of the school level: the school focuses on full-time general undergraduate education, vigorously develops postgraduate education, and strives to reach the level of project establishment and construction of doctoral degree authorized units. The relationship between the orientation of this major and the orientation of the school, and the current demand for inorganic non-metallic materials and engineering talents from economic and social development. In view of the requirements of the college's brand construction and engineering education certification, the revision of the training objectives is discussed in combination with the current situation and professional certification of domestic inorganic non-metallic materials related universities.

1.2 Full coverage of graduation requirements

The 2016 training program of inorganic nonmetallic materials engineering specialty has defined the graduation requirements from 12 aspects, and the 12 graduation requirements fully cover the 12 basic requirements listed in the general standards for engineering education certification. According to the urgent needs of application-oriented talent training and the sorting out of the feedback information from employers, the specialty adheres to the "three practical" talent training characteristics with the background of civil engineering in the school, and in accordance with the training objectives of the specialty and the requirements of engineering education certification standards, and in combination with the results of engineering education certification exchange and learning, finally combs and determines 12 graduation requirements, and decomposes them into 2-5 index points one by one, forming 35 graduation requirements index points.

2. CONTINUOUS IMPROVEMENT

2.1 Teaching process quality monitoring mechanism

The teaching process quality monitoring mechanism includes the main teaching links. Curriculum, curriculum system setting and monitoring and evaluation of graduates' requirements. Establish a clear teaching management structure and form an effective quality monitoring system; Formulate and strictly implement the teaching quality monitoring system; Each teaching link has scientific quality requirements. The assessment indicators are clear, the assessment cycle is reasonable, the records are formed, and the responsibility is assigned to each person. A well-functioning closed-loop control system of "assessment → feedback → rectification → assessment" is formed.

2.2 Teaching process quality monitoring mechanism and operation mode

(1) Teaching management mechanism

Teaching quality monitoring is an important measure for talent training quality monitoring and teaching quality evaluation. The teaching link management mainly manages the main teaching links according to the teaching quality standards, including the quality control of teaching links such as the development of training programs, teacher qualification review, curriculum outline preparation, curriculum teaching progress, teaching effect, experimental teaching, practice teaching, graduation design (thesis), etc.

The teaching management of inorganic nonmetallic material engineering is composed of three levels of management organizations, namely, schools, colleges and departments. The main functional departments of the school's teaching management are the Academic Affairs Office (the school's experimental teaching center), the evaluation center of the department (the quality office, the teacher development center); The college's teaching management is under the collective responsibility of the college's leading group under the leadership of the president, and is organized and led by the vice president in charge of teaching. The college's teaching work committee, which is composed of industry and enterprise experts and college experts, is a professional construction and teaching management decision-making advisory body, the college's teaching supervision group is a teaching quality evaluation and monitoring advisory body, and the teaching secretary assists the vice president in daily teaching management affairs; The person in charge of the specialty and the director of the experimental center are responsible for the teaching management and construction of the specialty, laboratory and curriculum. The three-level teaching management mechanism focuses on the students, ensures the macro guidance and control of the school's teaching management, strengthens the college's teaching organization and management functions, implements the main functions of the department in the specific teaching management and implementation, and reflects the auxiliary and guarantee role of the student work and the experimental center, so as to ensure the scientific formulation and efficient implementation of various professional teaching management rules and regulations.

(2) Operation mode of teaching management mechanism

All departments and personnel of teaching management carry out relevant work in strict accordance with the rules and regulations around the teaching reform, teaching organization, specialty and curriculum construction, talent training and other links of undergraduate majors. Specific responsibilities are as follows: The teaching committee of the university is responsible for guiding, researching, consulting and decision-making the undergraduate teaching work of the university. The vice president in charge of teaching is responsible for the teaching management of the whole school. Under the leadership of the school's Party Committee, Organize the preparation of school-level relevant teaching management documents, and take full charge of undergraduate talent training and teaching management.

The evaluation center of the college (quality office, teacher development center) is responsible for the undergraduate teaching and professional evaluation of the teaching units of the university; Evaluate the quality of teaching units and teaching auxiliary departments in serving undergraduate teaching; Carry out teacher development work and undertake the inspection and evaluation of undergraduate teaching in the whole school.

Under the direct leadership of the principal and the vice principal in charge of teaching, the Academic Affairs Office (Teaching Experiment Center) exercises the functions of school teaching administration, operation management, teaching quality management, teaching reform and research management; Be responsible for formulating the school's teaching management documents and teaching management system, and regularly organize, guide and supervise the work of professional teaching; Ensure the normal operation of various teaching activities.

