

# Curriculum Reform of Linear Algebra in Agricultural Colleges and Universities

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**Abstract:** Taking Xinjiang Agricultural University as an example, by integrating the ideological and political teaching cases into the course, the linear algebra course changes the current situation of “emphasizing theory and neglecting application” in the traditional mathematics classroom, increases the application-oriented teaching cases with the background of industry and agriculture. It adopts the online and offline mixed teaching mode, and “teaching” through inquiry and case teaching methods and students’ autonomous learning and discussion. The teaching mode of linear algebra has been comprehensively reformed in combination with diversified assessment methods, and satisfactory results have been achieved.

**Keywords:** Thought and Politics Curriculum ; Mixed Teaching Mode; Reform

Taking Xinjiang Agricultural University as an example, in order to fully implement the national conference on ideological and political work in colleges and universities, we should adhere to the fundamental task of building morality and cultivating people, take the construction concept of “new engineering and new agriculture” as the guide, and strengthen the central position of talent training and the basic position of undergraduate teaching, as well as carry out teaching innovation reform of linear algebra course. On the one hand, it is integrated into the ideological and political thought of the curriculum. On the other hand, the course changes the current situation of “emphasizing theory and neglecting application” in the traditional mathematics classroom; Through heuristic and case teaching methods and students’ autonomous learning discussion methods, the teaching mode is developed from “teaching” to “students”, adopt online and offline mixed teaching mode, and innovate modern teaching methods with the help of multimedia teaching means and modern information technology; Through the implementation of diversified process assessment methods, students’ comprehensive ability to learn this course is comprehensively evaluated.

## 1. Contents of curriculum innovation and reform

According to the discipline and curriculum requirements, this course reflects the thought of building morality and cultivating people and the education and teaching concept of “student-centered” through teaching innovation and reform. Specifically, the teaching innovation reform is carried out from the following five aspects:

### 1.1 Integrating the ideological and political elements of the course based on the teaching content

Based on the concept of ideological and political education, this course studies the teaching contents, excavates teaching cases, and designs teaching methods, so as to integrates the ideological and political elements into the teaching process of the whole course in an all-round and whole process. Students strive to inherit the “red gene” of agricultural university and carry forward the “agricultural university” spirit of “self-reliance and hard work” while learning linear algebra, which cultivate students’ objective

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and rigorous scientific spirit, and learn to use philosophical thinking methods to analyze and solve problems, so as to realize all-round and whole process education.

### **1.2 Exploring the teaching mode of “teacher led, student-centered”**

The development of teaching mode from “teaching” to “learning” reflects the teaching concept of “student-centered”. In 2020, this course adopts the online and offline mixed teaching mode, carries out case and heuristic teaching methods with the help of multimedia teaching means and modern information technology, and uses online teaching methods such as rain classroom and Ding Talk to carry out interactive methods such as classroom answer, contribution and bullet screen, so as to facilitate students to participate in the classroom and present the discussion process at any time. It can mobilize students’ thinking ability to explore, analyze and solve problems independently, and innovate the student-centered teaching mode.

### **1.3 Introduction of frontier knowledge of applied disciplines into the classroom**

We should change the current situation of “emphasizing theory and neglecting application” in the traditional mathematics classroom, increase the application-oriented teaching cases with industrial and agricultural background, and reflect the frontier of the discipline, in order to gradually make the teaching content have the “golden class” level of “gender once”. The idea of mathematical modeling will be integrated into the teaching process to cultivate students’ ability to transform practical problems into mathematical problems, so as to apply mathematical knowledge to solve practical problems.

### **1.4 Innovating diversified teaching methods and means**

We should change the single teaching method of “textbook + blackboard + chalk” in the traditional classroom, and innovate diversified teaching methods. This course adopts online and offline mixed teaching mode, online rain classroom and wisdom tree learning platform, and introduces high-quality courses from China university of petroleum. Modern information technology teaching methods combined with multimedia technology are adopted offline. On the one hand, it improves the efficiency of education and expands the time and space of education; On the other hand, in the teaching process, it enriches students’ sensory experience, makes audio-visual combination and vivid presentation of teaching content, and improves the quality of education and teaching.

