| VIETNAM NATIONAL UNIVERSITY - HO CHI MINH CITY<br>**UNIVERSITY OF SCIENCE** | **SOCIALIST REPUBLIC OF VIETNAM**<br>**Independence – Liberty - Happiness** |
|---|---|

# PROGRAM LEVEL
# BACHELOR OF SCIENCE IN MATERIALS TECHNOLOGY
# Admission: 2022

*(Decision No 1477/QĐ-KHTN dated 8 September2022*
*issued by the Rector of the University of Science, VNU-HCM)*

## 1. General information of the program

1.1. 1.1. Program name:

- Programme name in Vietnamese: Công nghệ vật liệu
- Programme name in English: Materials Technology

1.2. Major code: 7510402

1.3. Level: Undergraduate.

1.4. Type of diploma: Bachelor of Science in Materials Technology

1.5. Mode of study: Full time

1.6. Training duration: 4 years

1.7. Name of diploma:

- Name of diploma in Vietnamese: Cử nhân Công nghệ vật liệu
- Name of diploma in English: Bachelor of Materials Technology

1.8. Language: Vietnamese

1.9. Training place:

- Campus 1: 227 Nguyen Van Cu Std., Ward 4, District 5, Ho Chi Minh City.
- Campus 2: Linh Trung Ward, Thu Đuc City, Ho Chi Minh City.

## 2. Program Objectives

2.1. General objectives:

Training Bachelor of Materials Technology with solid expertise in the field of materials, proficient practical skills, high creativity, good teamwork and communication skills, proficient use of specialized foreign languages, high professional ethics and professionalism, meeting the needs of society for the field of advanced and smart materials. Bachelor of Materials Technology has the ability to apply specialized knowledge, practical skills and methodologies to research and develop products in the field of materials.

## 2.2. Specific objectives

| STT | Goals (MT or G) | Goal |
|---|---|---|
| **KNOWLEDGE** | | |
| 1 | MT1.1 | Apply knowledge of mathematics, physics, chemistry, computer science and basic social sciences to solve practical problems in manufacturing, design and materials selection. |
| 2 | MT1.2 | Apply materials science knowledge to innovate industrial processes, develop products and optimize materials for specific applications. |
| **SKILLS** | | |
| 3 | MT2.1 | Ability to work effectively in multidisciplinary teams, have independent scientific work skills, present and discuss work results. |
| **ATTITUDES** | | |
| 4 | MT3.1 | Develop the skills and mindsets necessary for lifelong learning, including the ability to evaluate new information, adapt to evolving technological and professional landscapes, and actively seek opportunities for ongoing personal and professional development. |
| **PROFESSIONAL RESPONSIBILITY** | | |
| 5 | MT4.1 | Commit to act in accordance with professional ethics, responsibilities and workplace regulations. |

2.3. LEARNING OUTCOME (LO) of the training program (specified from specific objectives)

| No | LOs | Expected LOs | Level of achievement of the LOs (according to Bloom's taxonomy)* | Link between LOs and training objectives |
|---|---|---|---|---|
| **KNOWLEDGE** | | | | |
| 1 | CCT1.1 | Gain a solid foundation of knowledge about the properties of different materials and the scientific principles that influence material behavior. | 4 | MT1.1 |
| 2 | CCT1.2 | demonstrate an understanding of the | 4 | MT1.1 |

| No | LOs | Expected LOs | Level of achievement of the LOs (according to Bloom's taxonomy)* | Link between LOs and training objectives |
|---|---|---|---|---|
| | | structure-process-property relationships of materials | | |
| 3 | CCT1.3 | Apply knowledge and skills to optimize the manufacturing process of products with specific features. | 4 | MT1.2 |
| **SKILLS** | | | | |
| 4 | CCT2.1 | Gain proficiency in the use of synthesis techniques and materials characterization to solve practical engineering problems, particularly in product design, materials optimization and manufacturing taking into account performance, cost and sustainability criteria. | 4 | MT1.3 |
| 5 | CCT2.2 | Use and interpret results from data to make decisions about materials selection and fabrication. | 4 | MT1.3 |
| 6 | CCT2.3 | Develop critical thinking and problem solving skills to support working effectively in multidisciplinary teams. | 4 | MT1.4 |
| 7 | CCT2.4 | Communicate scientific information effectively, especially using English, to a variety of audiences | 4 | MT1.4 |
| **ATTITUDES** | | | | |
| 8 | CCT3.1 | Committed to lifelong learning to stay up to date with new advances in engineering and materials technology. | 4 | MT1.4 |
| **PROFESSIONAL RESPONSIBILITY** | | | | |
| 9 | CCT4.1 | Promote professional ethics and social responsibility, emphasizing the impact of materials science on society and the environment. | 4 | MT1.5 |

2.4. Career opportunities/jobs that learners can take on

Bachelor of Materials Technology can work at:

- - Factories, high-tech zones, enterprises, companies, research institutes... have activities related to monitoring production lines, consulting - testing, researching, manufacturing and applying related materials and chemicals, especially advanced materials such as thin film materials for electronic components and devices; polymer materials, packaging, labels, leather shoes, alloy/metal materials; materials for industries such as optical fibers, ceramics, glass.
- - In addition to jobs directly related to material production, graduates of Materials Technology can also work at companies involved in consulting, maintenance, technical guidance and operating procedures for high-tech equipment/machinery, especially equipment for science, technology, medicine, etc.
- - Participate in teaching and research at universities, colleges, research institutes, Departments of Science and Technology, Departments of Natural Resources and Environment, etc.
- - Studying master's and doctoral programs with full scholarships in advanced countries such as France, USA, Japan, Korea, Taiwan, etc.

