# New Energy Science and Engineering

**(Grade 2024)**

**Course code: 080503T**

## I. Cultivation Objectives

1. General cultivation objective

This Program of Economic Statistics cultivates high-level application-oriented talents who have good overall development in moral, intellectual, physical, aesthetic and labour aspects and a solid foundation in mathematics, physics, chemistry, mechanical engineering, energy and power engineering, materials science, electronic science and technology, and engineering project management, master the principles of new energy conversion and utilization, the design and development of new energy conversion materials and systems, and the use of modern tools, and are able to engage in system design, technology development, project management and other related work in the new energy field.

2. Objective of value guidance

Have the awareness of green manufacturing, sustainable development, environmental protection and safe production, have a healthy personality and psychological quality, have a good scientific and cultural literacy, have the correct professional morality, professional ethics and social responsibility, and apply them in the process of designing, developing and implementing new energy conversion materials and system solutions, and promote the development of the national new energy, especially solar photovoltaic photo-thermal utilization industry.

3. Five years after graduation, students in this program should achieve the following objectives:

Objective 1: To be able to apply new energy science and engineering expertise to optimize material production processes in actual enterprises, and to analyze and propose effective solutions to complex engineering problems such as new energy conversion materials and systems.

Objective 2: Familiar with various new energy conversion materials and systems, proficient in solar energy conversion and utilization, especially solar photovoltaic utilization, electric energy storage, photothermal utilization, thermal energy management and utilization, and chemical conversion and utilization of energy, etc., and capable of engaging in technical or managerial work related to the specialty in relevant enterprises, and adapting to work independently and in teams.

Objective 3: To be familiar with the important laws and regulations as well as policies and guidelines of the professions and industries related to the fields of new energy, materials and environment, and to be able to analyze the development trend of the related fields.

Objective 4: Be familiar with and comply with important laws and regulations and policies of the occupation and industry related to the field of new energy, have good ideological and moral qualities and humanistic qualities, have a sense of environment and sustainable development, comply with professional norms, have the spirit of craftsmanship, and assume social responsibility.

Objective 5: Possess good interpersonal skills, psychological quality, organizational management and execution skills, be rich in teamwork spirit, and be able to integrate, drive or coordinate the organization and implementation of projects and play an effective role.

## II. Graduation requirements

**Graduation Requirement 1. Engineering Knowledge:** Be able to apply mathematics, natural sciences,

engineering fundamentals, and specialized knowledge of new energy science and engineering to solve complex engineering problems in the design and preparation, structure and properties, processes and equipment, products and applications of new energy conversion materials and systems

1.1 Be able to use mathematics, natural sciences, engineering fundamentals and professional knowledge of new energy science and engineering to appropriately formulate engineering problems of new energy conversion materials and systems.

1.2 Be able to establish appropriate mathematical models for the design and preparation, structure and performance, process and equipment, products and applications of new energy conversion materials and systems, and solve them using appropriate engineering conditions.

1.3 Be able to use mathematics, natural sciences, engineering fundamentals, new energy science and engineering professional knowledge and mathematical models for deriving and analyzing complex engineering problems such as design and preparation, structure and performance, process and equipment, products and applications of new energy conversion materials and systems.

1.4 Be able to use mathematics, natural sciences, engineering fundamentals, materials chemistry professional knowledge and mathematical models for the comparison and synthesis of solutions to complex engineering problems such as design and preparation, structure and performance, process and equipment, products and applications of new energy conversion materials and systems.

**Graduation Requirement 2. Problem Analysis:** To be able to apply the basic principles of mathematics, natural sciences, engineering sciences and new energy sciences and engineering to identify and express complex engineering problems in the design, structure and performance, process and equipment, products and applications of new energy conversion materials and systems, and to analyze them and obtain valid conclusions through literature research.

2.1 Be able to apply the basic principles of mathematics, natural sciences, engineering sciences, and new energy science and engineering to identify and express key aspects of complex engineering problems such as design and preparation, structure and performance, process and equipment, products and applications of new energy conversion materials and systems.

2.2 Be able to apply the basic principles and mathematical modeling methods of mathematics, natural sciences, engineering sciences and new energy science and engineering to correctly express the complex engineering problems of new energy conversion materials and systems design and preparation, structure and performance, process and equipment, products and applications.

2.3 Be able to recognize that there are multiple solutions to the complex engineering problems of new energy conversion materials and systems to choose from, and will seek alternative solutions through literature research.

2.4 Be able to apply basic principles and analyze, with the aid of literature research, the factors affecting complex engineering problems of new energy conversion materials and systems to obtain valid conclusions.

**Graduation Requirement 3. Design/Development of Solutions:** Be able to conceptualize and design solutions to complex engineering problems in the field of new energy conversion materials and systems, and design systems, units (components), or processes to meet specific needs, and be able to demonstrate a sense of creativity in the design process, taking into account social, health, safety, legal, cultural, and environmental factors.

