# Materials Chemistry

**(Grade 2022)**

**Course code: 080403**

## I. Cultivation Objectives

1. General cultivation objective

This program cultivates engineering talents with comprehensive development of morality, intellect, physique, aesthetics and labor, who have solid knowledge of materials science and chemistry and master the design and preparation technology of advanced functional materials (especially green electronic materials). Graduates can be engaged in the research and development of new products, processes and technologies for environmentally friendly materials, production management, process control and quality management in electronic components, printed circuit boards, electronic raw materials, electronic information chemicals and other related industries, and have the potential to pursue further studies.

2. Objective of value guidance

Have consciousness of green manufacturing, sustainable development, environmental protection and production safety, a healthy personality and psychological quality, good scientific and cultural literacy, correct professional ethics, professional conduct and a sense of social responsibility, which will be applied in the design, development and implementation of material process solutions to promote the development of the national electronic information materials industry.

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

(1) Be able to apply knowledge of Materials Chemistry to optimize materials production processes in real companies, to analyse and propose effective solutions to complex engineering problems such as the development of new materials, materials modification and materials performance testing.

(2) Be proficient in Materials Chemistry, particularly in technical or managerial work related to this profession in electronic information materials-related companies, and have adaptability to working independently and in teams.

(3) Be familiar with the important laws, regulations and policies of the professions and industries related to the materials, chemical and environmental fields, and to be able to analyse trends in the relevant fields.

(4) Be familiar with and comply with important laws, regulations and policies of the professions and industries related to the field of Materials Chemistry, have good moral and humanistic qualities, have an consciousness of the environment and sustainability, comply with professional codes, have an artisanal spirit and assume social responsibility.

(5) Have good interpersonal, psychological, organizational and management and implementation skills, be a team player, able to integrate, drive or coordinate the organization and implementation of projects and play an effective role.

**II. Graduation requirements**

**1. Engineering Knowledge:** Have the ability to apply knowledge of mathematics, natural sciences, engineering fundamentals and Materials Chemistry to solve complex engineering problems in the design and preparation, structure and properties, processes and equipment, products and applications of environmentally friendly functional materials.

**1.1** Be able to apply knowledge of mathematics, natural sciences, engineering fundamentals and Materials Chemistry to appropriately formulate engineering problems in environmentally friendly functional materials.

**1.2** Be able to develop suitable mathematical models for the design and preparation, structure and properties, processes and equipment, and products and applications of environmentally friendly functional materials and solve them using appropriate engineering conditions.

**1.3** Be able to apply knowledge of mathematics, natural sciences, engineering fundamentals, Materials Chemistry and mathematical models to the derivation and analysis of complex engineering problems in the design and preparation, structure and properties, processes and equipment, products and applications of environmentally friendly functional materials.

**1.4** Be able to apply knowledge of mathematics, natural sciences, engineering fundamentals, Materials Chemistry and mathematical models to the comparison and synthesis of solutions to complex engineering problems in the design and preparation, structure and properties, processes and equipment, products and applications of environmentally friendly functional materials.

**2. Analysis of the Problem:** Be able to apply the fundamental principles of mathematics, natural science, engineering science and Materials Chemistry to identify and express complex engineering problems in the design and preparation, structures and properties, processes and equipment, and products and applications of environmentally friendly functional materials, and to obtain valid conclusions through literature research and analysis.

**2.1** Be able to apply the basic principles of mathematics, natural science, engineering science and Materials Chemistry to identify and judge the key aspects of complex engineering problems in the design and preparation, structure and properties, processes and equipment, and products and applications of environmentally friendly functional materials.

**2.2** Be able to apply basic principles and mathematical modelling methods from mathematics, natural science, engineering science and Materials Chemistry to correctly represent complex engineering problems in the

design and preparation, structures and properties, processes and equipment, and products and applications of environmentally friendly functional materials.