**3. Total of credits: 130 (**excluding National Defense Education, Physical Education, Basic Information Technology and Foreign Languages**).**

**4. Admission conditions:** According to the Admission Regulations of the Ministry of Education and Training and Vietnam National University Ho Chi Minh City.

**5. Training process, graduation requirements.**

**5.1. Training process:**

According to the Regulations on university training issued with Decision No. 1175/QD-KHTN dated September 24, 2021, of the President of the University of Science, VNU-HCM.

**5.2. Graduation requirements:**

Students must simultaneously satisfy the following conditions:

- Accumulate enough credits for general education and professional education as described in sections 6 and 7 of this training programs.

- Satisfy the conditions in Article 17 of the Regulations on university training issued together with Decision No. 1175/QD-KHTN dated September 24, 2021, of the President of the University of Science - VNU-HCM.

## 6. Training program structure

| No | KNOWLEDGE BLOCK | | | NUMBER OF CREDITS (CR) | | | Total accumulated credits upon graduation (1+2+3+4) | NOTE |
|---|---|---|---|---|---|---|---|---|
| | | | | Mandatory | Elective | Total | | |
| 1 | **General Education (excluding National Defense Education, Physical Education, Basic Information Technology and Foreign Languages) (1)** | | | **48** | **4** | **52** | | |
| 2 | **Professional education:** | **Fundamental (2)** | | **40** | **2** | **42** | | |
| | | **Specialized (3)** | | **26** | **0** | **26** | | |
| | | 1 | Polymer & Composite Materials Technology | 26 | 0 | 26 | 130 | **130** |
| | | 2 | Biomedical Materials Technology | 26 | 0 | 26 | 130 | |
| | | 3 | Semiconductor Materials Technology | 26 | 0 | 26 | 130 | |
| | | 4 | Renewable Energy Materials Technology | 26 | 0 | 26 | 130 | |
| | | Graduate **(4)** | | 10 | | 10 | | |

## 7. Training program content

Course type convention:

- Mandatory courses: M
- Elective courses: E

### 7.1. General education knowledge

Accumulate a total of 52 credits (excluding Physical Education, National Defense Education, Information Technology and Foreign Languages):

### 7.1.1. Political Theory - Law

| No | Code | Course Name | Credit | NUMBER OF LESSONS | | | Course type | Note |
|---|---|---|---|---|---|---|---|---|
| | | | | Theory | Practice | Exercise | | |
| 1 | BAA00101 | Marxist-Leninist Philosophy | 3 | 45 | 0 | 0 | M | |
| 2 | BAA00102 | Marxist-Leninist Political Economy | 2 | 30 | 0 | 0 | M | |
| 3 | BAA00103 | Scientific Socialism | 2 | 30 | 0 | 0 | M | |
| 4 | BAA00104 | History of the Vietnamese Communist Party | 2 | 30 | 0 | 0 | M | |
| 5 | BAA00003 | Ho Chi Minh's Ideology | 2 | 30 | 0 | 0 | M | |
| 6 | BAA00004 | General Law | 3 | 45 | 0 | 0 | M | |
| **Sub-Total** | | | **14** | | | | | |

### 7.1.2. Social Sciences - Economics - Skills

| No | Code | Course Name | Credit | NUMBER OF LESSONS | | | Course type | Note |
|---|---|---|---|---|---|---|---|---|
| | | | | Theory | Practice | Exercise | | |
| 1 | BAA00005 | General Economics | 2 | 30 | 0 | 0 | E | Choose 1 subject |
| 2 | BAA00006 | General Psychology | 2 | 30 | 0 | 0 | E | |
| 3 | BAA00007 | Methodology of Creativity | 2 | 30 | 0 | 0 | E | |
| 4 | GEO00002 | Earth Sciences | 2 | 30 | 0 | 0 | E | Choose 1 subject |
| 5 | ENV00001 | General environment | 2 | 30 | 0 | 0 | E | |
| 6 | MST00001 | Laboratory Safety | 2 | 30 | 0 | 0 | E | |
| **Sub-Total** | | | **4** | | | | | |

### 7.1.3. Mathematics - Natural Sciences - Technology - Environment

| No | Code | Course Name | Credit | NUMBER OF LESSONS | | | Course type | Note |
|---|---|---|---|---|---|---|---|---|
| | | | | Theory | Practice | Exercise | | |
| 1 | MTH00003 | Integral Calculus 1B | 3 | 45 | 0 | 0 | M | |
| 2 | MTH00002 | Advanced Mathematics C | 3 | 45 | 0 | 0 | M | |
| 3 | MTH00040 | Probability Statistics | 3 | 45 | 0 | 0 | M | |
| 4 | CHE00001 | General Chemistry 1 | 3 | 30 | 0 | 30 | M | |

| No | Code | Course Name | Credit | NUMBER OF LESSONS | | | Course type | Note |
|---|---|---|---|---|---|---|---|---|
| | | | | Theory | Practice | Exercise | | |
| 5 | CHE00002 | General Chemistry 2 | 3 | 30 | 0 | 30 | M | |
| 6 | CHE00081 | Lab work - General Chemistry | 2 | 0 | 60 | 0 | M | |
| 7 | PHY00001 | General Physics 1 (Mechanics - Thermodynamics) | 3 | 45 | 0 | 0 | M | |
| 8 | PHY00002 | General physics 2 (Electromagnetic - Optical) | 3 | 45 | 0 | 0 | M | |
| 9 | PHY00004 | General physics 2 (Electricity-Magnetism ) | 3 | 45 | 0 | 0 | M | |
| 10 | PHY00081 | Lab work - General physics | 2 | 0 | 60 | 0 | M | |
| 11 | MSC00001 | Introduction to Materials Science | 3 | 45 | 0 | 0 | M | |
| 12 | MST00002 | Introduction to Materials Technology | 3 | 45 | 0 | 0 | M | |
| **Sub-Total** | | | **34** | | | | | |