3.1 To master the basic design/development methods and techniques for the whole cycle and process of engineering design and product development of new energy conversion materials and systems, and to understand

the factors affecting the design and technical solutions of new energy conversion materials and systems.

3.2 To be able to design and develop units (components) to meet the specific needs of new energy conversion materials and systems in the preparation, process, equipment and application of new energy conversion materials and systems in response to the solution of complex engineering problems of new energy conversion materials and systems.

3.3 To be able to present the design/development program of the whole process of product design for new energy conversion materials and systems in the form of drawings, design specifications, data charts or objects, and to reflect innovative ideas in the design process.

3.4 Be able to consider social, health, safety, legal, cultural and environmental constraints in complex engineering problems related to the design of products, units and processes for new energy conversion materials and systems.

**Graduation Requirement 4. Research:** Be able to research new energy conversion materials and systems complex engineering problems based on scientific principles and using scientific methods, including designing experiments, analyzing and interpreting data, and synthesizing information to obtain reasonable and valid conclusions.

4.1 Be able to investigate and analyze solutions to complex engineering problems of new energy conversion materials and systems based on relevant scientific principles, through literature research or relevant methods.

4.2 Be able to select research routes and design feasible experimental programs according to the characteristics of new energy conversion materials and system research objects.

4.3 Be able to construct experimental systems according to the experimental scheme of new energy conversion materials and systems, and adopt scientific and safe methods and means to carry out experimental research, and be able to collect and organize experimental data correctly.

4.4 Analyze and interpret the results of experimental research and get reasonable and effective conclusions through information synthesis.

**Graduation Requirement 5. Use of Modern Tools:** To be able to develop, select and use appropriate modern instruments, drawing tool software, information retrieval tools, etc., to predict and simulate the solutions to complex engineering problems such as design and preparation, structure and performance, process and equipment, products and applications of new energy conversion materials and systems, and to be able to understand their limitations.

5.1 Understand the principles and methods of using modern instruments, information technology tools, engineering tools and simulation software specialized in new energy conversion materials and systems, and understand their limitations.

5.2 Be able to select and use appropriate instruments, information resources, engineering tools and simulation software to analyze, calculate and design complex engineering problems in the design and preparation, structure and performance, process and equipment, products and applications of new energy conversion materials and systems.

5.3 Be able to develop, select and use appropriate techniques and resources to predict and simulate complex engineering problems in the design and preparation, structure and properties, processes and equipment, products and applications of new energy conversion materials and systems for specific research objects, and understand the limitations of simulation and prediction.

**Graduation Requirement 6. Engineering and Society:** to be able to reasonably analyze the engineering

practices related to new energy science and engineering based on the knowledge of engineering background, to evaluate the social, health, safety, legal and cultural impacts of the production, design, research and development, and other production practices of new energy conversion materials and systems, and to understand the responsibilities to be assumed.

6.1 Have experience of internship and engineering practice in new energy science and engineering related enterprises, understand the industrial technical standards, industrial policies and laws and regulations as well as culture related to the field of new energy conversion materials and systems, and understand the impacts of different societies and cultures on engineering activities.

6.2 Be able to analyze and evaluate the social, health, safety, legal, and cultural impacts of the implementation of projects in the field of new energy conversion materials and systems, as well as the impacts of these constraints on the implementation of related projects, and understand the responsibilities to be assumed.

**Graduation Requirement 7. Environment and Sustainable Development:** To be able to properly understand and evaluate the impacts on the environment and sustainable development of society in response to the problems of engineering practice in the production and development and application of new energy conversion materials and systems.

7.1 Understand the national strategy for environmental and social sustainable development and related policies, laws and regulations, and establish the concept of environmental protection and sustainable development and understand its connotation.

7.2 Be able to understand and evaluate the impact of engineering practices on environmental and social sustainable development of complex engineering problems related to the field of materials production.

**Graduation Requirement 8. Professional Norms:** Literacy in humanities and social sciences, a sense of social responsibility, and the ability to understand and comply with engineering professional ethics and norms and fulfill responsibilities in the engineering practice of new energy conversion materials and systems.

8.1 To understand the basic significance of worldview, outlook on life and values and their implications, to understand China's national conditions, to establish socialist core values, and to have knowledge of the humanities, critical thinking skills, ability to deal with affairs and scientific literacy.

8.2 To be able to understand the engineering professional ethics and norms of honesty and fairness, integrity and code of conduct in engineering practice, and to be able to consciously abide by them in engineering practice.

8.3 Understand the social responsibility of engineers for the safety, health and welfare of the public and for environmental protection, and be able to consciously fulfill their responsibilities in engineering practice.

**Graduation Requirement 9. Individuals and Teams** To be able to assume the roles of individual, team member, and leader in a team in a multidisciplinary context.

9.1 Understand the prevalence of multidisciplinary contexts in teamwork and the importance of teamwork, communicate effectively and work cooperatively with team members.

