

# Innovative Research of the Course “Curriculum Design of Building Fire Protection and Security”

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## Abstract

With the vigorous promotion of the concept of “Internet+”, “Curriculum Design of Building Fire Protection and Security”, as a professional core course of construction engineering, also need to make new definitions in teaching content and syllabus to meet the requirements of the new era. The article summarized the main teaching modes adopted in “Curriculum Design of Building Fire Protection and Security” in recent years. Based on the teaching objectives, teaching methods and teaching ideas, this paper put forward a innovative research for the course “Curriculum Design of Building Fire Protection and Security”.

## Keywords

Curriculum Design; Building Fire Protection and Security; Situation Analysis; Teaching Reform.

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## 1. Introduction

“Curriculum Design of Building Fire Protection and Security” is a professional practice course of building electricity and intelligence specialty [1]. Due to the frequent occurrence of fire, it is particularly important to study its causes, rules and control requirements. The course “Curriculum Design of Building Fire Protection and Security” required students to master the composition, application scope and related working principle of automatic fire alarm system and fire fighting linkage system. At the same time, students are required to master the design method of automatic fire alarm system and fire fighting linkage system. Students should have a correct concept and understanding of the subsystem of the automatic fire alarm system, and can design the automatic fire alarm system and fire-fighting linkage system by themselves through the teacher explanation in class. This course explained the actual case at first, and then asked students to design the project by themselves. The purpose of this course is to cultivate the thinking ability and hands-on drawing ability of student and to lay a solid foundation for subsequent “Architectural Electrical CAD” and graduation thesis.

Due to the vigorous promotion of “Internet+” in recent years, these traditional engineering majors also had a great impact. In this context, “Curriculum Design of Building Fire Protection and Security”, as a professional practice course of architectural engineering, also had an urgent need for reform. Based on the national requirements for “Internet+” and the development trend of civil engineering discipline, this paper proposed new ideas and directions for teaching reform from the aspects of teaching objectives and teaching methods.

## 2. Course Description

“Curriculum Design of Building Fire Protection and Security” is one of the professional practice courses of civil engineering, which mainly teaches the basic introductory knowledge of automatic fire alarm system and fire fighting linkage system.

A total of 32 class hours are arranged for “Curriculum Design of Building Fire Protection and Security”. Among them, 16 class hours are classroom teaching, mainly teaching students the working principle, subsystem, drawing requirement, and design specification of the automatic fire alarm system and the fire fighting linkage system. Another 16 class hours are for practical teaching, students conduct fire control design by themselves. By teaching CAD examples, it can help students understand more directly what specifications should be referred to when drawing the automatic fire alarm system and fire fighting linkage system.

According to the previous syllabus, the course is divided into two parts. The first part is classroom teaching, including the working principle, subsystem, drawing requirements, and design specifications of the automatic fire alarm system and the fire fighting linkage system. The main teaching emphasis and difficulty of this part is to ensure that students master the drawing requirements and design methods of automatic fire alarm system as well as relevant national and industry standards. The second part is for students to do their own drawing. The automatic fire alarm system and the fire fighting linkage system include the broadcasting system, the floor display system, fire-fighting control chamber, the detector arrangement, the sound and light alarm and automatic fire alarm system with telephone jack and so on. The teacher guide each student from every subsystem in drawing, starting from the basic CAD drawing skills, to ensure that students master the requirements of the outline.

### **3. Current teaching forms and main problems**

The course “Curriculum Design of Building Fire Protection and Security” is a professional practice course that every student must learn. This course is characterized by difficulty and a high requirement for drawing ability. In the teaching process, due to the imperfect teaching system and short practical teaching hours, students cannot fully understand the entire content of fire fighting drawing. The drawings specifications in classroom teaching are abstract, boring, and highly professional, which poses a great challenge to many students. Many students are not proficient in setting up layers and line types when making drawings, which makes it difficult to see the important lines of the drawings. For example, the doors and windows of the building and the fire line designed by students themselves are the same color, which makes it difficult to distinguish clearly. There are also minor issues such as students setting the font size inappropriately and forgetting names of drawings and label bars, which also leads to poor quality of the drawings.

