

Teaching Reform and Practice of Automatic Control Principle Course under the Certification of Engineering Education

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Abstract: The course of automatic control principle is the core basic course of automation specialty. The current curriculum system and teaching mode cannot meet the requirements of engineering education professional certification. Therefore, based on the training objectives, this paper analyzes the curriculum teaching reform from four aspects: teaching content, teaching mode, experimental content and evaluation method, so that students can systematically grasp the basic concepts and principles of automatic control system and have a certain sense of engineering management, So that students have the practical ability to solve practical engineering problems in automation and related fields.

Key words: *Automatic control principle, Engineering education professional certification, Teaching content, Evaluation method*

1. PROJECT BACKGROUND AND SIGNIFICANCE

The professional certification of engineering education is an internationally recognized quality assurance system of engineering education, and also an important basis for achieving international mutual recognition of engineering education and engineer qualifications. The Washington Agreement advocates three major educational concepts of student-centered, output-oriented and continuous improvement, highlighting students' ability to solve complex projects. Engineering majors who have passed the certification of engineering education should not only deeply understand and grasp complex engineering problems, but also cultivate students' ability to solve complex engineering problems according to the international principle of substantial equivalence.

The course content of automatic control principle is abstract, theoretical and involves a wide range of knowledge. Students generally feel difficult, difficult to understand and difficult to learn in the learning process, and it is difficult to combine theoretical knowledge with engineering practice, which affects their learning effect. Especially with the advancement of the construction of engineering education specialty, the traditional talent training objectives cannot meet the needs of modern society and the requirements of engineering education specialty certification. If traditional teaching modes and methods are still used, it is difficult to cultivate students' innovative ability and engineering management awareness, and it is also difficult to improve students' ability to solve complex engineering problems. Therefore, it is necessary to reform and optimize the teaching mode of this course.

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2. CURRENT SITUATION ANALYSIS

There are the following problems in the current teaching mode research and methods: First, there is a deviation between the teaching content and the engineering education concept of "cultivating students' comprehensive engineering ability". The traditional teaching content is to train students to analyze and solve problems from a "systematic" perspective. However, with the rapid development of Internet plus and artificial intelligence technology, the control systems that intersect and integrate with each other are becoming more and more complex, which makes it difficult for students to combine the traditional system concept with the current large system concept, which reduces their enthusiasm for learning and ability to understand complex knowledge.

Secondly, there is a gap between the teaching model and the "student-centered" education concept. At present, this course is based on the traditional classroom teaching mode, supplemented by electronic resources. The content of network resources is relatively limited, and it is unable to provide students with rich, mobile, flexible and diverse flexible learning methods that are not limited by time and space. It cannot make students become the main body of learning, from passive learning to active learning.

Thirdly, the course experiment is not closely connected with the theoretical content, which is a little out of touch. The reason is that the experiment lacks practical engineering background, which makes it difficult to cultivate students' engineering management ability, and thus affects the ability and quality of students to solve practical complex engineering problems.

Finally, the curriculum evaluation method is single and outdated. At present, the total score of the course is composed of 20% of the usual results, 10% of the experimental results and 70% of the final exam results. This assessment method cannot reflect the dynamic learning ability of students, and teachers cannot dynamically grasp the problems existing in students' learning, adjust the teaching content and methods according to the teaching feedback in time, and effectively mobilize students' learning enthusiasm and improve the learning effect.

3. OBJECTIVES AND METHODS OF TEACHING REFORM

According to the requirements of engineering education certification, the teaching of "Automatic Control Principle" takes the engineering education professional certification as the goal, adheres to the concept of "student-oriented", bases on the training goal, comprehensively implements the curriculum teaching reform from four aspects of teaching design, teaching mode, curriculum comprehensive experimental project design and curriculum evaluation method, meets the requirements of engineering education certification, and comprehensively improves students' ability to solve complex engineering problems.

First, improve the teaching content. The automation textbook of our school is "Principles of Automatic Control" edited by Professor Hu Shousong. It is planned to add modern AI knowledge, expand students' knowledge, improve students' understanding and understanding of modern control systems, and stimulate students' interest in learning.

Secondly, improve the teaching mode. Under the background of professional certification of engineering education, the concept of student-centered and teacher-led was put forward, and the original teaching mode of "teacher lecturing and students listening" was changed, so as to promote students to change from passive learning to active learning, so as to achieve the expected teaching objectives.

Thirdly, reform the experimental content. It is planned to integrate the experimental content into the engineering background, so that students can better understand the experimental operation under the engineering background and improve their engineering ability.

Finally, improve the evaluation system. At present, the examination can only reflect students' mastery of basic theoretical knowledge, but not their engineering management and practical ability. Therefore, it is necessary to pay attention to the process management of evaluation, starting with the evaluation of students' preview, classroom questioning, and homework after class, and strengthen the whole process management of students, which is helpful to cultivate students' engineering practice ability.

4. CONCLUSION

According to the certification requirements of engineering education, the teaching reform of automatic control principle course is explored and thought. Based on the training objectives, the course teaching reform is analyzed from four aspects: teaching content, teaching mode, experimental content and assessment method, in order to mobilize students' learning enthusiasm and improve students' ability to analyze and solve complex engineering problems.

REFERENCES

- [1] Man Hong, Zhang Jianmin, he yuebang, teaching reform of "automatic control principle" under the concept of new engineering OBE, education and teaching forum, 2022,33:192-193
- [2] Zhang Wei, exploration of automatic control principle curriculum reform under the background of engineering education professional certification, China modern educational equipment 2021363:97-99
- [3] Zhou Lei, Wang Yuqi, Qiao Guifang, teaching reform and practice of automatic control principle under the background of engineering education professional certification China modern educational equipment 2020347:33-35
- [4] Chu Hongxia Wang Xifeng Xie Zhongyu Du Juan, teaching reform and practice of automatic control principle experiment under the background of engineering education professional certification China modern education equipment 2018, 285:35-36
- [5] Li Qinghua, Pan Feng, Feng Wei, discussion on the experimental teaching reform of "automatic control principle" under the certification of engineering education, education and Teaching Forum 2018, 38:276-278
- [6] Zhang Li, Jie Jing, Zhu Wen, exploration and practice of teaching reform of automatic control principle based on obe-cdio concept, Journal of higher education, 2021, 36:128-131
- [7] Cao kecai, Yang Min, Zhou Yingjiang, Zhao Bo, Wan Youhong, research on teaching reform of "automatic control principle" based on OBE, Journal of electrical and electronics teaching, 2019,41 (3): 17-21