### 7.1.4. Computer Science (not included in GPA, included in cumulative credits)

| No | Code | Course Name | Credit | NUMBER OF LESSONS | | | Course type | Note |
|---|---|---|---|---|---|---|---|---|
| | | | | Theory | Practice | Exercise | | |
| 1 | CSC00003 | Basic Informatics | 3 | 15 | 60 | 0 | M | |
| **Sub-Total** | | | **3** | | | | | |

### 7.1.5. Foreign language (not included in GPA and cumulative credits)

| No | Code | Course Name | Credit | NUMBER OF LESSONS | | | Course type |
|---|---|---|---|---|---|---|---|
| | | | | Theory | Practice | Exercise | |
| 1 | ADD00031 | English 1 | 3 | 30 | 30 | 0 | Students who meet the current foreign language output standards do not register for English courses. |
| 2 | ADD00032 | English 2 | 3 | 30 | 30 | 0 | |
| 3 | ADD00033 | English 3 | 3 | 30 | 30 | 0 | |
| 4 | ADD00034 | English 4 | 3 | 30 | 30 | 0 | |
| **Sub-Total** | | | **12** | | | | |

### 7.1.6. Physical education (not included in GPA, included in cumulative credits)

| No | Code | Course Name | Credit | NUMBER OF LESSONS | | | Course type | Note |
|---|---|---|---|---|---|---|---|---|
| | | | | Theory | Practice | Exercise | | |
| 1 | BAA00021 | Physical education 1 | 2 | 15 | 30 | 0 | M | |
| 2 | BAA00022 | Physical education 2 | 2 | 15 | 30 | 0 | M | |
| **Sub-Total** | | | **4** | | | | | |

### 7.1.7. National defense and security education (not included in GPA, included in accumulated credits)

| No | Code | Course Name | Credit | NUMBER OF LESSONS | | | Course type | Note |
|---|---|---|---|---|---|---|---|---|
| | | | | Theory | Practice | Exercise | | |
| 1 | BAA00030 | National defense - Security education | 4 | | | | M | |
| **Sub-Total** | | | **4** | | | | | |

### 7.2. Professional educational knowledge

**7.2.1. Basic industry knowledge:** Accumulate a total of 42 credits from the courses according to the following table:

| No | Code | Course Name | Credit | NUMBER OF LESSONS | | | | Course type | Note |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Theory | Practice | Exercise | Thesis | | |
| 1 | MSC10006 | Transition and Non-Transition Elements | 3 | 45 | 0 | 0 | 0 | M | |

| No | Code | Course Name | Credit | NUMBER OF LESSONS | | | | Course type | Note |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Theory | Practice | Exercise | Thesis | | |
| 2 | MSC10007 | Organic Chemistry | 3 | 30 | 0 | 30 | 0 | M | |
| 3 | MST10001 | Organic Chemistry Practice | 2 | 0 | 60 | 0 | 0 | M | |
| 4 | MST10002 | Inorganic Chemistry Practice | 2 | 0 | 60 | 0 | 0 | M | |
| 5 | MST10003 | Inorganic Material Fabrication Methods | 3 | 30 | 0 | 30 | 0 | M | |
| 6 | MST10005 | Material Fabrication Methods Practice | 2 | 0 | 60 | 0 | 0 | M | |
| 7 | MST10008 | Material Analysis Methods Practice | 2 | 0 | 60 | 0 | 0 | M | |
| 8 | MST10009 | Polymer and Composite Materials | 3 | 30 | 0 | 30 | 0 | M | |
| 9 | MST10011 | Professional Skills | 2 | 22.5 | 0 | 15 | 0 | M | |
| 10 | MST10015 | Calculation and Simulation for Materials | 2 | 15 | 30 | 0 | 0 | M | |
| 11 | MST10016 | Organic Material Fabrication Methods | 2 | 22.5 | 0 | 15 | 0 | M | |
| 12 | MST10017 | Structural and Morphological Analysis Methods | 2 | 22.5 | 0 | 15 | 0 | M | |
| 13 | MST10018 | Methods for Analyzing Material Properties | 2 | 30 | 0 | 0 | 0 | M | |
| 14 | MST10019 | Biotechnology Practice | 2 | 0 | 60 | 0 | 0 | M | |
| 15 | MST10020 | Material Modification Techniques | 2 | 30 | 0 | 0 | 0 | M | |
| 16 | MST10021 | Biotechnology | 2 | 30 | 0 | 0 | 0 | M | |
| 17 | MST10022 | Fundamentals of Solid State Science | 2 | 30 | 0 | 0 | 0 | M | |
| 18 | MST10023 | Material Thermodynamics | 2 | 30 | 0 | 0 | 0 | M | |

| No | Code | Course Name | Credit | NUMBER OF LESSONS | | | | Course type | Note |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Theory | Practice | Exercise | Thesis | | |
| 19 | MST10024 | Metal and Alloy Materials | 2 | 30 | 0 | 0 | 0 | E | Choose 1 subject |
| 20 | MST10025 | Ceramic Materials | 2 | 30 | 0 | 0 | 0 | E | |
| 21 | MST10026 | Semiconductor Materials | 2 | 30 | 0 | 0 | 0 | E | |
| **Sub-Total** | | | **42** | **397.5** | **330** | **135** | **862.5** | | |