9.2 Be able to work independently or cooperatively in a team.

9.3 Be able to organize, coordinate and direct a team to carry out work and complete tasks on time.

**Graduation Requirements 10. Communication Ability** to effectively communicate and interact with industry peers and the general public on complex engineering issues in the field of new energy conversion materials and systems, including writing reports and design manuscripts, presenting speeches, expressing one's views clearly and responding to questions, and possessing a certain degree of international perspective and the ability to

communicate and interact in a cross-cultural context.

10.1 Knowledge of the methods and techniques of writing technical documents or scientific papers, ability to clearly express professional views on complex engineering issues in the field of new energy conversion materials and systems orally, in manuscripts and diagrams, respond to queries, and understanding of the differences in communicating with peers in the industry and the public.

10.2 Understand the international development trend and research hotspots of new energy conversion materials and systems, and understand and respect the differences and diversity of different cultures in the world.

10.3 Master a foreign language and have a certain degree of international perspective, able to communicate and exchange basic information on professional issues in the field of new energy conversion materials and systems in a cross-cultural context.

**Graduation requirement 11. Project management** Understand and have knowledge of engineering management principles and economic decision-making methods and be able to apply them to engineering activities in the materials field.

11.1 Be able to understand and master the relevant engineering management principles and economic decision-making methods in engineering projects.

11.2 To understand the engineering management and economic decision-making issues involved in the whole product cycle and process in the new energy conversion materials and systems industry.

11.3 Be able to analyze and evaluate engineering design and technology development solutions for new energy conversion materials and systems in a multidisciplinary environment using engineering principles and economic decision-making methods.

**Graduation Requirements 12. Lifelong Learning** A sense of self-directed and lifelong learning, and the ability to continuously learn and adapt to development.

12.1 Be able to understand the trend of continuous development of professional technology in the context of social and technological development, and recognize the necessity of continuous exploration and learning.

12.2 Ability to learn independently, including the ability to understand technical issues, the ability to generalize and summarize, and the ability to raise questions.

**III. Schooling System**

Four years.

**IV. Length of Study**

Flexible study period, generally four years, the minimum length of flexibility is not less than three years, the longest not more than six years.

**V. Requirements for Graduation and Degree Conferring**

To graduate, students must complete the minimum number of credits required by the Instructive Cultivation Plan for each category of study and all the content required by the Extracurricular Class, with a total of 168 credits, and a Bachelor of Engineering degree if they meet the requirements for the award of a Bachelor's degree.

**VI. Discipline**

Power Engineering and Engineering Thermophysics, Materials Science and Engineering, New Energy Science

and Engineering

**VII. Core Courses**

Basic Mechanical Design, Principles of Automatic Control, New Energy Materials, Energy Chemistry, Solid State and Semiconductor Physics, Engineering Fluid Dynamics, Engineering Thermodynamics, Hydrogen and New Energy Power Systems, Heat and Mass Transfer, Hydro and Wind Power Generation Technology, Biomass Energy Conversion Principles and Technology, Solar Photovoltaic Energy Conversion Principles and Technology, Thermal Management and Utilization, Principles and Techniques of Energy Dynamics Measurement, Distributed Power Generation and Grid-Connected Technology, Energy Economics and Policy.

**VIII. Course Structure and Course Hours (excluding Extracurricular Class)**

| **Category** | **Total Credit** | **%** | **Total Course Hours** | **Theory Learning** | **Practical Training** |
|---|---|---|---|---|---|
| Public Fundamental Course | 58.5 | 35 | 1072 | 982 | 90 |
| General Education | 10 | 6 | 160 | 160 | 0 |
| Engineering Fundamental Course | 13.5 | 8 | 216 | 208 | 8 |
| Professional Fundamental Course | 19 | 11 | 304 | 304 | 0 |
| Professional Course | 24.5 | 15 | 392 | 392 | 0 |
| Professional Practise | 41.5 | 25 | 1000 | 0 | 1000 |
| Total | 167 | 100 | 3144 | 2046 | 1098 |
| **Theory:Practical** | 65 : 35 | | | | |

