

# Research on Ideological and Political System Teaching under the Background of Professional Certification

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**Abstract.** In the current national universities continue to promote curriculum ideological and political construction under the background, in the professional ideological and political work run out the total course of education and teaching, to implement the content of all courses of ideological and political curriculum functions, adhere to the virtuous education as the center of the tache, the realization of the integral procedure of education, far-ranging education reflected in the work of all teachers, to reconcile to the new era of energy and power talent training new goals. This paper introduces the basic ideas and measures of the reform, and takes the contents of each chapter as a case to show, and discusses and analyzes the practice process.

**Keywords:** Energy and power specialty; Gas turbine principle; Personnel training; Course ideology and politics

## 1. Introduction

“Gas-steam Combined Cycle Power Generation Technology” is a professional elective course for energy and power engineering majors, which is the current thermal power generation technology with the highest efficiency, the greatest technical difficulty, and China is still relatively backward in a production technology. At present, our country is relatively backward in this aspect of technology, but also encountered the Western countries led by the United States technology blockade and economic oppression, how to ameliorate students' learning interest in the classroom teaching process, rational deal with the status quo of unsophisticated technology, stimulate students' patriotic enthusiasm, and turn it into the motivation for hard study. In the context of ideological and political ideas, to change the traditional teaching emphasis and imparts knowledge and skills, we should aware of the standards of behavior leadership and quality building of students. Through the concept of ideological and political teaching of professional courses, we hope to better achieve the goal of cultivating talents of our school: outstanding talents with good virtuous personality, bodily and psychogenic fitness, acute sense of social liability, solid theoretical foundation, extraordinary sense of originality, a certain international vision and good unraveling capacity, adapt to economic and social growth, energy and power characteristics.

## 2. Overall Design of Curriculum Ideological and Political Construction

**2.1 Based on Professional Personnel Training and School Characteristics of The “Four in One” Curriculum Ideological and Political Teaching Objectives.** “Gas-steam combined cycle power generation Technology” is a professional course in the direction of clean energy in the power department, and belongs to the major core course. Based on the characteristics of energy and electric power and the positioning of high-level research university, this course is oriented to the future development of students according to professional characteristics and social needs, and based on the concept of OBE, it refines goals and strengthens high-level goals, laying a professional foundation for training excellent engineers for energy and power majors. As shown in Fig 1.

<b>Social needs school positioning</b>	<b>Energy power has distinctive characteristics A high-level research university</b>					
↓ Salvage ↓	Professional graduation requirements	System master energy efficient conversion and clean utilization, energy power plants and systems and other professional knowledge.	.....	Good moral character, good physical and mental health, high sense of social responsibility, solid theoretical foundation, strong engineering practice ability, international vision, innovation and entrepreneurship and competitive consciousness.		
↑ support ↑	Graduation requirements target points	Basic and professional knowledge of mathematics, natural science and engineering. It can be used to solve complex problems in power engineering and engineering thermophysics.	Be able to apply the basic principles of mathematics, natural science and engineering science, identify, describe and analyze complex engineering problems through literature research, and provide reasonable solutions.	...	Ability to assume the role of individual, team member and leader in a multidisciplinary team setting	With humanities and social science literacy and social responsibility, able to understand and abide by engineering professional ethics and norms in engineering practice, and fulfill responsibilities.
	Course objective	<b>Knowledge objective</b> Apply natural science knowledge to gas and steam combined cycle power generation technology to learn its basic theory and method	<b>Capability objective</b> The ability of gas turbine design and operation analysis is obtained, which can solve various problems in gas turbine design and operation		<b>Value goal</b> Develop teamwork spirit	<b>Literacy goal</b> Cultivate the spirit of home and country, stimulate patriotic enthusiasm, and establish a correct view of science and practice

Figure 1. Process of formulating curriculum ideological and political goals based on professional personnel training and school characteristics

**2.2 Ideological and Political Integration Based on the General Trend of Professional Certification.** In the context of the general trend of professional certification and the great ideological and political background, the curriculum not only require to meet the demand of professional accreditation, but also needs to integrate ideological and political elements, as shown in Fig 2. In combination with the revision of professional certification training program, we should timely add ideological and political elements to professional training objectives, implant ideological and political concepts in course objectives, integrate ideological and political gist in course teaching, and involve ideological and political factors in course evaluation.