### 7.2.2. Specialized knowledge

#### 7.2.2.1. Polymer & Composite Materials Technology Specialization

**Required Courses**: Accumulate a total of 26 credits from the courses according to the following table:

| No | Code | Course Name | Credit | NUMBER OF LESSONS | | | | Course type | Note |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Theory | Practice | Exercise | Thesis | | |
| 1 | MSC10012 | Quality Management Systems (QMS) | 3 | 45 | 0 | 0 | 0 | M | |
| 2 | MSC10201 | Polymer Synthesis Internship | 2 | 0 | 60 | 0 | 0 | M | |
| 3 | MSC10202 | Mechanical Properties of Polymer | 2 | 0 | 60 | 0 | 0 | M | |
| 4 | MSC10219 | Processing Technology of Polymers | 2 | 22.5 | 0 | 15 | 0 | M | |
| 5 | MST10101 | Mechanical Properties of Polymers | 2 | 30 | 0 | 0 | 0 | M | |
| 6 | MST10112 | Enterprise Internship | 3 | 0 | 90 | 0 | 0 | M | |
| 7 | MST10129 | Learning with Enterprises | 2 | 30 | 0 | 0 | 0 | M | |
| 8 | MST10136 | Advanced Materials Research and Manufacturing Project | 2 | 0 | 0 | 0 | 60 | M | |

| No | Code | Course Name | Credit | NUMBER OF LESSONS | | | | Course type | Note |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Theory | Practice | Exercise | Thesis | | |
| 9 | MST10137 | Innovation and Entrepreneurship | 2 | 30 | 0 | 0 | 0 | M | |
| 10 | MST10138 | Polymer characterization methods | 2 | 22.5 | 0 | 15 | 0 | M | |
| 11 | MST10139 | Polymer Additives and Polymer-Modified | 2 | 30 | 0 | 0 | 0 | M | |
| 12 | MST10140 | Polymer Blends and Thermoplastic Elastomers | 2 | 30 | 0 | 0 | 0 | M | |
| **Sub-Total** | | | **26** | **240** | **210** | **30** | 60 | **540** | |

### 7.2.2.2. Biomedical Materials Technology Specialization

**Required Courses**: Accumulate a total of 26 credits from the courses according to the following table**:**

| No | Code | Course Name | Credit | NUMBER OF LESSONS | | | | Course type | Note |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Theory | Practice | Exercise | Thesis | | |
| 1 | MSC10012 | Quality Management Systems (QMS) | 3 | 45 | 0 | 0 | 0 | M | |
| 2 | MSC10315 | Biological Property Assessment of Materials Internship | 2 | 0 | 60 | 0 | 0 | M | |
| 3 | MST10112 | Enterprise Internship | 3 | 0 | 90 | 0 | 0 | M | |
| 4 | MST10129 | Learning with Enterprises | 2 | 30 | 0 | 0 | 0 | M | |
| 5 | MST10136 | Advanced Materials Research and Manufacturing Project | 2 | 0 | 0 | 0 | 60 | M | |
| 6 | MST10137 | Innovation and Entrepreneurship | 2 | 30 | 0 | 0 | 0 | M | |
| 7 | MST10201 | Biomedical Materials 1 | 2 | 22.5 | 0 | 15 | 0 | M | |
| 8 | MST10202 | Biomedical Materials 2 | 2 | 22.5 | 0 | 15 | 0 | M | |
| 9 | MST10203 | Biomedical Material Fabrication Practices | 2 | 0 | 60 | 0 | 0 | M | |
| 10 | MST10204 | Techniques for evaluating the biological properties of materials | 2 | 30 | 0 | 0 | 0 | M | |
| 11 | MST10205 | Biomedical Sensors and Evaluation Techniques | 2 | 30 | 0 | 0 | 0 | M | |
| 12 | MST10206 | Tissue Engineering | 2 | 30 | 0 | 0 | 0 | M | |
| **Sub-Total** | | | **26** | **240** | **210** | **30** | 60 | **540** | |

### 7.2.2.3. Semiconductor Materials Technology Specialization

**Required Courses**: Accumulate a total of 26 credits from the courses according to the following table:

| No | Code | Course Name | Credit | NUMBER OF LESSONS | | | | Course type | Note |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Theory | Practice | Exercise | Thesis | | |
| 1 | MSC10012 | Quality Management Systems (QMS) | 3 | 45 | 0 | 0 | 0 | M | |
| 2 | MST10112 | Enterprise Internship | 3 | 0 | 90 | 0 | 0 | M | |
| 3 | MST10129 | Learning with Enterprises | 2 | 30 | 0 | 0 | 0 | M | |
| 4 | MST10136 | Advanced Materials Research and Manufacturing Project | 2 | 0 | 0 | 0 | 60 | M | |
| 5 | MST10137 | Innovation and Entrepreneurship | 2 | 30 | 0 | 0 | 0 | M | |
| 6 | MST10301 | Semiconductor Packaging Technology | 2 | 22.5 | 0 | 15 | 0 | M | |
| 7 | MST10302 | Semiconductor Devices | 2 | 22.5 | 0 | 15 | 0 | M | |
| 8 | MST10303 | Optoelectronic Devices | 2 | 30 | 0 | 0 | 0 | M | |
| 9 | MST10304 | Microelectromechanical Systems (MEMS) Technology | 2 | 30 | 0 | 0 | 0 | M | |
| 10 | MST10305 | Semiconductor Device Fabrication and Evaluation Internship | 2 | 0 | 60 | 0 | 0 | M | |
| 11 | MST10306 | Modeling and Simulation of Semiconductor Devices | 2 | 0 | 60 | 0 | 0 | M | |