## IX. Teaching schedule (1)

| Category | Type | Provided by | Course Code | Course Name | Assessment | Credit | Course Hours | Theory Learning | Practical Training | Recommended semester |
|---|---|---|---|---|---|---|---|---|---|---|
| Public Fundamental Course | required | School of | b1080001 | Basic Principles of Marxism | test | 3 | 48 | 42 | 6 | Autumn 1 |
| | required | School of | b1080009 | Ethics and the Rule of Law | non-test | 3 | 48 | 42 | 6 | Autumn 1 |
| | required | School of | b1080006 | Outline of Modern Chinese History | non-test | 3 | 48 | 42 | 6 | Spring 1 |
| | required | School of Marxism | b1080004 | Introduction to Mao Zedong Thought and the Theoretical System of Socialism with Chinese Characteristics | test | 3 | 48 | 42 | 6 | Spring 2 |
| | required | School of Marxism | b1080011 | Introduxtion to Xi Jinping Thought on Socialism with Chinese Characteristics for a New Era | test | 3 | 48 | 42 | 6 | Autumn 2 |
| | required | School of | ----- | Situation and Policy (Modules 1 to 4) | non-test | 2 | 32 | 28 | 4 | Autumn 1 to |
| | required | School of | b1080008 | Labour Education A | non-test | 0.5 | 16 | 16 | | Spring 1 |
| | required | School of | b1020080 | Advanced MathematicsA1 | test | 4 | 64 | 64 | | Autumn 1 |
| | required | School of | b1020081 | Advanced MathematicsA2 | test | 4 | 64 | 64 | | Spring 1 |
| | required | School of | b1020012 | Linear Algebra | test | 2 | 32 | 32 | | Spring 1 |
| | required | School of | b1020013 | Probability Theory and Mathematical Statistics | test | 2 | 32 | 32 | | Autumn 2 |
| | required | School of Foreign | b1020018 | Academic Chinese | non-test | 2 | 32 | 32 | | Spring 1 |
| | required | School of | b1020064 | Academic Physics A (Module 3) | test | 3 | 48 | 48 | | Spring 1 |
| | required | School of | b1020065 | Academic Physics B | test | 2 | 32 | 32 | | Autumn 2 |
| | required | School of | b1020111 | Academic Physics C | non-test | 2 | 32 | | 32 | Spring 1 |
| | required | College of | ----- | Physical Education I to VI | non-test | 3 | 160 | 160 | | Autumn 1 to |
| | required | Others | b1110003 | Military skills | non-test | 0.5 | 2W | | | Autumn 1 |
| | required | Others | b1110002 | Military theory | non-test | 0.5 | 32 | 32 | | Autumn 2 |
| | required | Others | b1080009 | Mental Health Education for University Students | non-test | 2 | 32 | 16 | 16 | Autumn 1 |
| | required | Engineering | b1010005 | University Computer Fundamentals | non-test | 2 | 32 | 32 | | Spring 1 |
| | | School of | b1012001 | Applications and Practice of Artificial Intelligence | non-test | 1 | 16 | 8 | 8 | Spring 1 |
| | | School of | b1013002 | Low-carbon and Ecological Civilization | non-test | 1 | 16 | 16 | 0 | Autumn 1 |
| | | Module A | b1020003 | General English III | test | 3 | 48 | 48 | | Autumn 1 |
| | | | b1020004 | General English IV | test | 3 | 48 | 48 | | Spring 1 |
| | | | b1020005 | General Academic English A | test | 2 | 32 | 32 | | Autumn 2 |
| | ★ Academic English(Select 1 Module for 10 Credits) | | --- | English Knowledge Expansion | non-test | 2 | 32 | 32 | | Spring 2 |
| | | Module B | b1020002 | General English II | test | 3 | 48 | 48 | | Autumn 1 |
| | | | b1020003 | General English III | test | 3 | 48 | 48 | | Spring 1 |
| | | | b1020006 | General Academic English B | test | 2 | 32 | 32 | | Autumn 2 |
| | | | --- | English Knowledge Expansion | non-test | 2 | 32 | 32 | | Spring 2 |
| | | Module C | b1020001 | General English I | test | 4 | 64 | 64 | | Autumn 1 |
| | | | b1020002 | General English II | test | 3 | 48 | 48 | | Spring 1 |
| | | | b1020003 | General English III | test | 3 | 48 | 48 | | Autumn 2 |
| | ★ Academic German | School of Foreign | b1020040 | Academic German I | test | 3 | 48 | 48 | | Autumn 1 |
| | | School of | b1020041 | Academic German II | test | 3 | 48 | 48 | | Spring 1 |
| | | School of | b1020042 | Academic German III | test | 4 | 64 | 64 | | Autumn 2 |
| | ★ Academic Japanese | School of | b1020077 | Academic Japanese I | test | 3 | 48 | 48 | | Autumn 1 |
| | | School of | b1020078 | Academic Japanese II | test | 3 | 48 | 48 | | Spring 1 |
| | | School of | b1020079 | Academic Japanese III | test | 4 | 64 | 64 | | Autumn 2 |
| **Subtotal (Public Fundamental Course)** | | | | | | **58.5** | **1072** | **982** | **90** | |
| General Education | selective | Art Education | b0----- | Aesthetic Education | non-test | 2 | 32 | 32 | | Autumn, |
| | selective | Each College | b0----- | Social Sciences and Humanistic Qualities | non-test | 4 | 64 | 64 | | Autumn, |
| | | | | Natural Sciences and Technology Innovation | non-test | 4 | 64 | 64 | | Autumn, |
| **Subtotal (General Education)** | | | | | | **10** | **160** | **160** | | |