**2.3** Be able to recognize that there are multiple solutions available for complex engineering problems in environmentally friendly functional materials and will seek alternative solutions through literature research.
**2.4** Be able to apply basic principles and draw on literature research to analyse the factors influencing complex engineering problems in environmentally friendly functional materials and to obtain valid conclusions.

**3. Design/develop of solutions:** Have the ability to conceive and design solutions to complex engineering problems in the field of environmentally friendly functional materials, to design systems, units (components) or processes that meet specific needs, and to demonstrate a sense of innovation in the design process, taking into account social, health, safety, legal, cultural and environmental considerations.

**3.1** Understand basic design/development methods and techniques for the full cycle and full process of engineering design and product development of environmentally friendly functional materials and understand the various factors that influence Product Design and technical solutions for environmentally friendly functional materials.
**3.2** Be able to design and develop units (components) that meet specific needs in the preparation, process, equipment and application of environmentally friendly functional materials by addressing solutions to complex engineering problems in environmentally friendly functional materials.

**3.3** Be able to present design/development solutions for the full process of Product Design of environmentally friendly functional materials in the form of drawings, design specifications, data diagrams or physical objects, and demonstrate a sense of innovation 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 environmentally friendly functional materials.

**4. Research:** Have the ability to apply scientific principles and methods to complex engineering problems in environmentally friendly functional materials, including the design of experiments, analysis and interpretation of data, and the synthesis of information to reach sound and valid conclusions.

**4.1** Be able to investigate and analyse solutions to complex engineering problems in environmentally friendly functional materials based on relevant scientific principles, through literature research or related methods.

**4.2** Be able to select a research route and design a feasible experimental program according to the characteristics of the research object of environmentally friendly functional materials.
**4.3** Be able to construct an experimental system according to the experimental scheme of

environment-friendly functional materials and adopt scientific and safe methods and means to carry out experimental research, and be able to collect and collate experimental data correctly.
**4-4** Be able to analyse and interpret the results of experimental research and obtain reasonable and valid conclusions through information synthesis.

**5. Use of modern tools:** Have the ability to develop, select and use appropriate modern instruments, graphic tools and software, information retrieval tools, etc., to predict and simulate solutions to complex engineering problems in the design and preparation, structure and properties, processes and equipment, products and applications of environmentally friendly functional materials, and to understand their limitations.

**5-1** Understand the principles and methods of using modern instrumentation, information technology tools, engineering tools and simulation software in the field of environmentally friendly functional materials, and understand their limitations.
**5.2** Be able to select and use appropriate instrumentation, information resources, engineering tools and simulation software to analyse, calculate and design complex engineering problems in the design and preparation, structure and properties, processes and equipment, and products and applications of environmentally friendly functional materials.
**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, and products and applications of environmentally friendly functional materials for a specific research target, and understand the limitations of simulation and prediction.

**6. Engineering and Society:** Have the ability to undertake a sound analysis of engineering practices related to Materials Chemistry based on engineering background knowledge and to evaluate the social, health, safety, legal and cultural impacts of the production, design and development of environmentally friendly functional materials, and to understand the responsibilities involved.

**6-1** Have experience of internships and engineering practice in Materials Chemistry-related companies, knowledge of industrial technology standards, industrial policies and laws and regulations, and culture related to the field of environmentally friendly functional materials, and an understanding of the impacts of different social cultures on engineering activities.
**6-2** Be able to analyse and evaluate the social, health, safety, legal and cultural impacts of the implementation of projects in the field of environmentally friendly functional materials and the impacts of these constraints on the implementation of relevant projects, and understand the responsibilities involved.

**7. Environment and Sustainable Development:** Have the ability to understand and evaluate the impacts of engineering practice issues of the production and development of environmentally friendly functional materials on the environment and sustainable development of society.

**7-1** Understand national strategies for environmental and social sustainability and related policies, laws and regulations, and develop a concept of environmental protection and sustainable development and an understanding of its implications.

**7-2 Be** able to understand and evaluate the impacts of engineering practice on environmental and social sustainability in complex engineering problems related to the field of materials production.