| No | Code | Course Name | Credit | NUMBER OF LESSONS | | | | Course type | Note |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Theory | Practice | Exercise | Thesis | | |
| 12 | MST10307 | Basic Integrated Circuits | 2 | 30 | 0 | 0 | 0 | M | |
| **Sub-Total** | | | **26** | **240** | **210** | **30** | 60 | **540** | |

### 7.2.2.4. Renewable Energy Materials Technology Specialization

**Required Courses**: Accumulate a total of 26 credits from the courses according to the following table:

| No | Code | Course Name | Credit | NUMBER OF LESSONS | | | | Course type | Note |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Theory | Practice | Exercise | Thesis | | |
| 1 | MSC10012 | Quality Management Systems (QMS) | 3 | 45 | 0 | 0 | 0 | M | |
| 2 | MST10112 | Enterprise Internship | 3 | 0 | 90 | 0 | 0 | M | |
| 3 | MST10129 | Learning with Enterprises | 2 | 30 | 0 | 0 | 0 | M | |
| 4 | MST10136 | Advanced Materials Research and Manufacturing Project | 2 | 0 | 0 | 0 | 60 | M | |
| 5 | MST10137 | Innovation and Entrepreneurship | 2 | 30 | 0 | 0 | 0 | M | |
| 6 | MST10401 | Renewable Energy Systems and Their Impact on Economic and Environmental | 2 | 22.5 | 0 | 15 | 0 | M | |
| 7 | MST10402 | Energy Harvesting and Conversion Materials | 2 | 30 | 0 | 0 | 0 | M | |
| 8 | MST10403 | Energy Storage Materials | 2 | 30 | 0 | 0 | 0 | M | |
| 9 | MST10404 | Renewable Energy Harvesting and Conversion Technology | 2 | 22.5 | 0 | 15 | 0 | M | |
| 10 | MST10405 | Renewable Energy Storage Technology | 2 | 30 | 0 | 0 | 0 | M | |
| 11 | MST10406 | Characterization of Energy Conversion | 2 | 0 | 60 | 0 | 0 | M | |

| No | Code | Course Name | Credit | NUMBER OF LESSONS | | | | Course type | Note |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Theory | Practice | Exercise | Thesis | | |
| | | and Storage Materials | | | | | | | |
| 12 | MST10407 | Characterization of Energy Conversion and Storage Devices | 2 | **0** | 60 | 0 | 0 | M | |
| **Sub-Total** | | | **26** | **240** | **210** | **30** | 60 | **540** | |

### 7.2.3. Graduation knowledge: 10 credits, students choose 1 of 2 options to accumulate 10 credits

7.2.3.1 **Option 1:** Students do 10-credit graduation thesis

| No | Code | Course Name | Credit | NUMBER OF LESSONS | | | | Course type | Note |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Theory | Practice | Exercise | Thesis | | |
| 1 | MST10995 | Graduation thesis | 10 | 0 | 0 | 0 | 300 | M | |
| **Sub-Total** | | | **10** | | | | **300** | | |

7.2.3.2 **Option 2:**

Students who do Seminars graduate with 06 credits and choose to study 04 credits of elective courses in the following table:

| No | Code | Course Name | Credit | NUMBER OF LESSONS | | | | Course type | Note |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Theory | Practice | Exercise | Thesis | | |
| 1 | MST10990 | Graduation Seminar | 6 | 0 | 0 | 0 | 180 | M | |
| 2 | MST10121 | Painting Materials and Varnish Technology | 2 | 30 | 0 | 0 | 0 | E | Choose 02 subjects |
| 3 | MST10171 | Smart Materials and Applications | 2 | 30 | 0 | 0 | 0 | E | |
| 4 | MST10172 | Packaging Materials Technology | 2 | 30 | 0 | 0 | 0 | E | |
| 5 | MST10173 | New Materials Technology in Construction | 2 | 30 | 0 | 0 | 0 | E | |
| 6 | MST10174 | Nanotechnology and Nanomaterials | 2 | 30 | 0 | 0 | 0 | E | |

| No | Code | Course Name | Credit | NUMBER OF LESSONS | | | | Course type | Note |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Theory | Practice | Exercise | Thesis | | |
| 7 | MST10175 | Sensor Technology and Applications | 2 | 30 | 0 | 0 | 0 | E | |
| 8 | MST10176 | Machine Learning and AI in Materials Science | 2 | 30 | 0 | 0 | 0 | E | |
| 9 | MST10177 | Flexible Devices | 2 | 30 | 0 | 0 | 0 | E | |
| 10 | MST10178 | Recycling Materials Technology | 2 | 30 | 0 | 0 | 0 | TC | |
| **Sub-Total** | | | **10** | 60 | 0 | 0 | **180** | | |