**★ Note: The total number of credits for the first foreign language is 10, including 3 languages, namely, Academic English, Academic German, and Academic Japanese, and the appropriate language is selected as needed; where Academic English is selected, the appropriate module is selected in Module ABC.**

## IX. Teaching schedule (2)

| Category | Type | Provided by | Course Code | Course Name | Assessment | Credit | Course Hours | Theory Learning | Practical Training | Recommended Semester |
|---|---|---|---|---|---|---|---|---|---|---|

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Engineering Fundamental Course** | required | School of Energy | b2014026 | Modern Engineering Drawing | | test | 3 | 48 | 48 | | Spring 1 |
| | required | School of Energy | b2014027 | Engineering Ethics | | non-test | 0.5 | 8 | 8 | | Summer 1 |
| | required | School of Energy | b2014028 | Engineering Mechanics | | test | 2 | 32 | 32 | | Autumn 2 |
| | required | School of Energy | b2090004 | Electrical and Electronic Technology | | test | 2 | 32 | 24 | 8 | Spring 2 |
| | required | School of Energy | b2014029 | Engineering Thermodynamics | | test | 3 | 48 | 48 | | Spring 2 |
| | required | School of Energy | b2014030 | Engineering Fluid Mechanics | | test | 3 | 48 | 48 | | Spring 2 |
| **Subtotal (Engineering Fundamental** | | | | | | | **13.5** | **216** | **208** | **8** | |
| **Professional Fundamental Course** | required | School of Energy | b2014024 | Introduction to New Energy Science and | | non-test | 1 | 16 | 16 | | Autumn 1 |
| | required | School of Energy | b2014025 | Basic Chemistry | | test | 3 | 48 | 48 | | Autumn 1 |
| | required | School of Energy | b2014031 | Fundamentals of Engineering Materials | | test | 2 | 32 | 32 | | Spring 1 |
| | required | School of Energy | b2014032 | Fundamentals of Mechanical Design | | test | 2 | 32 | 32 | | Autumn 2 |
| | required | School of Energy | b2014033 | Principles of Automatic Control | | test | 3 | 48 | 48 | | Autumn 2 |
| | required | School of Energy | b2014034 | Solid State and Semiconductor Physics | | test | 2 | 32 | 32 | | Spring 2 |
| | required | School of Energy | b2014035 | Heat and Mass Transfer | | test | 3 | 48 | 48 | | Autumn 3 |
| | required | School of Energy | b2014021 | Scientific and Technical Paper Writing | | non-test | 1 | 16 | 16 | | Autumn 1 |
| | required | School of Energy | b2014059 | Artificial Intelligence Programming | | non-test | 2 | 32 | 32 | | Spring 2 |
| **Subtotal( Fundamental** | | | | | | | **19** | **304** | **304** | | |
| **Required Professional Course** | required | School of Energy | b2014037 | New Energy Materials | | test | **2** | **32** | **32** | | Autumn 2 |
| | required | School of Energy | b2014038 | Energy Chemistry | | test | **2** | **32** | **32** | | Autumn 2 |
| | required | School of Energy | b2014039 | Hydrogen Energy and New Energy | | test | **2** | **32** | **32** | | Spring 2 |
| | required | School of Energy | b2014040 | Product Carbon Footprint Assessment | | non-test | **0.5** | **8** | **8** | | Spring 2 |
| | required | School of Energy | b2014041 | Energy Engineering Management | | non-test | **1** | **16** | **16** | | Spring 2 |
| | required | School of Energy | b2014042 | Hydraulic and Wind Power Generation | | test | **2** | **32** | **32** | | Autumn 3 |
| | required | School of Energy | b2014043 | Biomass Conversion Principles and | | test | **2** | **32** | **32** | | Autumn 3 |
| | required | School of Energy | b2014044 | Solar Photovoltaic Conversion | | test | **2** | **32** | **32** | | Spring 3 |
| | required | School of Energy | b2014045 | Thermal Energy Management and | | test | **2** | **32** | **32** | | Spring 3 |
| | required | School of Energy | b2014046 | Energy Power Measurement Principles | | test | **2** | **32** | **32** | | Spring 3 |
| | required | School of Energy | b2014047 | Distributed Power Generation and Grid | | test | **2** | **32** | **32** | | Autumn 4 |
| | required | School of Energy | b2014048 | Energy Economy and Policy | | non-test | **1** | **16** | **16** | | Autumn 4 |
| | **Subtotal(Required Professional** | | | | | | **20.5** | **328** | **328** | | |
| | ★ Select different courses in different modules for 4 credits | | Module A | b2014049 | Solar Thermal Utilization Principles | non-test | 2 | 32 | 32 | | Spring 3 |
| | | | | b2014050 | Semiconductor Materials and Devices | non-test | 2 | 32 | 32 | | Spring 3 |
| | | | | b2014051 | Energy Storage Materials and Systems | non-test | 2 | 32 | 32 | | Spring 3 |
| | | | Module B | b2014053 | Low-grade Thermal Energy Utilization | non-test | 2 | 32 | 32 | | Spring 3 |
| | | | | b2014054 | Energy Saving Materials and | non-test | 2 | 32 | 32 | | Spring 3 |
| | | | | b2014055 | Thermoelectric Materials and Devices | non-test | 2 | 32 | 32 | | Spring 3 |
| | | | Module C | b2014056 | Fossil Energy Low Carbon Utilization | non-test | 2 | 32 | 32 | | Spring 3 |
| | | | | b2014057 | Photochemical Conversion Principles | non-test | 2 | 32 | 32 | | Spring 3 |
| | | | | b2014049 | Energy Catalytic Materials | non-test | 2 | 32 | 32 | | Spring 3 |
| | **Subtotal (Selective Professional** | | | | | | **6** | **64** | **64** | | |
| **Subtotal (Professional Course)** | | | | | | | **24.5** | **392** | **392** | | |