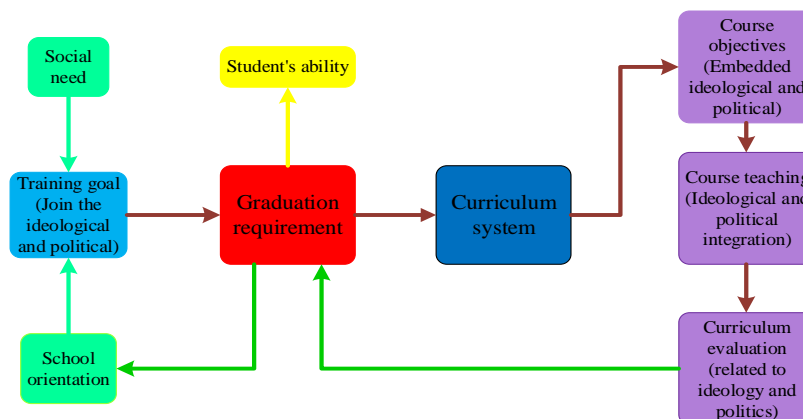


Figure 2. Ideological and political integration based on the trend of professional certification

**2.3 Ideological and Political Construction Objectives of the Course “Gas-steam Combined Cycle Power Generation Technology”.** Through in-depth thinking and analysis of the teaching content knowledge of “Gas-steam Combined cycle Power Generation Technology”, knowledge points suitable for integration into ideological and political thinking are dug out, relevant ideological and political information is collected, and condensed into ideological and political goals, as shown in Fig 3.

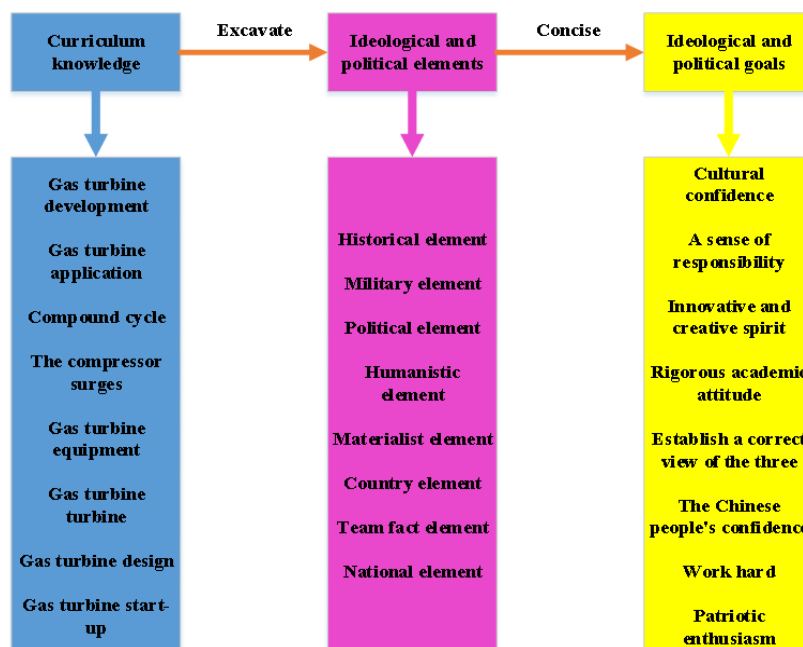


Figure 3. Ideological and political construction objectives of the course “Gas-steam Combined cycle Power Generation Technology”

### 3. Curriculum Ideological and Political Teaching Practice

**3.1 The Syllabus Guides the Ideological and Political Practice of the Syllabus.** The teaching team has improved the course syllabus with the target of pursue morality and people, and added the content of “training students' scientific literacy, feelings of family and country, responsibility, ideals and beliefs, materialistic dialectics thought and innovative consciousness” to the original course purpose.

**3.2 Teaching Attitude Shows the Ideological and Political Responsibility of the Course.** Teaching by example is better than words, and teachers' teaching attitude can also show students their ideological and political responsibility in the syllabus Teachers arrive in the schoolroom in advance, dress clean and tidy, and make full and comprehensive preparations for lessons, which can convey the educator's professionalism to students and feel the responsibility of teachers.

**3.3 The Teaching Content Integrates the Ideological and Political Elements of the Course.** Through the selection of teaching content knowledge, the addition of appropriate engineering cases, the way of video and pictures, tracing the development process of technology, summarizing the current application status, and looking forward to the future development direction, combining current affairs and political materials, guiding students' cultural self-confidence, touching students' patriotic feelings, expanding their horizons, encouraging students' creative thinking, and stimulating students' thirst for knowledge. Establish correct three views, enhance students' sense of mission and social responsibility, closely combine classroom teaching with ideological and political education, enhance students' value recognition in professional education, actively build a first-class talent training system for electric power majors, and gradually form a general pattern of all-round education of the whole process, and truly achieve the educating purpose of moral education.