**8: Professional Codes:** Have human and social science literacy, social responsibility and the ability to understand and comply with engineering ethics and codes of practice and responsibilities in the engineering practice of environmentally friendly functional materials.

**8-1** Understand the fundamental significance of perspective on world, life and values and their impact, understand the national conditions of China, develop core values of socialism, and have humanistic knowledge, critical thinking skills, ability to deal with situations and scientific literacy.

**8-2** Be able to understand the engineering ethics and codes of honesty and fairness and integrity in engineering practice and be able to follow them consciously in engineering practice.

**8-3** Understand the engineer's social responsibility for the safety, health and well-being of the public, and for environmental protection, and be able to exercise conscious responsibility in the practice of engineering.

**9: Individuals and teams:** Have the ability to assume the role of individual, team member and leader of a team in a multidisciplinary context.

**9-1** Understand the prevalence of multidisciplinary backgrounds in team work and the importance of teamwork to communicate effectively and work collaboratively with team members.

**9-2 Be** able to work independently or collaboratively in a team.

**9-3** Be able to organize, co-ordinate and direct a team to carry out work and complete tasks on time.

**10: Communication:** Have the ability to communicate effectively with industry peers and the public on complex engineering issues related to environmentally friendly functional materials, including writing reports and briefs design, presenting statements, expressing their views clearly and answering questions. Have an international perspective and be able to communicate and interact in a cross-cultural context.

**10-1** Master the methods and techniques of writing technical documents or scientific papers, and be able to clearly express professional views on complex engineering issues in the field of environmentally friendly functional materials orally, in manuscripts and diagrams. Be able to respond to queries, and understand the differences in communication with industry peers and the public.

**10-2** Understand international trends and research hotspots in environmentally friendly functional materials and understand and respect the differences and diversity of different cultures around the world.

**10-3** Have knowledge of a foreign language and a certain international perspective, with the ability to communicate and exchange basic information on professional issues in the field of environmentally friendly functional materials, in a cross-cultural context.

**11: Project Management:** Understand and master the principles of engineering management and economic decision-making methods and be able to apply them to engineering activities in the materials sector.

**11-1** Be able to understand and appreciate the relevant engineering management principles and economic decision-making methods in engineering projects.

**11-2** Understand the engineering management and economic decision-making issues involved in the full product cycle and process in the environmentally friendly functional materials industry.

**11-3** Be able to analyse and evaluate engineering design and technology development options for environmentally friendly functional materials using engineering principles and economic decision-making methods in a multidisciplinary environment.

**12: Lifelong learning:** Have a sense of independent and lifelong learning, with the ability to learn and adapt to development.

**12-1** Be able to understand trends in the ongoing development of professional skills in the context of social and technological developments and recognize the need for continuous exploration and learning.

**12-2** Have the ability to learn independently, including the ability to understand technical issues, summarize and ask questions, etc.

**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**

In order to graduate, students must complete the minimum number of credits required by the Instructive Cultivation Plan for each course category and all the content required by the Extracurricular Class, with a total of 165 credits, and will be awarded a Bachelor of Engineering degree if they meet the requirements for the award of a Bachelor's degree.

**VI. Discipline**

Materials Science and Engineering, Chemistry

**VII. Core Courses**

Inorganic Chemistry, Organic Chemistry, Analytical Chemistry, Physical Chemistry, Fundamentals of Materials Science, Materials Chemistry, Materials Analysis and Testing, Polymer Chemistry and Physics, Physical and Mechanical Properties of Materials, Materials Technology

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

| **Category** | **Total Credit** | **%** | **Total Course Hours** | **Theory Learning** | **Practical Training** |
|---|---|---|---|---|---|
| Public Fundamental Course | 55.5 | 34 | 1024 | 944 | 80 |
| General Education | 10 | 6 | 160 | 160 | 0 |
| Engineering Fundamental Course | 6 | 4 | 96 | 64 | 32 |
| Professional Fundamental Course | 28 | 17 | 448 | 448 | 0 |
| Professional Course | 23 | 14 | 368 | 336 | 32 |
| Professional Practice | 41.5 | 25 | 1000 | 0 | 1000 |
| Total | 164 | 100 | 3096 | 1952 | 1144 |
| **Theory**: **Practical** (%) | 63:37 | | | | |