### **1.5 Implement the whole process assessment and evaluation**

Through the implementation of diversified process assessment methods and periodic assessment methods, we can pay attention to the students’ usual learning effect and comprehensively investigate the students’ comprehensive ability to learn this course. The proportion of usual scores has been increased in the course assessment methods. The course assessment method will be reformed to 50% of the usual results and 50% of the final examination. Among them, the usual scores include attendance, module test, after-school homework, classroom interaction, course learning experience and other assessment methods.

## **2. Effectiveness of curriculum reform**

Through the implementation of the teaching innovation reform of Linear Algebra, the problem of “pain points” in Linear Algebra has been solved, and a satisfactory teaching effect has been achieved, which has been highly praised by leaders, peers and students.

### **2.1 High satisfaction of teaching evaluation and improved teaching effect**

Through the teachers, leaders and peers of the school steering group, as well as the results of students’ teaching evaluation, students are highly satisfied with the teaching of Linear Algebra. In recent five years, the comprehensive average score of students’ teaching evaluation and peer leaders’ listening evaluation has been over 90. According to the teaching evaluation results, the reform and innovation of this course is large, and the teaching means are rich. Through learning this course, students understand the frontier of the discipline, gain great personal gains, improve the level of application of modern information technology, and have high satisfaction with the teaching evaluation of teachers and courses.

### **2.2 It embodies the student-centered teaching concept**

Through the reform of teaching content, the application of case teaching and inquiry teaching mode, and the introduction of modern information technology teaching means, the current situation of “emphasizing theory and neglecting application” in the traditional mathematics classroom has been changed, the depth and breadth of teaching content have been expanded, and students’ classroom attendance and students’ enthusiasm to participate in learning in the classroom have been improved. Students’ performance in the classroom has been significantly active, and the classroom atmosphere has been greatly improved, reflecting the student-centered teaching concept.

### **2.3 Improving students’ comprehensive quality and ability**

According to the results of students' teaching evaluation, the focus of learning has shifted from mechanical calculation to the cultivation of application ability, which has stimulated students' interest in learning, cultivated students' practical ability to analyze and solve problems, enhanced students' overall cognition and learning level of this course, and expanded students' knowledge vision and application level of modern information technology, which improves students' comprehensive quality and ability.

#### **2.4 The pass rate and average score of Linear Algebra have been improved**

By comparing the assessment data of various students in recent five years, it is found that after the implementation of teaching innovation reform, the average score and pass rate of students have been greatly improved, especially the average score and pass rate of students in ethnic and bilingual classes with weak foundation, from 72.11/92.20% and 69.52/87.14% in 2019-2020 academic year to 72.48/92.86% and 70.72/92.20% in 2020-2021 academic year, which has been greatly improved and achieved remarkable results.

### **3. Conclusion**

Through the implementation of curriculum reform, students not only improve their learning interest and internal drive in learning linear algebra, but also improve the average score and pass rate of learning the course. They also cultivate their mathematical thinking ability, logical analysis ability and practical ability to solve practical problems. At the same time, in the study of ideological and political cases, the classical mathematical thinking methods are refined, which provides a powerful thinking method for solving other problems in the future. Further, by organically integrating the content of curriculum education, students are actively guided to form correct three views, so as to realize all-round and whole process education. In the future course teaching reform, on the premise of laying a good foundation for students' basic knowledge, we will also summarize the knowledge system, form a thinking map of knowledge points, and further expand the knowledge structure, so as to create online teaching resources, try to use flipped classroom, group discussion and other methods to innovate the teaching mode to make the course further meet the gender golden class standard.

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