

# Research on the Undergraduate Key Course Construction and Practice for Equipment Purchasing Management

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**Abstract.** Based on the construction experience of the undergraduate course in equipment purchasing management of Air Force Engineering University, which is "General Quality Characteristics and Management of Equipment", the current situation of the course was analyzed, and the teaching objectives and orientation, teaching purposes and teaching contents of the course were studied. Furthermore, the teaching design of this course and design of specific construction scheme were carried out. The teaching practice proves that the course has got good teaching results and achieved the expected teaching goals.

**Keywords:** undergraduate education; equipment purchasing management; course construction.

## 1. Introduction

The course "General Quality Characteristics and Management of Equipment" originated from the "Aviation Maintenance Engineering" course opened by the former Air Force Engineering College in 1984. In 1989, it was changed to the "Reliability and Maintenance Engineering" course. In 2000, it was changed to "Reliability and Maintenance Engineering" course. In 2018, according to the requirements of the new syllabus, the course "General Quality Characteristics and Management of Equipment" as a new professional course for the equipment purchasing management was offered, which has 60 hours.

The course is based on advanced mathematics, probability theory and mathematical statistics, university physics and other courses, through system learning the basic theory of equipment reliability, maintainability, security, safety, testability, environmental adaptability (referred to as "six features"), methods, techniques and management, the system management idea of students can be cultivated. And lay the foundation for learning the follow-up professional courses, such as "equipment contract management", "quality supervision and inspection acceptance" and others. What's more .it can also build a good foundation for students to take their first job [1].

## 2. Course Status Analysis

The course "General Quality Characteristics and Management of Equipment" is the first course to be combined with the "six features" theory, method and technology and management actual conditions inside and outside the military [2]. The course is based on the full life and feature management of the whole system, combined with the actual development of the equipment model, the "six features" problem in the life cycle of the equipment, and the use of relevant laws to guide the quality supervision and practice of the equipment development process [3].

At present, the laboratory has built the "equipment quality characteristics simulation" laboratory can be used for the practice of the course, but there is still lack of teaching materials, case libraries, multimedia digital resources, and other teaching conditions, and the course construction is urgently needed.

### **3. Course Teaching Goal and Orientation**

#### **3.1 Knowledge and Skill**

Understand the research objects, scope and tasks of the general quality characteristics of equipment; understand the basic theory and knowledge system of "six features"; master the technical methods of reliability, maintainability, supportability, testability analysis modeling, calculation and evaluation, master the development stage The basic requirements, regulations, standards and main tasks of "six features" supervision; through the study of this course, students should be able to carry out research on modeling analysis and quantitative evaluation of the main characteristics of weapons and equipment, with basic equipment, general quality characteristics, management and supervision capabilities [4].

#### **3.2 Process and Method**

Through the use of a variety of teaching methods, students develop the ability to find problems, analyze problems and solve problems, guide students to actively explore the difficulties of the curriculum, grasp the development trend of the discipline; through independent reading, students have a strong ability to collect, organize and analyze information [5]. Through group discussion and personal reports, to develop students' ability to learn actively, and to use the knowledge they have learned to analyze problems, with a certain degree of independent thinking, analysis, and innovation.

#### **3.3 Attitude and Value**

Cultivate an interest in this course, apply the theoretical knowledge learned to specific practice, dare to propose innovative theoretical viewpoints; have team spirit and cooperation awareness, establish a "six features" quality concept of weapons and equipment, and enhance students Mission and responsibility.

### **4. Course Design**

#### **4.1 The Overall Condition of Course**

The main lecturers of this course consist of 1 professor, 2 associate professors, and 2 lecturers. It will be divided into teaching contents according to the "six features" of the equipment, including overview, reliability, maintainability, supportability, testability, safety, and environmental adaptability 7 modules. According to the teaching content, students' personality characteristics, etc., using various teaching methods such as theoretical teaching, problem traction, case study, and computer practice, in the process of specific teaching organization, the link between "theory and practice" will always be used. To explore the "six features" problems that may be encountered during the development of equipment models. Through the regular teaching joint meeting, pre-arranged discussion questions, review before class, and after-school homework inspection, the process quality is monitored. The course adopts a comprehensive assessment method, in which: the final exam takes 70 points, and the daily teaching interaction, case study, and experimental report account for 30 points.