## IX. Teaching schedule (1)

| Category | Type | Provided by | Course Code | Course Name | Assessment | Credit | Course Hours | Theory Learning | Practical | Recommended semester |
|---|---|---|---|---|---|---|---|---|---|---|
| Public Fundamental Course | required | School of Marxism | b1080009 | Ethics and the Rule of Law | non-test | 3 | 48 | 42 | 6 | Autumn 1 |
| | required | School of Marxism | 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 I | test | 3 | 48 | 42 | 6 | Autumn 2 |
| | required | School of Marxism | b1080007 | Introduction to Mao Zedong Thought and the Theoretical System of Socialism with Chinese Characteristics II | test | 2 | 32 | 28 | 4 | Spring 2 |
| | required | School of Marxism | ----- | Situation and Policy (Modules 1 to 4) | non-test | 2 | 32 | 28 | 4 | Autumn 1 to Spring 2 |
| | required | School of Marxism | b1080008 | Labour Education A | non-test | 0.5 | 16 | 16 | | Spring 1 |
| | required | College of Arts and Sciences | b1020080 | Advanced MathematicsA1 | test | 4 | 64 | 64 | | Autumn 1 |
| | required | College of Arts and Sciences | b1020081 | Advanced MathematicsA2 | test | 4 | 64 | 64 | | Spring 1 |
| | required | College of Arts and Sciences | b1020012 | Linear Algebra | test | 2 | 32 | 32 | | Autumn 2 |
| | required | College of Arts and Sciences | b1020013 | Probability Theory and Mathematical Statistics | test | 2 | 32 | 32 | | Autumn 2 |
| | required | College of Arts and Sciences | b1020018 | Academic Chinese | non-test | 2 | 32 | 32 | | Spring 1 |
| | required | College of Arts and Sciences | b1020064 | Academic Physics A (Module 3) | test | 3 | 48 | 48 | | Spring 1 |
| | required | College of Arts and Sciences | b1020065 | Academic Physics B | test | 2 | 32 | 32 | | Autumn 2 |
| | required | College of Arts and Sciences | b1020111 | Academic Physics C | non-test | 2 | 32 | | 32 | Autumn 2 |
| | required | College of Physical Education | ----- | Physical Education I to VI | non-test | 3 | 160 | 160 | | Autumn 1 to Autumn 4 |
| | required | Others | b1110003 | Military skills | non-test | 0.5 | 2W | | | Autumn 1 |
| | required | College of Arts and Sciences | b1110002 | Military theory | non-test | 0.5 | 32 | 32 | | Spring 1 |
| | required | Others | b1080009 | Mental Health Education for University Students | non-test | 2 | 32 | 16 | 16 | Autumn 1 |
| | required | Engineering Training | b1010005 | University Computer Fundamentals | non-test | 2 | 32 | 32 | | Spring 1 |
| | ★ Academic English(Select 1 Module for 10 Credits) | 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 |
| | | | --- | 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 | College of Arts and Sciences | b1020040 | Academic German I | test | 3 | 48 | 48 | | Autumn 1 |
| | | College of Arts and Sciences | b1020041 | Academic German II | test | 3 | 48 | 48 | | Spring 1 |
| | | College of Arts and Sciences | b1020042 | Academic German III | test | 4 | 64 | 64 | | Autumn 2 |
| | ★ Academic Japanese | College of Arts and Sciences | b1020077 | Academic Japanese I | test | 3 | 48 | 48 | | Autumn 1 |
| | | College of Arts and Sciences | b1020078 | Academic Japanese II | test | 3 | 48 | 48 | | Spring 1 |
| | | College of Arts and Sciences | b1020079 | Academic Japanese III | test | 4 | 64 | 64 | | Autumn 2 |
| **Subtotal (Public Fundamental Course)** | | | | | | **55.5** | **1024** | **944** | **80** | |
| General Education | selective | Art Education Center | b0----- | Aesthetic Education | non-test | 2 | 32 | 32 | | Autumn, Spring |
| | selective | Each College | b0----- | Social Sciences and Humanistic Qualities | non-test | 4 | 64 | 64 | | Autumn, Spring |
| | | | | Natural Sciences and Technology Innovation | non-test | 4 | 64 | 64 | | Autumn, Spring |
| **Subtotal (General Education)** | | | | | | **10** | **160** | **160** | | |

