

Exploration of Training Mode of Applied Talents in Environmental Engineering Specialty

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Abstract

According to the characteristics of environmental engineering in universities, combined with the characteristics of social requirements, a new type of environmental engineering specialty curriculum system is constructed. The curriculum system agrees with the position of running a school and aims of personnel training in the application-oriented universities, providing practical and suitable way to cultivate high-level application-oriented talents for the market and production.

Keywords: Application teaching, Environmental engineering specialty, curriculum system

1. Introduction

Environmental protection industry is the most potential industry in twenty-first Century [1-2]. At present, china's environmental protection industry personnel is seriously inadequate, especially the lack of high-quality environmental protection applied talents in the field of production to solve practical problems. Thus, it is more urgent to train application-oriented talents of environmental specialty [3-5]. Therefore, it is particularly important to design the practical teaching mode in environmental engineering specialty. In order to adapt to the application of environmental protection undergraduate training requirements, it is not only the requirement of the development of social economy and science and technology, but also the requirement of the development of higher education. It is also beneficial to adjust the structure of higher education more reasonably.

2. Construction and practice of training mode for talents of environmental engineering specialty

The talent training program of environmental engineering is based on general education and environmental engineering education based on "thick foundation, wide caliber, strong ability, high quality and innovation". According to the goal of cultivating innovative talents of environmental engineering specialty, the training program and training plan of environmental engineering specialty were worked out. The undergraduate system of environmental engineering is divided into six platforms, namely, general courses, professional basic courses, professional required courses, specialized elective courses, vocational education courses and extended courses. General education is a public basic course and a basic science course. Through the study of general courses, students can master the most basic theories and methods of humanities, social and natural science, and can learn the basic scientific knowledge necessary for professional in the future, and have the necessary moral quality. Through the study of professional basic courses, students can strengthen the understanding and solve the subject base of environmental problems, students can deeply understand the generation of environmental pollution, governance of chemical mechanism and biological function. Professional compulsory courses are introduction to environmental engineering specialty, air pollution control engineering, water pollution control engineering, physical pollution treatment, environmental chemistry, environmental monitoring, environmental impact assessment and solid waste treatment and disposal courses and so on. The specialized course modules include professional required courses, specialized elective courses, vocational education courses and extended courses. Professional courses are professional knowledge that environmental engineering specialty must have, and can be divided into two directions. Module one is to highlight the industrial "three wastes" governance technology; module two is to highlight the environmental impact assessment. Students can choose the learning module independently according to their personality development and social needs. The curriculum system of environmental engineering undergraduate is shown in Table 1.

Table 1 The curriculum system of environmental engineering undergraduate

Class	Course type environmental engineering specialty	
	Class hour	%
General lesson	640	30.9
Basic course	558	26.9
Professional required courses	316	15.2
Professional elective courses	194	9.4
Vocational education course	236	11.4
Development course	128	6.2
Total	2072	100

3. Construction and practice of practice teaching system for environmental engineering specialty

According to the talent training mode of "thick foundation, wide caliber, strong ability, high quality and innovation", the curriculum system of practical teaching of environmental engineering specialty is put forward. This system should follow the principles of science and engineering discipline platform, and penetration of science and liberal principles, curriculum system and teaching content of the overall optimization principle, innovative principle and practical principle, and so on. Thus, a set of practical teaching system of environmental engineering specialty based on "basic, prominent characteristics, close to reality, tracking forward" is constructed. This system focuses on the teaching content of the specialty basic courses in environmental engineering specialty and specialized courses; it pays attention to training students' practical ability, innovation consciousness and entrepreneurial spirit. The system continuously trains applied talents, and scientifically and reasonably establishes the practical teaching system in accordance with the training target of Environmental engineering specialty Specialty. In view of the nature and training target of environmental engineering specialty specialty, the five practical teaching links are reformed deeply and systematically, independently and independently, such as internship, environmental professional experimental courses, environmental professional curriculum design, production of professional practice and graduation thesis. This combination combines the experimental teaching with the first line of production. It focuses on cultivating students' ability to solve the actual production problems, and strive to achieve the goal of training the application talents of zero distance posts.

4 Optimize the experimental content of environmental core specialty

In the rapid development of science and technology on today, in the environmental engineering specialty core professional experimental teaching, we should capture the latest scientific and technological achievements and social needs, and enrich it into the teaching content. Only in this way, students can understand the trends and trends of discipline development, and master new techniques and methods. For example, the determination of sulfur dioxide content in air, determination of chemical oxygen demand, determination of volatile phenol in water, determination of total organic carbon in water, determination of biochemical oxygen demand, determination of ammonia nitrogen in water and monitoring of environmental noise in the course of environmental monitoring experiment course are carried out. Most of the current environmental engineering specialty experiments are confirmatory experiments, and the designed and comprehensive experimental content is less. It can not achieve the purpose of cultivating students' comprehensive application ability, innovative consciousness and innovative ability. Therefore, comprehensive and designing experiments can be combined with teachers' scientific research topics, such as the determination of organochlorine pesticides DDT and 666 in soil by gas chromatography, the treatment and recovery of wastewater from 2- amino pyridine production, study on adsorption behavior and mechanism of phenol on graphite, study on thermodynamics and kinetics of adsorption resins for chlorophenols, study on adsorption of chlorophenol wastewater by adsorption resin, and so on. In this way, students can grasp the frontier of the subject research, and try to use the new means and new methods to solve the experimental problems as much as possible, at the same time, it can save the experimental funds and make full use of the scientific research funds.