Main ideological and political design of the course:

1) In Chapter 1, when talking about “gas turbine development”, takes the walking horse lantern, which has been widely circulated among the people in the Ming Dynasty of China, as a case, explaining that China has been very good at applying the working principle of gas turbines to manufacture folk crafts 800 years ago. Pictures and short videos are displayed to stimulate students' cultural confidence, and finally achieve the effect of “persevering calmly, summoning up the courage to forge ahead, and invigorating the vitality of innovation and creation”.

2) In Chapter 1, when talking about “application of gas turbine”, taking the M1 tank with gas turbine technology as an example, and combined with the two wars against Iraq led by the United States, when gas turbine is applied to weapons, the improvement of weapon performance directly affects the trend of war, indicating the importance of gas turbine technology to a country's economy, politics and military. With pictures and short video display, in order to stimulate students' patriotic enthusiasm, enhance the sense of mission and responsibility, to study hard cultural knowledge, and strengthen the country.

3) In Chapter 2, when talking about the “compound cycle”, takes the self-reliant research and development of naval gas turbines to make Chinese warships a new life as an example, explaining that advanced technology cannot expect charity from others, but can only rely on their own hard work, hard work, it is possible to obtain the technology, it is possible to be independent of others, and have their own voice. Short video display, in order to stimulate the students' self-improvement, the courage to create the national spirit, to stimulate the students' innovative spirit of The Times.

4) In chapter 3, talking about “compressor surge”, taking C-17 aircraft stall and a thermal power plant fan stall accident as examples, shows that science and technology must not be careless; otherwise it will affect personal safety and equipment accidents. Short videos are presented to cultivate students' rigorous attitude towards academic research.

5) In Chapter 3, when talking about the “gas turbine”, take the R-R engine production process as an example to indicate that the gas turbine is indeed the pearl in the industrial crown due to its difficult manufacturing, long research and development cycle and wide range of industries. Short video shows guide students to respect the regulation of the evolution of things, establish a correct view of science and practice; everything is not in a single moment.

6) In Chapter 3, when talking about “gas turbine”, taking large aircraft C919 and C929 as an example, it shows that given time, China has the ability to design and manufacture gas turbines, which is not inferior to any other country. The short video display reflects the rise of China's all-embracing national power, and the level of scientific research, design and equipment production and manufacturing has been greatly improved, which stimulates students' patriotic enthusiasm and enhances the confidence of being Chinese. However, we must also realize that there is still a certain disparity contrast with advanced countries, and we must base ourselves on our own efforts and contribute our own strength to the development of the country.

7) In chapter 4, when talking about “gas turbine design”, the 50MW heavy gas turbine signed a heavy gas turbine technical cooperation between State Power Investment and Ansaldo, which has all its own property rights to develop, produce and put into operation, is taken as an example, indicating that China has a certain strength in the design and manufacture of gas turbines. With videos and pictures, students can understand the difficulties of developing gas turbines in the country and understand the importance of competition and cooperation. Taking the failure of the acquisition of Ukrainian engine company and Jin Yinan's Sino-US relationship report as an example, it shows that our country's gas turbine will not be plain sailing. The short video display lets students understand the hardships of developing gas turbines in China, and meanwhile lets students comprehend that China's thickening is influenced by the international community, with both opportunities and challenges, and inspires students' patriotic enthusiasm and sense of mission.

8) In chapter 6, when talking about “gas turbine start-up”, taking the maintenance of domestic gas turbine thermal components as an example shows that foreign blockade of our gas turbine technology is everywhere. To show the pictures, let the students understand the hardships of national development of gas turbines, inspire the patriotic passion of students.

**3.4 Teaching Methods Deepen the Ideological and Political Connotation of The Course of Study.** The course is carried out by the educating methods of simplified teaching, research-oriented teaching, silent ideological and political educating, close connection with practice educating, and people-friendly teaching. Through these teaching methods, students can learn to grasp the focus and essence of things, examine problems with research thinking, easily accept curriculum ideology and politics, combine theory with practice to apply knowledge, and have a perfect schoolroom teaching ambience and barrier-free communication between educators and learners.

**3.5 Teaching Assessment into the Syllabus Ideological and Political Conditions.** In the process assessment, a large task based on online gas turbine state parameters and characteristic parameters is added to assess students' teamwork spirit.

**3.6 Teaching Evaluation Feedback Curriculum Ideological and Political Effects.** Only when the syllabus ideology and politics are transformed into students' spontaneous cognition, can it be said that it has really played a role. Before the end of the course, we investigate the effect of ideological and political teaching of the course, and understand the teaching situation of ideological and political teaching of the course through the feedback of students' information, which is helpful to adjust and polish up the teaching devise and teaching process of the course.