## 8. Expected teaching plan/curriculum structure, link between modules and LOs

| Semester | Code | Course Name | Credit | Level of achievement of the LOs (according to Bloom's assessment scale) | Link between LOs and training program |
|---|---|---|---|---|---|
| 1 | BAA00004 | General Law | 3 | 2.0 | CCT4.1 |
| | ADD00031 | English 1 | 3 | 2.0 | CCT2.4 |
| | BAA00021 | Physical education 1 | 2 | 2.0 | |
| | BAA00030 | National defense - Security education | 4 | 2.0 | |
| | MTH00003 | Integral Calculus 1B | 3 | 2.0 | CCT1.1 |
| | MTH00002 | Advanced Mathematics C | 3 | 2.0 | CCT1.1 |
| | CHE00001 | General Chemistry 1 | 3 | 2.0 | CCT1.1 |
| | CHE00002 | General Chemistry 2 | 3 | 2.0 | CCT1.1 |
| | PHY00001 | General Physics 1 (Mechanics - Thermodynamics) | 3 | 2.0 | CCT3.1 |
| | MST00002 | Introduction to Materials Technology | 3 | 2.0 | CCT1.1, CCT1.2, CCT1.3, CCT2.2 |
| | **Sub-Total (excluding National Defense and Security Education, English))** | | **23** | | |
| 2 | BAA00101 | Marxist-Leninist Philosophy | 3 | 2.0 | CCT4.1 |

| Semester | Code | Course Name | Credit | Level of achievement of the LOs (according to Bloom's assessment scale) | Link between LOs and training program |
|---|---|---|---|---|---|
| | BAA00102 | Marxist-Leninist Political Economy | 2 | 2.0 | CCT4.1 |
| | BAA00103 | Scientific Socialism | 2 | 2.0 | CCT4.1 |
| | BAA00005 | General Economics | 2 | 2.0 | CCT4.1 |
| | BAA00006 | General Psychology | 2 | 2.0 | CCT2.3, CCT2.4 |
| | BAA00007 | Methodology of Creativity | 2 | 2.0 | CCT2.3 |
| | GEO00002 | Earth Sciences | 2 | 2.0 | CCT1.1 |
| | ENV00001 | General environment | 2 | 2.0 | CCT1.1 |
| | MST00001 | Laboratory Safety | 2 | 2.0 | CCT1.3 |
| | ADD00032 | English 2 | 3 | 2.0 | CCT2.4 |
| | BAA00022 | Physical education 2 | 2 | 2.0 | |
| | CSC00003 | Basic Informatics | 3 | 2.0 | CCT2.4 |
| | PHY00002 | General physics 2 (Electromagnetic - Optical) | 3 | 2.0 | CCT3.1 |
| | **Sub-Total (excluding english)** | | **20** | | |
| **3** | BAA00104 | History of the Vietnamese Communist Party | 2 | 2.0 | CCT4.1 |
| | BAA00003 | Ho Chi Minh's Ideology | 2 | 2.0 | CCT4.1 |
| | ADD00033 | English 3 | 3 | 2.0 | CCT2.4 |
| | MTH00040 | Probability Statistics | 3 | 2.0 | CCT1.1 |
| | CHE00081 | Lab work - General Chemistry | 2 | 2.0 | CT2.1 |
| | PHY00081 | Lab work - General physics | 2 | 2.0 | CCT2.1 |
| | PHY00004 | Modern Physics (Quantum - Atom - Nucleus) | 3 | 2.0 | CCT2.3 |
| | MSC00001 | Fundamental of Materials Science | 3 | 2.0 | CCT1.1, CCT1.2, CCT1.3, CCT2.1 |
| | **Sub-Total (excluding english)** | | **19** | | |
| **4** | ADD00034 | English 4 | 3 | 2.0 | CCT2.4 |
| | MSC10007 | Organic Chemistry | 3 | 2.0 | CCT1.1 |

| Semester | Code | Course Name | Credit | Level of achievement of the LOs (according to Bloom's assessment scale) | Link between LOs and training program |
|---|---|---|---|---|---|
| | MST10009 | Polymer and Composite Materials | 3 | 3.0 | CCT1.1, CCT1.2, CCT2.2 |
| | MSC10006 | Transition and Non-Transition Elements | 3 | 3.0 | CCT1.2, CCT1.3, CCT3.1 |
| | MST10003 | Inorganic Material Fabrication Methods | 3 | 3.0 | CCT1.2, CCT2.2, CCT2.4 |
| | MST10002 | Inorganic Chemistry Practice | 2 | 3.0 | CCT1.2, CCT1.3 |
| | MST10011 | Professional Skills | 2 | 3.0 | CCT2.3, CCT4.1 |
| | **Sub-Total (excluding english)** | | **16** | | |
| **5** | MST10001 | Organic Chemistry Practice | 2 | 3.0 | CCT1.1, CCT1.2 |
| | MST10016 | Organic Material Fabrication Methods | 2 | 3.0 | CCT1.2, CCT2.3 |
| | MST10019 | Biotechnology Practice | 2 | 3.0 | CCT1.3 |
| | MST10021 | Biotechnology | 2 | 3.0 | CCT1.3 |
| | MST10005 | Material Fabrication Methods Practice | 2 | 3.0 | CCT1.2, CCT1.3 |
| | MST10020 | Material Modification Techniques | 2 | 3.0 | CCT1.3 |
| | MST10023 | Material Thermodynamics | 2 | 3.0 | CCT1.3 |
| | MST10015 | Calculation and Simulation for Materials | 2 | 3.0 | CCT1.2, CCT1.3, CCT2.2, CCT2.3 |
| | MST10025 | Ceramic Materials | 2 | 3.0 | CCT1.2 |
| | MST10024 | Metal and Alloy Materials | 2 | 3.0 | CCT1.2 |
| | MST10026 | Semiconductor Materials | 2 | 3.0 | CCT1.2 |
| | MST10022 | Fundamentals of Solid State Science | 2 | 3.0 | CCT1.2 |
| | **Sub-Total** | | **20** | | |
| **6** | **Polymer & Composite Materials Technology Specialization** | | | | |
| | MST10018 | Các phương pháp phân tích tính chất của vật liệu | 2 | 3.0 | CCT1.3 |
| | MST10008 | Thực hành các phương pháp phân tích vật liệu | 2 | 3.0 | CCT2.1 |