5. Improve the experimental teaching method of core specialty of environmental engineering specialty

The most important intuitive way for students to master theoretical knowledge is the experiment, and the laboratory is an important place for students to study as the main body. The traditional experimental teaching belongs to the nanny type teaching method. As a result, the students have high dependence on teachers, lack of independence, lack of independent practical ability training, and lack of certain perceptual knowledge of the first line of production. Therefore, we design the experiment teaching mode of environmental engineering, the experimental class moved to the production of the first line, it can let the students go out and design process in the sewage treatment plant into a series of experimental projects: Determination of mixed coagulation experiments, filtration experiments, the properties of the activated sludge aeration experiment, experiment, catalytic oxidation of Fe-C⁺ (continuous) and A²/O sewage treatment process. Through close practice with production, students can refine knowledge, broaden their horizons and exercise ability, and strengthen the cultivation of students' application ability, innovative consciousness and practical ability.

6. Strengthening the practice link of environmental engineering specialty specialty

Environmental engineering specialty has strong practice, so it is very important to train students' practical ability, so we cannot ignore the practical teaching link. The practical teaching link of environmental engineering specialty includes four links: cognition practice, course design of environmental specialty, production practice and graduation thesis. In the second semester, students through the practice in Yancheng City Chenjiagang Chemical Industrial Park, Jiangsu sword Pesticide Chemical Co. Ltd., sewage treatment plant and other enterprises. Through the production process line and equipment visit trainee, students can understand the

environmental industry production practice, enhance perceptual knowledge, strengthen the engineering consciousness, it is helpful to improve the students' professional practice ability. In the fourth semester and the fifth semester, students are arranged to carry out environmental engineering curriculum design and monitoring curriculum design, the purpose is to enable students to understand the general procedures and basic steps of wastewater treatment engineering design. It lays a good foundation for the future graduation link and the actual work of water pollution control engineering. The factory in the seventh and eighth semester internship for students, the main purpose is to let students understand the nature of the environmental protection work, understand the nature and task of China Environmental engineering specialty Research, environmental management organization and environmental industry development departments, so as to improve the learning initiative of professional knowledge and consciousness of learning. This lays a good foundation for the future participation in environmental protection work and the choice of employment direction. The graduation thesis is to train students to use the knowledge learned in four years, it is not also an important part of the training of scientific research, but also a comprehensive test of the degree of master of professional knowledge. its purpose is to improve the students' ability to analyze and solve problems, to master the methods of writing scientific research methods and scientific papers, to cultivate the students creativity and improve scientific research quality is vital for undergraduate students. The main purpose of environmental practice teaching is to improve students' ability to understand and solve problems, stimulate innovative thinking, explore and innovate knowledge, and train high-quality environmental protection talents for economic construction.

6. Focus on constructing professional practice base construction, to provide an internship platform for students

In order to improve the students' practical ability, creation ability, employability and entrepreneurship as the principle, the plant practice and professional practice are key processes of practical course, and relatively stable practice base is an important prerequisite for constructing the curriculum system. Therefore, we established long-term cooperation with Yancheng City Built Water Co., Ltd., Jianhu County East sewage treatment plant, Yancheng Municipal Food and Drug Administration, Dongtai City Environmental Monitoring station and Yancheng Municipal Environmental Monitoring Center station, set up the practice base for the environmental engineering specialty, and constructed curriculum structure system based on combination of working and learning. Such course system includes knowledge and a skill met by professional posts, and takes into account the mutual infiltration of culture, society and technology education. The establishment of these bases also creates a better environment for the practice of Environmental engineering specialty students.

7. Establish environmental teaching module, service area service enterprises

In order to ensure the coordination of regional environmental and economic development, our university run a school together with Nanjing University and Yancheng environmental technology and Engineering Research Institute, to train applied talents for environmental protection industry around Yancheng and Lianyungang, especially for Lianyungang Chemical Industrial Park and coastal environmental protection continue Education College. Four sections have been set up: a workshop for administrator in industrial park; treatment technology of industrial wastewater; skills of environmental monitoring and testing; a core team of waste gas treatment. The aim is to enhance the environmental awareness and the development level of park-in-charger; to improve the professional skills of the employees; to promote the healthy development of the park. In May, August and November 2015, students of class 2012 and 2013 from environmental engineering specialty participated in training skills of environmental monitoring, and benefited from increasing their visions and strengthening the ability of experimental practice.

In order to meet the requirements of higher education in the new era, and cultivate qualified innovative talents with innovative ability and deep scientific literacy, we must build innovative training mode for applied talents of Environmental engineering specialty Specialty. We should pay attention to the feedback of graduates and employers, actively revise the personnel training program, adjust the curriculum system, update the content of the teaching materials, explore and improve the teaching methods, and strengthen and improve the teaching practice. In this way, the training mode of innovative application-oriented talents should be reflected as much as possible in various teaching links, optimize the structure of teachers, improve training programs according to social needs, improve the quality control mechanism and other aspects.

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