## IX. Teaching schedule (3)

| Category | Type | Provided by | Course Code | Course Name | Assessment | Credit | Course Hours | Theory Learning | Practical Training | Recommended semester |
|---|---|---|---|---|---|---|---|---|---|---|
| **Professional Practice** | School | School of Energy and | b4014017 | Basic Chemistry Laboratory | non-test | 2 | 48 | | 48 | Spring 1 |
| | required | Engineering Training | b4090003 | Basic Engineering Training C | non-test | 2 | 48 | | 48 | Summer 1 |
| | required | School of Energy and | b4014019 | Cognitive Internship | non-test | 1 | 24 | | 24 | Summer 1 |
| | required | School of Energy and | b4014020 | Academic Lectures | non-test | 1 | 24 | | 24 | Summer 1 |
| | required | ngineering Training | b4014021 | Electrical and Electronic Technology | non-test | 1 | 24 | | 24 | Spring 2 |
| | required | School of Energy and | b4013087 | Labor Education B | non-test | 0.5 | 16 | | 16 | Spring 3 |
| | required | School of Energy and | b4014022 | Level 1 Program (New Energy Materials) | non-test | 2 | 48 | | 48 | Summer 2 |
| | required | School of Energy and | b4014023 | Production Internship | non-test | 2 | 48 | | 48 | Summer 2 |
| | required | School of Energy and | b4014024 | New Energy Science and Engineering | non-test | 2 | 48 | | 48 | Summer 2 |
| | required | School of Energy and | b4014025 | Heat and Fluid Course Experiment | non-test | 2 | 48 | | 48 | Autumn 3 |
| | required | School of Energy and | b4014026 | Computer Aided Design (CFD) | non-test | 2 | 48 | | 48 | Autumn 3 |
| | required | School of Energy and | b4014027 | Innovation and Entrepreneurship in New | non-test | 2 | 48 | | 48 | Autumn 3 |
| | required | School of Energy and | b4014028 | Energy Power Measurement Experiment | non-test | 1 | 24 | | 24 | Spring 3 |
| | required | School of Energy and | b4014029 | Secondary Program (Photovoltaic | non-test | 3 | 72 | | 72 | Spring 3 |
| | required | School of Energy and | b4014030 | Graduation Internship and Graduation | non-test | 12 | 288 | | 288 | Spring 4 |
| | **Subtotal (Professional Practice)** | | | | | | 35.5 | 856 | | 856 | |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| ★ Select different courses in different modules for 6 credits | Module A | | b4014031 | Secondary Project Program (Photothermal | non-test | 3 | 72 | | 72 | Summer 3 |
| | | | b4014032 | Secondary project (semiconductor | non-test | 3 | 72 | | 72 | Summer 3 |
| | | | b4014033 | Secondary Project (Energy Storage | non-test | 3 | 72 | | 72 | Summer 3 |
| | Module B | | b4014034 | Secondary Project (Low-grade Heat | non-test | 3 | 72 | | 72 | Summer 3 |
| | | | b4014035 | Secondary Project (Energy Saving | non-test | 3 | 72 | | 72 | Summer 3 |
| | | | b4014036 | Secondary Project (Thermoelectric | non-test | 3 | 72 | | 72 | Summer 3 |
| | Module C | | b4014037 | Secondary Project Project (Materials and | non-test | 3 | 72 | | 72 | Summer 3 |
| | | | b4014038 | Secondary project (Chemical storage | non-test | 3 | 72 | | 72 | Summer 3 |
| | | | b4014039 | Secondary Project (Energy Catalytic | non-test | 3 | 72 | | 72 | Summer 3 |
| | | **Subtotal (Selective Practice Course)** | | | | 6 | 144 | | 144 | |
| **Subtotal(Professional Practice)** | | | | | | **41.5** | **1000** | | **1000** | |
| | | | | | | | | | | |
| **Extracurricular Class** | required | Others | b5110001 | Extracurricular Class | non-test | **1** | - | - | - | Autumn, Spring, |
| **Total** | | | | | | **168** | **3144** | **2046** | **1098** | |

**★ Description of vocational qualification certificates associated with the program:**
**Through the courses of Carbon Footprint Evaluation, Energy Engineering Management, and Energy Economy and Policy, students can take the vocational qualification certificate examination related to this program: Carbon Emission Manager.**

## X. Credit of Extracurricular Class

Through taking extracurricular classes, students are encouraged to take part in academic lectures, social practice activities, campus cultural and sports activities, innovative and entrepreneurial activities, voluntary activities, etc. to improve their social adaptability and enhance the competitiveness in the job market. Details are specified in Students' Manual.