| Semester | Code | Course Name | Credit | Level of achievement of the LOs (according to Bloom's assessment scale) | Link between LOs and training program |
|---|---|---|---|---|---|
| | MST10017 | Các phương pháp phân tích cấu trúc và hình thái vật liệu | 2 | 3.0 | CCT1.1, CCT2.1, CCT2.2, CCT2.4 |
| | MST10101 | Mechanical Properties of Polymers | 2 | 3.0 | CCT1.2, CCT1.3, CCT2.1, CCT2.2 |
| | MST10138 | Polymer characterization methods | 2 | 3.0 | CCT1.1, CCT1.2, CCT2.2 |
| | MSC10219 | Processing Technology of Polymers | 2 | 3.0 | CCT1.2, CCT1.3, CCT2.1, CCT2.2 |
| | MST10139 | Polymer Additives and Polymer-Modified | 2 | 3.0 | CCT1.1, CCT1.2, CCT2.2 |
| | **Sub-Total** | | **14** | | |
| | **Biomedical Materials Technology Specialization** | | | | |
| | MST10018 | Material Property Analysis Methods | 2 | 3.0 | CCT1.3 |
| | MST10008 | Material Analysis Methods Practice | 2 | 3.0 | CCT2.1 |
| | MST10017 | Structural and Morphological Analysis Methods | 2 | 3.0 | CCT1.1, CCT2.1, CCT2.2, CCT2.4 |
| | MST10201 | Biomedical Materials 1 | 2 | 3.0 | CCT1.3 |
| | MST10205 | Biomedical Sensors and Evaluation Techniques | 2 | 3.0 | CCT1.3 |
| | MST10206 | Tissue Engineering | 2 | 3.0 | CCT1.3 |
| | MST10204 | Techniques for evaluating the biological properties of materials | 2 | 3.0 | CCT1.1 |
| | **Sub-Total** | | **14** | | |
| | **Semiconductor Materials Technology Specialization** | | | | |
| | MST10018 | Material Property Analysis Methods | 2 | 3.0 | CCT1.3 |
| | MST10008 | Material Analysis Methods Practice | 2 | 3.0 | CCT2.1 |
| | MST10017 | Structural and Morphological Analysis Methods | 2 | 3.0 | CCT1.1, CCT2.1, CCT2.2, CCT2.4 |

| Semester | Code | Course Name | Credit | Level of achievement of the LOs (according to Bloom's assessment scale) | Link between LOs and training program |
|---|---|---|---|---|---|
| | MST10301 | Semiconductor Packaging Technology | 2 | 3.0 | CCT1.1, CCT2.1, CCT3.1, CCT4.1 |
| | MST10302 | Semiconductor Devices | 2 | 3.0 | CCT1.1, CCT2.3, CCT3.1, CCT4.1 |
| | MST10303 | Optoelectronic Devices | 2 | 3.0 | CCT1.3 |
| | MST10304 | Microelectromechanical Systems (MEMS) Technology | 2 | 3.0 | CCT1.1, CCT1.2, CCT2.3, CCT4.1 |
| | **Sub-Total** | | **14** | | |
| | **Renewable Energy Materials Technology Specialization** | | | | |
| | MST10018 | Methods for Analyzing Material Properties | 2 | 3.0 | CCT1.3 |
| | MST10008 | Practical Methods for Material Analysis | 2 | 3.0 | CCT2.1 |
| | MST10017 | Methods for Analyzing Material Structure and Morphology | 2 | 3.0 | CCT1.1, CCT2.1, CCT2.2, CCT2.4 |
| | MST10401 | Renewable Energy Systems and Their Impact on Economic and Environmental | 2 | 3.0 | CCT1.3 |
| | MST10402 | Energy Harvesting and Conversion Materials | 2 | 3.0 | CCT1.1 |
| | MST10403 | Energy Storage Materials | 2 | 3.0 | CCT1.1, CCT1.2, CCT2.2, CCT2.4 |
| | MST10404 | Microelectromechanical Systems (MEMS) Technology | 2 | 3.0 | CCT1.2 |
| | **Sub-Total** | | **14** | | |
| **7** | **Polymer and Composite Materials Technology, Biomedical Materials Technology, Semiconductor Materials Technology, Renewable Energy Materials Technology** | | | | |
| | MST10112 | Enterprise Internship | 3 | 3.0 | CCT3.1, CCT4.1 |
| | **Sub-Total** | | **3** | | |
| **8** | **Polymer & Composite Materials Technology Specialization** | | | | |