#### **4.2 Teaching Process Design**

In the teaching practice, the course "General Quality Characteristics and Management of Equipment" will focus on the basic requirements of the development of knowledge capabilities of students' general quality characteristics, and implement the trinity of course teaching objectives of knowledge and skills, processes and methods, attitudes and values. Active teaching methods; actively advocate independent exploration, cooperation and exchange, reading self-study and other active and diversified teaching methods, so that the students' learning process becomes the "re-creation" process under the guidance of the instructors; setting up typical equipment RMS analysis experiments, equipment model development The "six features" supervision case study and analysis, role-playing

and other practical exploration activities, stimulate students' interest in learning, develop the ability to think independently and actively explore.

### 4.3 Class Hour Assignment

The course has a total of 60 hours of study, including 50 hours of theoretical teaching, 10 hours of practice, divided into eight modules: introduction, reliability, maintainability, supportability, testability, safety, environmental adaptability, and management. The main points and class assignments of each module are as follows:

Table 1. Teaching module and class hour assignment

Teaching module	Content	Planning class hours
Introduction	General quality characteristics overview, status role, development history.	4
Reliability	Reliability concept, requirements, design and analysis, testing and evaluation.	22
Maintainability	Maintainability concepts, requirements, design and analysis, testing and evaluation.	10
Supportability	Supportability concept, requirements, analysis, support resource planning, testing, and evaluation.	6
Testability	Testability concepts, requirements, design and analysis, verification and evaluation.	6
Safety	Safety concepts, requirements, design and analysis, hazards and controls.	2
Environmental adaptability	Environmental adaptability concepts, requirements, design and analysis.	2
Management	General quality characteristics process management, outline preparation, review, supervision case.	8

## 5. Course Construction Plan

### 5.1 Course Construction Goal

According to the requirements of the new syllabus, the curriculum construction plan of "General Quality Characteristics and Management of Equipment" will be formulated, with emphasis on strengthening the construction of teaching design, teaching content, teaching methods and means, teaching conditions, etc., highlighting the interactivity and pertinence in the teaching organization process. Effectiveness, improve the quality of classroom teaching, strive to meet the university's excellent curriculum construction standards, and complete the expected results such as new textbooks, curriculum design, test questions, and case libraries.

### 5.2 Course Reform Idea

(1) Update the concept of education and teaching. Strengthen the reform of teaching methods, thoroughly change the "I tell you to listen", full house irrigation situation, truly implement the requirements of quality education and innovative education, carry out problem-oriented, case-based, seminar-based teaching, and give full play to the main role of students. Secondly, it is necessary to strengthen the reform of teaching methods and examination methods, further improve the production level of multimedia courseware, and strengthen practical teaching. Third, we must constantly reform and improve the examination methods, thoroughly change the phenomenon of the exams of political theory courses, and guide students to improve their ability and quality.

(2) Optimize the content of the course. According to the characteristics of equipment development, the adjustment and reform of the management system and operation mechanism, and the actual needs

of construction and development, the equipment characteristics are highlighted, and the theory and practice are closely combined to formulate the "course design plan" that meets the characteristics of equipment purchasing management. Develop a typical case base for the development of Air Force equipment.

(3) Innovative teaching methods and means. Establish a curriculum case library that can reflect the characteristics of equipment, and stimulate students to solve practical problems through the knowledge and means they have learned; keep up with equipment development, adjust teaching content in a timely manner, and increase the application of modernization, standardization, standardization, and interactive teaching methods. What's more, a three-dimensional teaching network was formed by innovatively using multimedia courseware, case library, test question bank, WeChat articles, etc.

### **5.3 Course Construction Features**

After three years of construction, the expected characteristics of the course construction are summarized as follows:

(1) Establish bilingual teaching courseware and supporting test questions library.

(2) With the help of the military representative training platform, the military industry, universities, research institutes and other well-known experts will be invited to give lectures on a regular basis, focusing on the practical problems and solutions of the "six features" in the development of equipment models, broadening their horizons and deeply understanding the equipment. The importance of "six features" fosters a sense of mission and responsibility.

(3) Closely integrate the latest national military standards, industry standards, and foreign standards related to the general quality characteristics of equipment, expand and deepen the curriculum teaching content, and enhance students' ability to learn and use the main standards.

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