2.3 Curriculum system setting and curriculum quality evaluation and revision mechanism

The curriculum system setting is an important part of the professional talent training program and an important support for the professional talent training objectives and graduation requirements. According to the relevant system of the university, the college regularly evaluates the curriculum system in the training program of inorganic nonmetallic materials engineering specialty, and puts forward continuous improvement measures based on the evaluation results.

The teaching work committee of the college is responsible for the regular evaluation of the curriculum system of each specialty of the college, and the evaluation cycle is once every two years. The evaluation of the setting of the professional curriculum system shall be based on the implementation and adjustment of the talent training plan in each academic year, the degree of achievement of the training objectives and graduation requirements, the support of the curriculum teaching objectives to the graduation requirements, the teaching implementation, quality monitoring, etc. to form self-assessment materials; The person in charge of the discipline reports to the teaching committee of the college; The teaching work committee of the college conducts a comprehensive evaluation through on-site inspection of supporting materials, holding a teacher's symposium and other forms, gives conclusions and puts forward suggestions for improvement; The person in charge of the discipline and the teaching team will formulate improvement measures according to the evaluation opinions and implement them in the curriculum of the future

talent training program.

The self-evaluation report, meeting minutes, evaluation conclusions and improvement measures, implementation summary and other documents formed by the regular evaluation of the curriculum system should be kept as teaching files for a long time to ensure the continuity and effectiveness of the continuous improvement of the curriculum system.

2.4 The school carries out the quality supervision of the normalized teaching process every semester.

The methods of supervision include: inspection through teaching supervision, tracking of the classroom quality by the heads of departments, counselors, irregular in-depth lectures, evaluation of the style of teaching and learning, and evaluation of the teaching progress and the implementation of the syllabus through listening and watching classes; Class preparation, lesson plan preparation and teaching; Homework correction and tutoring; Teaching method and teaching effect; Class discipline and attendance of students.

Through the supervision of teachers' evaluation of teaching and teachers' evaluation of learning, the college requires teachers to listen to other teachers' classroom teaching for more than 3 class hours each semester, on the one hand to achieve the role of mutual learning and promoting teaching, on the other hand to make an objective evaluation of the professional and professional level, teaching methods, teaching means, as well as students' learning situation, learning status, classroom teaching effect, etc. Supervise through examination and assessment. Inspect whether the test paper proposition conforms to the curriculum teaching The syllabus requirements, whether the knowledge points are comprehensive, whether the degree of difficulty is moderate, and whether the supported graduation requirements are reflected. At the same time, the students' learning attitude, learning process and learning effect are comprehensively evaluated through the data such as the score distribution of the course assessment and the analysis of the test paper. Supervise through special teaching inspection. Including mid-term teaching inspection, special teaching inspection for graduation design (thesis), special inspection for laboratory and practical training, and professional construction inspection. These inspections are carried out once every semester or academic year. The inspection and evaluation conclusion is not only a work of teaching quality evaluation, but also an important basis for the evaluation of teaching quality of colleges (departments).

3. CONCLUSION

The supervision team of the college integrates the above quality evaluation data and information to form the overall evaluation conclusion and continuous improvement opinions of the professional teaching quality. The professional leader, the director of the experimental center, the head of the teaching team, etc. will formulate specific improvement measures according to the evaluation conclusion and the rectification opinions, and implement them within the specified time.

According to the training practice of inorganic nonmetallic materials engineering professionals, guided by the engineering education certification standards, a relatively complete curriculum quality evaluation and revision mechanism has been formed by using three evaluation methods. According to the evaluation results, continuous improvement has been made to improve the quality of talent training. The professional certification of Cheng Education follows three basic concepts: results-oriented, student-centered, and continuous improvement. In this context, this major actively carries out certification work, following the concept of Professor Li Zhiyi of Dalian University of Technology, "The key is to deepen the reform of classroom teaching and improve the quality of classroom teaching, which is an important basis for achieving the training objectives. This needs to achieve four changes, namely, from indoctrination classroom to dialogue classroom, from closed classroom to development classroom, from knowledge classroom to ability classroom, and from full stop classroom to question mark classroom. In addition, there should be a complete knowledge improvement system that can implement the training objectives, graduation requirements and teaching activities The continuous and effective improvement should include the three cycles of in-school, out-of-school and in-class, and establish a clear interaction relationship between these three improvements and the elements of the three cycles. "

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