## Appendix I: Matrix of Supporting Relationships of Graduation Requirements to Cultivation Objectives（√）

| Cultivation Objective / Graduation Requirements | Cultivation Objective 1 | Cultivation Objective 2 | Cultivation Objective 3 | Cultivation Objective 4 | Cultivation Objective5 |
|---|---|---|---|---|---|
| Graduation Requirement 1 | √ | √ | | | |
| Graduation Requirement 2 | √ | √ | | | |
| Graduation Requirement 3 | √ | | √ | | |
| Graduation Requirement 4 | √ | √ | | | |
| Graduation Requirement 5 | √ | | | | |
| Graduation Requirement 6 | | √ | √ | √ | |
| Graduation Requirements 7 | | | √ | √ | |
| Graduation Requirement 8 | | √ | | √ | √ |
| Graduation Requirement 9 | | √ | | | √ |
| Graduation Requirement 10 | | √ | | | √ |
| Graduation Requirement 11 | | √ | √ | | √ |
| Graduation Requirement 12 | | | √ | √ | |

## Appendix II: Matrix of Supporting Relationships of Programs to Graduation Requirements（H/M/L）

| Serial No. | Graduation Requirements(GR) / Course Name | GR 1 | GR 2 | GR 3 | GR 4 | GR 5 | GR 6 | GR 7 | GR 8 | GR 9 | GR 10 | GR 11 | GR 12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Basic Principles of Marxism | | | | | | | | L | | | | |
| 2 | Ethics and the Rule of Law | | | | | | | | L | | | | |
| 3 | Outline of Modern Chinese History | | | | | | L | | L | | | | |
| 4 | Introduction to Mao Zedong Thought and the Theoretical System of Socialism with Chinese Characteristics | | | | | | | L | L | | | | |
| 5 | Introduxtion to Xi Jinping Thought on Socialism with Chinese Characteristics for a New Era | | | | | | | | L | | | | |
| 6 | Situation and Policy (Modules 1 to 4) | | | | | | | | L | | | | |
| 7 | Labour Education A | | | | | | | | L | | | | |
| 8 | Advanced Mathematics A | M | L | | | | | | | | | | |
| 9 | Linear Algebra | M | L | | | | | | | | | | |
| 10 | Probability Theory and Mathematical Statistics | M | L | | | | | | | | | | |
| 11 | Academic Physics A/B | M | L | | | | | | | | | | |
| 12 | Academic Physics C | L | | | M | | | | | | | | |
| 13 | Academic Chinese | | | | | | | | | | M | | L |
| 14 | General English（Japaness、Germany） | | | | | | | | | | M | | |
| 15 | General Education （Humanistic、 Natural Sciences、 | | | | | | | | | | | | L |
| 16 | Military skills | | | | | | | | L | | | | |
| 17 | Military theory | | | | | | | | L | | | | |
| 18 | Basic Engineering Training C | L | | | | | | | M | | | | |
| 19 | Physical Education I to VI | | | | | | | | | L | | | L |
| 20 | Mental Health Education for University Students | | | | | | | | | | L | | L |
| 21 | Extracurricular Class | | | | | | | | L | L | L | | |
| 22 | University Computer Fundamentals | | | | | M | | | | | | | |
| 23 | Modern Engineering Drawing | | | | | M | | | | | | | |
| 24 | Engineering Ethics | | | | | | | | M | L | | | |
| 25 | Engineering Mechanics | M | M | | | | | | | | | | |
| 26 | Electrical and Electronic Technology | M | | | | | | | | | | | |
| 27 | Engineering Thermodynamics | | M | | | | | | | | | | |
| 28 | Engineering Fluid Mechanics | | M | | | | | | | | | | |
| 29 | Introduction to New Energy Science and Engineering | | | | | | | H | L | | | | |
| 30 | Basic Chemistry | M | | | | | | M | | | | | |
| 31 | Fundamentals of Engineering Materials | | | H | | | | M | | | | | |
| 32 | Fundamentals of Mechanical Design | M | | M | | | | | | | | | |
| 33 | Principles of Automatic Control | | M | | | | | | | | | | |
| 34 | Solid State and Semiconductor Physics | H | | | | | | M | | | | | |
| 35 | Heat and Mass Transfer | | M | | | | | | | | | | |
| 36 | Scientific and Technical Paper Writing and Literature Search | | | | | | | | | | M | | M |
| 37 | Artificial Intelligence Programming (Python) | | M | | | M | | | | | | | |
| 38 | New Energy Materials | M | | | | | M | | | | | | |
| 39 | Energy Chemistry | | | | | | | M | | | | | |
| 40 | Hydrogen Energy and New Energy Power Systems | | | | | | | M | | | | | |
| 41 | Product Carbon Footprint Assessment | | | | | | | M | | | | | |
| 42 | Energy Engineering Management | | | | | | M | | | | | M | |
| 43 | Hydraulic and Wind Power Generation Technology | M | | | | | | | L | | | | |
| 44 | Biomass Conversion Principles and Technology | M | | | | | | | L | | | | |
| 45 | Solar Photovoltaic Conversion Principles and Technology | | | M | | | | | | | | | |