### **4. Reform strategy of teaching objectives of “Curriculum Design of Building Fire Protection and Security”**

The teaching objective of “Curriculum Design of Building Fire Protection and Security” is that by learning the course, students can master the building fire system and fire fighting linkage system working principle, classification and application of the subsystem, to master the related national standards, industry standards, familiar with CAD graphing method and the skill, training students’ ability to analyze and solve problems, to cultivate the students’ practice ability and innovation consciousness, lay a good foundation for follow-up study of other courses, study of professional skills, and graduation design.

Nowadays, CAD is rapidly changing and 3D BIM has gradually entered the market, so in subsequent curriculum design course, BIM design can be added to the curriculum design course objectives in line with the trend of the times.

### **5. Reform strategy of teaching method of “Curriculum Design of Building Fire Protection and Security”**

The “Opinions of the Central Committee of the Communist Party of China and the State Council on Deepening Education and Teaching Reform and Comprehensively Improving the Quality of Compulsory Education (full text)” promulgated in June 2019 proposed “strengthening the role of the

main position in the classroom and effectively improving the quality of classroom teaching”. This opinion can be applied to the teaching of the course “Curriculum Design of Building Fire Protection and Security”.

The first is to perfect the homework assessment methods. After the end of the teaching part, students will be assigned the corresponding drawing questions and asked to summarize the class content, and sort out the legend, design standards and drawing steps commonly used in drawing. In this way, students can consolidate the key knowledge taught in class and really gain knowledge by themselves. Another train of thoughts is to let students to design directly in the course of class, sort out their ideas step by step and carry out the design. In this way, we can find the omission in time and make up for the omission. According to the completion degree of students’ drawings, individual coaching can be given and can explore flexible drawing assignments to improve the quantity and quality of designs. Students can be given several sets of drawings to avoid copying, or one set of drawings to change its details, such as changing the location of electrical wells or changing the location of the fire-fighting control chamber. Teachers should also give timely feedback to each student and answer questions timely. Common mistakes should be explained uniformly and individual mistakes should be explained separately, so as to take care of everyone student as much as possible. At the same time, a student support system should be established, excellent students and poor students form a group. In the group, students can help each other.

The second is to promote the deeper integration of information technology with education and teaching. Due to the outbreak of the novel coronavirus this year, “Curriculum Design of Building Fire Protection and Security” carried out online teaching on “Super Star Learning APP” and established a course network learning platform of “Curriculum Design of Building Fire Protection and Security”. The students can scan the code to sign-in and the teacher can randomly make a roll call on the “Super Star Learning APP”. The APP can choose different ways of calling names to prevent the problem of checking in by others. During the class, students can also ask questions anonymously on the APP and watch the video back. The application of the APP not only greatly enhances the interest and flexibility of classroom teaching, but also enables students to put down their pen and listen to the teacher carefully. They can put down their pens, listen carefully to the teacher and wait for the relaxed state of slowly making up your notes after class. This will also change the boring and tedious impression of this course from the heart.

The third is to reform the teaching method. “Curriculum Design of Building Fire Protection and Security” is a course that involves more content in the classroom teaching part, which mainly consists of three parts. The first is the national standard and departmental standard related to fire protection and security, requiring teachers to teach students the most common specifications and definitions that may be encountered in the design process. This part of the content is the most boring of the teaching part. Many standards are very short, so it is difficult to remember. When the teacher explains this part, he can combine with specific application examples, for example, to explain why the fire shutter should fall twice, rather than directly to the bottom. The second is the various systems that need to be designed in the project, including fire protection broadcasting system, manual alarm control system, sound and light alarm system, fire hydrant button, special telephone system, smoke and temperature sensing system, etc. This part is the core content of the design. The teacher can start with the design sequence and explain the definition, function and design sequence of each system to the students clearly, and then explain to students with specific cases. When students encounter specific problems in the design, the teacher can explain them in combination with the specifications in the first part to deepen the students’ impression. The third is the way of layout and drawing. The teacher explains how to determine the scale and size of the drawing according to its total length and total width. Then teach the students how to write the design description, how to draw the legend and the specific content of the title bar. Through the teaching of these three aspects, students will have a certain understanding of specific drawings, so that they can consolidate their knowledge and master their own design.

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