(★Note: The first foreign language is 10 credits in total, including 3 languages: Academic English, Academic German and Academic Japanese, choose the appropriate language as required; when Academic English is chosen, please choose the appropriate module in Module A, B, C)

## IX. Teaching schedule (2)

| Category | Type | Provided by | Course Code | Course Name | Assessment | Credit | Course Hours | Theory Learning | Practical Training | Recommended semester |
|---|---|---|---|---|---|---|---|---|---|---|
| **Engineering Fundamental** | required | Engineering Training | b2090005 | Electrical and Electronic Technology | non-test | 3 | 48 | 32 | 16 | Autumn 3 |
| | required | School of Energy and Materials | b2014001 | Mechanical drawing | test | 3 | 48 | 32 | 16 | Autumn 3 |
| **subtotal (Engineering Fundamental Course)** | | | | | | **6** | **96** | **64** | **32** | |
| **Professional Fundamental Course** | required | School of Energy and Materials | b2013130 | Inorganic chemistry | test | 4 | 64 | 64 | | Autumn 1 |
| | required | School of Energy and Materials | b2013099 | Introduction to the Program of Materials Chemistry | non-test | 1 | 16 | 16 | | Autumn 1 |
| | required | School of Energy and Materials | b2013093 | Organic Chemistry | test | 3 | 48 | 48 | | Spring 1 |
| | required | School of Energy and Materials | b2013015 | Fundamentals of Materials Science | test | 3 | 48 | 48 | | Autumn 2 |
| | required | School of Energy and Materials | b2013031 | Analytical Chemistry | test | 3 | 48 | 48 | | Autumn 2 |
| | required | School of Energy and Materials | b2013177 | Physical Chemistry | test | 3 | 48 | 48 | | Spring 2 |
| | required | School of Energy and Materials | b2013007 | Materials Analysis and Testing | test | 3 | 48 | 48 | | Spring 2 |
| | required | School of Energy and Materials | b2013035 | Polymer Chemistry and Physics | test | 3 | 48 | 48 | | Spring 2 |
| | required | School of Energy and Materials | b2013010 | Materials Chemistry | test | 3 | 48 | 48 | | Autumn 3 |
| | required | School of Energy and Materials | b2013175 | Scientific and Technical Paper Writing and Literature Search | non-test | 2 | 32 | 32 | | Spring 2 |
| **Subtotal (Professional Fundamental Course)** | | | | | | **28** | **448** | **448** | | |
| **Professional Course** | required | School of Energy and Materials | b2014002 | Physical and Mechanical Properties of Materials | test | 2 | 32 | 32 | | Spring 2 |
| | required | School of Energy and Materials | b2013103 | Materials Technology | test | 2 | 32 | 32 | | Autumn 3 |
| | required | School of Energy and Materials | b2013092 | Applied Electrochemistry (English-taught) | test | 3 | 48 | 32 | 16 | Autumn 3 |
| | required | School of Energy and Materials | b2013006 | Material table interface | test | 3 | 48 | 32 | 16 | Spring 3 |
| | required | School of Energy and Materials | b2013106 | Nanomaterials technology | test | 3 | 48 | 48 | | Spring 3 |
| | required | School of Energy and Materials | b2014003 | Semiconductor materials | test | 3 | 48 | 48 | | Spring 3 |
| | required | School of Energy and Materials | b2013032 | Packaging materials and devices | non-test | 2 | 32 | 32 | | Spring 3 |
| | required | School of Energy and Materials | b2014004 | Project Management | non-test | 1 | 16 | 16 | | Autumn 4 |
| | **Subtotal(Required Professional Course)** | | | | | **19** | **304** | **272** | **32** | |
| | Selective 2 Credits | School of Energy and Materials | b2013005 | Thin film materials and preparation technology | non-test | 2 | 32 | 32 | | Spring 3 |
| | | School of Energy and Materials | b2013033 | Composite materials | test | 2 | 32 | 32 | | Spring 3 |
| | | School of Energy and Materials | b2013029 | Electronic chemicals | non-test | 2 | 32 | 32 | | Spring 3 |
| | Selective 2 Credits | School of Energy and Materials | b2013086 | Introduction to New Energy Materials | non-test | 2 | 32 | 32 | | Autumn 4 |
| | | School of Energy and Materials | b2013069 | Energy saving materials for buildings | non-test | 2 | 32 | 32 | | Autumn 4 |
| | | School of Energy and Materials | b2013111 | Optoelectronic materials and devices | non-test | 2 | 32 | 32 | | Autumn 4 |
| | **Subtotal (Selective Professional Course)** | | | | | **4** | **64** | **64** | | |
| **Subtotal (Professional Course)** | | | | | | **23** | **368** | **336** | **32** | |

