Module Distribution

I. Course-Research Program

SEMESTER 1	
Courses	**Credits**
Advanced Material Structure	3
Advanced Material Properties and Performance	3
Integration of Science and Mathematics	4
Scientific Literacy	2
Philosophy of Science	2
Total	**14**

SEMESTER 2	
Courses	**Credits**
Advanced Thermodynamics and Kinetics Materials	3
Advanced Materials Characterization and Analysis	3
Research Proposal	8
Total	**14**

SEMESTER 3	
Courses	**Credits**
Scientific Publication	6
Research Progress 1	8
Total	**14**

SEMESTER 4	
Courses	**Credits**
Research Progress 2	10
International Publication 1	6
Total	**16**

SEMESTER 5	
Courses	**Credits**
International Publication 2	6
Dissertation Examination 1	8
Total	**14**

SEMESTER 6	
Courses	**Credits**
Dissertation Examination 2	12
Doctoral Promotion	4
Total	**16**

II. Research Program

SEMESTER 1	
Courses	**Credits**
Literature Review 1 (R)	5
Literature Review 2 (R)	5
Total	**10**

SEMESTER 2	
Courses	**Credits**
Research Proposal (R)	8
Total	**8**

SEMESTER 3	
Courses	**Credits**
Research Progress 1 (R)	10
Scientific Publication (R)	8
Total	**18**

SEMESTER 4	
Courses	**Credits**
Research Progress 2 (R)	10
International Publication 1 (R)	8
Total	**18**

SEMESTER 5	
Courses	**Credits**
Dissertation Examination 1 (R)	8
International Publication 2 (R)	10
Total	**18**

SEMESTER 6	
Courses	**Credits**
Dissertation Examination 2 (R)	12
Doctoral Promotion (R)	4
Total	**16**

Information and Registration

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UNIVERSITAS INDONESIA
FMIPA

BAN-PT

Doctoral Programme in Materials Science

Scan E-Brochure

Department of Physics

Faculty of Mathematics and Natural Sciences
Universitas Indonesia

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Vision

The vision of the Doctoral Program in Materials Science is the vision of the Department of Physics Universitas Indonesia. The vision is "To become an excellent centre of education and research in the field of physics and applied physics at national and global level, toward the best in South-East Asia as well as being competitive and competent to solve problems and challenges".

Mission

The Doctoral Program in Materials Science mission is the mission of the Department of Physics Universitas Indonesia. The mission is:

1. To keep and strengthen the excellence in education and research in the field of Physics and Applied Physics.
2. To fix up and update internal management that supports staff and students to increase their national and international scientific activities and productivities in the field of Physics and Applied Physics.
3. To actively take part as an embodiment Physics and Applied Physics contribution to serving the community.
4. To set up graduate being able to compete in global market.

Objective

The objectives of the Doctoral Program in Materials Science are:

1. To produce doctors of materials science who can critically evaluate the latest developments in materials science and technology.
2. To produce doctors of materials science who can identify and analyze problems in the field of materials science and are able to formulate scientifically responsible solutions through a multidisciplinary approach and are beneficial to humanity.
3. To produce doctors of materials science who can manage, lead and develop experimental research methods and/or material modeling that pay attention to ethics, safety, environmental and socio-economic aspects.
4. To produce doctors of materials science who can produce innovative and original research work in the form of materials engineering, processing methods and/or new materials analysis techniques that are recognized by the national and international materials science community.

Graduate Profile and Learning Outcomes

Graduate Profile

Doctoral graduates of Materials Science who are able to develop material science and technology that is beneficial to humanity through independent research work that is innovative, original and recognized by the international materials science community.

Graduate Learning Outcomes (PLO)

Doctoral Program in Materials Science graduates have the following Program Learning Outcomes:

1. Able to construct an integrated relationship between structure, properties, processing, and performance of material systems. (K)
2. Able to identify and analyze problems in the field of materials science and able to formulate scientifically responsible solutions, taking into account ethics, the environment and socio-economics. (K)
3. Able to design and implement experimental research methods and mathematical modeling that are ethically academically responsible, analyze data critically and systematically and draw conclusions. (S)
4. Able to create and design new materials, processing methods and material analysis techniques and material product innovations by paying attention to humanities values that are beneficial for the development of materials science, industry and society in general. (S)
5. Able to apply material science concepts in solving complex industrial material application problems through a multidisciplinary approach that takes into account safety, social and ethical aspects. (S, C)

Research Specialization

Polymer Materials

The research specialization aims to produce graduates who are capable of developing and applying polymer materials in a wide range of applications, such as conductive polymers Polyaniline (PANI) for wave absorption. The study also focuses on nano polymers, which have various distinguishing features such as huge surface area, flexibility, and superior mechanical properties for a variety of applications in electronic devices.

Metallic Materials, Alloys and Corrosion

This research group studies the metals, and alloys' properties behavior, and application, covering the understanding of the metallurgic process, natural resources extraction, and corrosion mechanism and protection. The graduates are expected to have skills in developing materials and novel corrosion prevention measures to improve the performance of metallic components. In addition, this research group studies light alloys and their protection measures addressing durability challenges by integrating sophisticated material science for industrial applications.

Composite Materials

Composite Materials are formed by combining two or more materials on a macroscopic scale, creating a third with superior properties. Graduates with this specialization are expected to be able to tailor the properties of composite materials. This specialty includes research topics on metal oxide and noble metal nanostructure noble metal composites for applications in optoelectronics, sensors, and photocatalysts. Moreover, nanocomposites are also studied to improve functionality, sensitivity, and efficiency in various technological applications.

Nanomaterials

Nanomaterials are commonly defined as materials with at least one dimension between 1 and 100 nm. Nanomaterials have features that distinguish them from bulk materials, including enhanced surface area, conductivity, tensile strength, elasticity, durability, and stability. This research specialization covers various research on nanomaterials such as nanocomposite material, noble metal nanoparticles for catalytic and electronic applications, nanomagnets, nanometals for optoelectronic devices, sensors, and photocatalytic applications, and synthesis and characterization of organic nano semiconductors.

Ceramic, dielectric and magnetic materials.

Graduates are expected to have the ability to conduct research in ceramics, dielectrics, and magnetism. The research specializes in the development and characterization of materials such as radar-absorbing materials (RAM), soft and hard magnets, magnetic computing, magnetic sensors, and magneto-optical materials. In addition, this research group advances instrumentation systems that use magnetism and optics to improve performance in various technological applications.

Curriculum

The Learning Outcomes of the Study Program reflect the targeted level of academic qualifications. They are equivalent to the Indonesian National Qualifications Framework (KKNI) Level 9, the Physical Society of Indonesia (PSI), and the Qualification European Framework (EQF) Level 8. Admission to the Doctoral Program offers two programs: By Research and By Lecture-Research. Each Program has a different curriculum, but the minimum credit for graduation is the same (minimum 88 credits, equal to 158.4 ECTS).