| Semester | Code | Course Name | Credit | Level of achievement of the LOs (according to Bloom's assessment scale) | Link between LOs and training program |
|---|---|---|---|---|---|
| | MST10140 | Polymer Blends and Thermoplastic Elastomers | 2 | 3.0 | CCT1.2, CCT2.2, CCT2.4 |
| | MSC10202 | Mechanical Properties of Polymer | 2 | 3.0 | CCT1.1, CCT2.1, CCT2.2 |
| | MSC10201 | Polymer Synthesis Internship | 2 | 3.0 | CCT1.2, CCT2.2, CCT4.1 |
| | MST10129 | Learning with Enterprises | 2 | 3.0 | CCT4.1 |
| | MST10136 | Advanced Materials Research and Manufacturing Project | 2 | 3.0 | CCT2.1, CCT2.2, CCT4.1 |
| | MST10137 | Innovation and Entrepreneurship | 2 | 3.0 | CCT2.2 |
| | MSC10012 | Quality Management Systems (QMS) | 3 | 3.0 | CCT1.3, CCT3.1 |
| | **Sub-Total** | | **15** | | |
| | **Biomedical Materials Technology Specialization** | | | | |
| | MST10203 | Biomedical Material Fabrication Practices | 2 | 3.0 | CCT1.1, CCT1.3, CCT2.1, CCT3.1 |
| | MSC10315 | Biological Property Assessment of Materials Internship | 2 | 3.0 | CCT1.1 |
| | MST10202 | Biomedical Materials 2 | 2 | 3.0 | CCT1.1, CCT1.2 |
| | MST10129 | Learning with Enterprises | 2 | 3.0 | CCT4.1 |
| | MST10136 | Advanced Materials Research and Manufacturing Project | 2 | 3.0 | CCT2.1, CCT2.2, CCT4.1 |
| | MST10137 | Innovation and Entrepreneurship | 2 | 3.0 | CCT2.2 |
| | MSC10012 | Quality Management Systems (QMS) | 3 | 3.0 | CCT1.3, CCT3.1 |
| | **Sub-Total** | | **15** | | |
| | **Semiconductor Materials Technology Specialization** | | | | |

| Semester | Code | Course Name | Credit | Level of achievement of the LOs (according to Bloom's assessment scale) | Link between LOs and training program |
|---|---|---|---|---|---|
| | MST10305 | Semiconductor Device Fabrication and Evaluation Internship | 2 | 3.0 | CCT2.1 |
| | MST10306 | Modeling and Simulation of Semiconductor Devices | 2 | 3.0 | CCT1.1, CCT1.2, CCT2.1, CCT2.2 |
| | MST10307 | Basic Integrated Circuits | 2 | 3.0 | CCT1.3 |
| | MST10129 | Learning with Enterprises | 2 | 3.0 | CCT4.1 |
| | MST10136 | Advanced Materials Research and Manufacturing Project | 2 | 3.0 | CCT2.1, CCT2.2, CCT4.1 |
| | MST10137 | Innovation and Entrepreneurship | 2 | 3.0 | CCT2.2 |
| | MSC10012 | Quality Management Systems (QMS) | 3 | 3.0 | CCT1.3, CCT3.1 |
| | **Sub-Total** | | **15** | | |
| | **Renewable Energy Materials Technology Specialization** | | | | |
| | MST10405 | Renewable Energy Storage Technology | 2 | | CCT1.1, CCT1.2, CCT2.2, CCT2.3 |
| | MST10406 | Characterization of Energy Conversion and Storage Materials | 2 | 3.0 | CCT2.1 |
| | MST10407 | Characterization of Energy Conversion and Storage Devices | 2 | 3.0 | CCT2.3 |
| | MST10129 | Learning with Enterprises | 2 | 3.0 | CCT4.1 |
| | MST10136 | Advanced Materials Research and Manufacturing Project | 2 | 3.0 | CCT2.1, CCT2.2, CCT4.1 |
| | MST10137 | Innovation and Entrepreneurship | 2 | 3.0 | CCT2.2 |
| | MSC10012 | Quality Management Systems (QMS) | 3 | 3.0 | CCT1.3, CCT3.1 |
| | **Sub-Total** | | **15** | | |

| Semester | Code | Course Name | Credit | Level of achievement of the LOs (according to Bloom's assessment scale) | Link between LOs and training program |
|---|---|---|---|---|---|
| 9 | **Option1:** | | | | |
| | MST10995 | Graduation thesis | 10 | 3.0 | CCT1.2, CCT1.3, CCT2.1, CCT2.2, CCT2.4 |
| | | | | | |
| | MST10990 | Graduation Seminar | 6 | 3.0 | CCT1.2, CCT1.3, CCT2.1, CCT2.2, CCT2.4 |
| | MST10171 | Smart Materials and Applications | 2 | 3.0 | CCT1.1, CCT1.2, CCT2.2 |
| | MST10172 | Packaging Materials Technology | 2 | 3.0 | CCT1.1, CCT2.3 |
| | MST10121 | Painting Materials and Varnish Technology | 2 | 3.0 | CCT1.1, CCT2.3 |
| | MST10173 | New Materials Technology in Construction | 2 | 3.0 | CCT1.3 |
| | MST10174 | Nanotechnology and Nanomaterials | 2 | 3.0 | CCT1.3 |
| | MST10175 | Sensor Technology and Applications | 2 | 3.0 | CCT1.1 |
| | MST10176 | Machine Learning and AI in Materials Science | 2 | 3.0 | CCT1.2, CCT1.3, CCT2.2, CCT2.3 |
| | MST10177 | Flexible Devices | 2 | | CCT1.1, CCT1.2, CCT2.3, CCT4.1 |
| | MST10178 | Recycling Materials Technology | 2 | | CCT1.1, CCT2.1, CCT4.1 |
| | **Sub-Total** | | **10** | | |

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