## IX. Teaching schedule (3)

| Category | Type | Provided by | Course Code | Course Name | Assessment | Credit | Course Hours | Theory Learning | Practical Training | Recommended semester |
|---|---|---|---|---|---|---|---|---|---|---|
| Professional Practice | required | School of Energy and Materials | b4013052 | Inorganic chemistry experiments | non-test | 1 | 24 | | 24 | Autumn 1 |
| | required | School of Energy and Materials | b4013043 | Organic chemistry experiments | non-test | 1 | 24 | | 24 | Spring 1 |
| | required | Engineering Training | b4090003 | Basic Engineering Training C | non-test | 2 | 48 | | 48 | Summer 1 |
| | required | School of Energy and Materials | b4013076 | Cognitive Placement | non-test | 1 | 24 | | 24 | Summer 1 |
| | required | School of Energy and Materials | b4013037 | Academic Lectures I | non-test | 1 | 24 | | 24 | Summer 1 |
| | required | School of Energy and Materials | b4013015 | Analytical chemistry experiments | non-test | 1 | 24 | | 24 | Autumn 2 |
| | required | School of Energy and Materials | b4013017 | Polymer chemistry and physics experiments | non-test | 1 | 24 | | 24 | Spring 2 |
| | required | School of Energy and Materials | b4013038 | Academic Lectures II | non-test | 1 | 24 | | 24 | Summer 2 |
| | required | School of Energy and Materials | b4013035 | Physical chemistry experiments | non-test | 1 | 24 | | 24 | Summer 2 |
| | required | School of Energy and Materials | b4014001 | Comprehensive Experiment 1 - Preparation and Application of Functionalized Modification of | non-test | 3 | 72 | | 72 | Summer 2 |
| | required | School of Energy and Materials | b4013001 | Materials Chemistry experiments | non-test | 1 | 24 | | 24 | Autumn 3 |
| | required | School of Energy and Materials | b4014002 | Comprehensive Experiment 2 - Preparation and Application of Green Catalytic Materials | non-test | 3 | 72 | | 72 | Autumn 3 |
| | required | School of Energy and Materials | b4013087 | Labour Education B | non-test | 0.5 | 16 | | 16 | Spring 3 |
| | required | School of Energy and Materials | b4000002 | the Program of Materials Chemistry Innovation and Entrepreneurship | non-test | 2 | 48 | | 48 | Spring 3 |
| | required | School of Energy and Materials | b4014005 | Basic training in battery materials | non-test | 2 | 48 | | 48 | Summer 3 |
| | required | School of Energy and Materials | b4013079 | Professional internships | non-test | 1 | 24 | | 24 | Summer 3 |
| | required | School of Energy and Materials | b4014008 | Comprehensive Experiment 7 - Preparation and application of photocatalytic materials | non-test | 2 | 48 | | 48 | Autumn 4 |
| | required | School of Energy and Materials | b4013002 | Materials Chemistry Graduation Internship and Graduation Design (Thesis) | non-test | 12 | 288 | | 288 | Spring 4 |
| | **Subtotal(Required Professional Practice)** | | | | | **36.5** | **880** | | **880** | |
| | Selective 3 Credits | School of Energy and Materials | b4014003 | Comprehensive Experiment 3 - Preparation and Application of Thermally Conductive | non-test | 3 | 72 | | 72 | Spring 3 |
| | | School of Energy and Materials | b4014004 | Comprehensive Experiment 4 - Preparation and Application of Thermoelectric Materials | non-test | 3 | 72 | | 72 | Spring 3 |
| | Selective 2 Credits | School of Energy and Materials | b4014006 | Comprehensive Experiment 5 - Preparation and application of thermal interface materials | non-test | 2 | 48 | | 48 | Summer 3 |
| | | School of Energy and Materials | b4014007 | Comprehensive experiment 6 - Preparation and performance testing of thermal storage | non-test | 2 | 48 | | 48 | Summer 3 |
| | **Subtotal(Selective Professional Practice)** | | | | | **5** | **120** | | **120** | |
| **Subtotal(Professional Practice)** | | | | | | **41.5** | **1000** | | **1000** | |
| **Extracurricular** | required | Others | b5110001 | Extracurricular Class | non-test | **1** | - | - | - | Autumn, Spring, |
| **Total** | | | | | | **165** | **3096** | **1952** | **1144** | |