| Serial No. | Graduation Requirements(GR) / Course Name | GR 1 | GR 2 | GR 3 | GR 4 | GR 5 | GR 6 | GR 7 | GR 8 | GR 9 | GR 10 | GR 11 | GR 12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 46 | Thermal Energy Management and Utilization | | | M | | | | | | | | | |
| 47 | Energy Power Measurement Principles and Technology | | | | | M | | | | | | | |
| 48 | Distributed Power Generation and Grid Connection Technology | M | | | | | | | | | | | |
| 49 | Energy Economy and Policy | | | | | | M | M | | | | | |
| 50 | Solar Thermal Utilization Principles and Technology | | | M | | | | M | | | | | |
| 51 | Semiconductor Materials and Devices | | | M | | | | M | | | | | |
| 52 | Energy Storage Materials and Systems | | | M | | | | M | | | | | |
| 53 | | | | M | | | | M | | | | | |
| 54 | Low-grade Thermal Energy Utilization Principles and Technology | | | M | | | | M | | | | | |
| 55 | Energy Saving Materials and Technologies | | | M | | | | M | | | | | |
| 56 | Thermoelectric Materials and Devices | | | M | | | | M | | | | | |
| 57 | Fossil Energy Low Carbon Utilization Technology | | | M | | | | M | | | | | |
| 58 | Photochemical Conversion Principles and Hydrogen Production Technology | | | M | | | | M | | | | | |
| 59 | Basic Chemistry Laboratory | | | | | | | | | M | | | |
| 60 | Basic Engineering Training C | | | | | | H | M | | | | | |
| 61 | Cognitive Internship | | | | | | | M | | | M | | |
| 62 | Academic Lectures | | | | M | | | | | | | | |
| 63 | Electrical and Electronic Technology Laboratory | | | | | | | M | | | | | M |
| 64 | Labor Education B | | | M | | | | | | | L | | |
| 65 | Level 1 Program (New Energy Materials) | | | | | | H | | M | M | L | | |
| 66 | Production Internship | | M | | M | | | | | | | | |
| 67 | New Energy Science and Engineering Basic Experiment | | M | | M | | | | | | | | |
| 68 | Heat and Fluid Course Experiment | | | | | H | | | | | | | |
| 69 | Computer Aided Design (CFD) | | | | | | | | | H | | M | |
| 70 | Innovation and Entrepreneurship in New Energy | | | | M | L | | | | | | | |
| 71 | Energy Power Measurement Experiment | | | H | | | M | | | | L | | |
| 72 | Secondary Program (Photovoltaic Conversion Materials and System Design) | | | | H | M | | | | | H | L | M |
| 73 | Secondary Project Program (Photothermal Conversion Materials and System Design) | | | | H | | | | M | L | L | | |
| 74 | Secondary project (semiconductor materials and system design) | | | | H | | | | M | L | L | | |
| 75 | Secondary Project (Energy Storage Materials and System Design) | | | | H | | | | M | L | L | | |
| 76 | Secondary Project (Low-grade Heat Conversion Materials and System Design) | | | | H | | | | M | L | L | | |
| 77 | Secondary Project (Energy Saving Materials and System Design) | | | | H | | | | M | L | L | | |
| 78 | Secondary Project (Thermoelectric Conversion Materials and System Design) | | | | H | | | | M | L | L | | |
| 79 | Secondary Project Project (Materials and System Design for Low Carbon Utilization of Energy) | | | | H | | | | M | L | L | | |
| 80 | Secondary project (Chemical storage materials and system design) | | | | H | | | | M | L | L | | |
| 81 | Secondary Project (Energy Catalytic Materials and System Design) | | | | H | | | | M | L | L | | |

Notes:

The strength of a course's support for graduation requirements is indicated by “H/high, M/medium, L/weak”;

Strength of support is defined as the extent to which the course covers the graduation requirement indicator points, with H covering at least 80%, M at least 50%, and L at least 30%.