#### 4. Curriculum Evaluation and Effectiveness

**4.1 Establish The Whole Process and Diversified Assessment Mechanisms.** The course assessment of “Gas steam combined cycle Power generation Technology” adopts the whole process of learning effect as the center, oriented to the development of students, and multi-directional teaching evaluation mechanism. Among them, the final assessment is carried through at the finale of the school term in the form of closed-book examination, the process assessment is completed several times by online and offline examination, and the whole process of formative evaluation runs through the whole teaching process, including: course work, engineering case calculation, and classroom interaction. This assessment mechanism is oriented to the comprehensive development of students, so as to facilitate teachers to systematically understand the knowledge grasp of students in a timely manner. It attaches equal importance to the evaluation of knowledge, ability and accomplishment, and can complete the all-round evaluation of the schooling objectives, capability objectives and virtue objectives of the course, and meet the requirements of the teaching syllabus.

**4.2 Teaching Supervision and Students' Evaluation of the Teaching Level of the Team Teacher.** In the three years since the ideological and political structure of the course “Gas Steam Combined Cycle Power Generation Technology” was implemented in 2019, after three academic years of construction cycle, the class evaluation score of “Gas Steam Combined Cycle Power Generation Technology” is at the forefront of the department and has been improved year by year.

Table 1. Class-based evaluation score of gas-steam combined cycle power generation technology

Academic year/Semester	2020-2021-1	2021-2022-1	2022-2023-1
	Student evaluation	Student evaluation	Student evaluation
Gas-steam combined cycle power generation technology	94.45	96.08	97.85
Course design of gas-steam combined cycle power generation technology	95.08	96.1	96.6

All the classes undertaken by the members of the teaching team have been positively evaluated by the teaching supervisors of the university, and 4 classes of the members of the team have been rated as “excellent” classes.

**4.3 Demonstration Radiation.** The teachers of this course group teach many courses, involving all students in the Department of Dynamic Energy. Through the summary of the teaching

experience of this course, the ideological and political ideas of the course are implanted in each course, which can quickly radiate to all students in the department.

## 5. Characteristic and Innovation

**5.1 Integration, All Elements Teaching Model.** The ideological and political fabrication of “Gas and Steam Combined Cycle Power Generation Technology” course highlights the ideological and political education principle of “efficient and top firepower technology knowledge and theory” and “Great rejuvenation of Chinese Dream”. The knowledge point of this course organically integrates ideological and political elements, and is based on the “four-in-one” talent training concept of “knowledge exploration, ability training, value guidance and quality cultivation”. It has established the training goal of reflecting “knowledge, ability, quality, value”, highlighted the ideological and political teaching case carrier with the application of fresh technology as the core, and explored the “integration, all elements” course ideological and political teaching mode, reflecting the overall, systematic, connotation and burgeoning of the curriculum ideological and political execution pathway, with full reference and popularization.

**5.2 Research Teaching Innovation Paradigm Based on Engineering Case Analysis.** The fostering of students' ability of analysis, problem solving and scientific quality needs to be strengthened in the process of solving practical engineering cases. The research-based teaching based on engineering case analysis follows the process of knowledge theory research construction and embodies the process of engineering problem research and solution. In the case study, students strengthen the application of knowledge, discover and learn new knowledge, and complete the fostering of competency improvement and originality goals. Simultaneously, the ideological and political elements are united, and the research-based teaching is fully integrated with the ideological and political elements.

For example, when talking about “gas turbine design”, the signing of heavy-duty gas turbine technical cooperation between State Power Investment and Ansaldo shows that China has certain strength in the design and manufacture of gas turbines. The video and pictures (as shown in Fig 4) are displayed to understand the difficulties of developing gas turbines in the country, let students understand the importance of competition and cooperation, and understand that “the iron depends on itself”, and stimulate students' patriotic enthusiasm and sense of mission.



Figure 4. China has successfully developed 50MW heavy-duty gas turbines

## 6. Conclusions

In view of the new changes and new requirements of talent training under the special background of “two engines” of national aero engine and gas turbine, based on the student-centered concept, the ideological and political elements of the course are organically incorporate with professional knowledge to cultivate students' innovation consciousness and innovation capability, and guide students to learn the requirements of the country and solve the urgent needs of the country. Inspire students' determination and courage to overcome the “jammed neck” technology, draw nutrients from the spirit of scientists and craftsmen in great countries, establish the great ambition of science and technology power, and inspire students' rational value pursuit. Finally achieve the goal of

effectively improving the teaching quality of the course and improving the training stage of energy and power students.

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