**★Explanation of the relevance of professional certificates to the course:**

Students will learn analytical chemistry, analytical chemistry experiments, materials analysis and testing, and materials structure characterization, and will be able to sit for the vocational qualification examinations related to this subject: chemical analyst, chemical examiner, and materials composition examiner.

## X. Prerequisite for Course Study

| No. | Course Name | Prerequisite Course | No. | Course Name | Prerequisite Course |
|---|---|---|---|---|---|
| 1 | Materials Chemistry | Physical Chemistry | 7 | Packaging materials and devices | Fundamentals of Materials Science |
| | | Fundamentals of Materials Science | | | Materials Chemistry |
| | | Inorganic chemistry | | | Physical and Mechanical Properties of Materials |
| 2 | Physical and Mechanical Properties of Materials | Fundamentals of Materials Science | 8 | Composite materials | Fundamentals of Materials Science |
| | | University Physics | | | Materials Chemistry |
| | | Advanced Mathematics | | | Polymer Chemistry and Physics |
| 3 | Materials Analysis and Testing | Organic Chemistry | 9 | Nanomaterials technology | Inorganic chemistry |
| | | Inorganic chemistry | | | Physical Chemistry |
| | | Fundamentals of Materials Science | | | Materials Chemistry |
| | | University Physics | | | Physical and Mechanical Properties of Materials |
| 4 | Polymer Chemistry and Physics | Organic Chemistry | 10 | Environmental materials | Fundamentals of Materials Science |
| | | Inorganic chemistry | | | Materials Chemistry |
| | | University Physics | | | Inorganic chemistry |
| 5 | Materials Technology | Fundamentals of | 11 | Material table interface | Fundamentals of Materials Science |
| | | Inorganic chemistry | | | Inorganic chemistry |
| | | Organic Chemistry | | | Physical Chemistry |
| | | Polymer Chemistry and Physics | | | Materials Chemistry |
| 6 | Applied electrochemistry | Inorganic chemistry | 12 | Semiconductor materials | University Physics |
| | | Organic Chemistry | | | Fundamentals of Materials Science |
| | | Physical Chemistry | | | Materials Chemistry |
| | | Analytical Chemistry | | | Physical and Mechanical Properties of Materials |

## XI. 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.