

Master Program in Materials Science and Engineering (MPMT)

Name of the program (original language)	Program Studi Magister Ilmu dan Teknik Material
Name of the program (English translation)	Master Program in Materials Science and Engineering (MPMT)
Final degree	Magister Teknik (M.T.)/Master of Science (M.Sc.)
Standard period of study	2 years
Credit points (according to ECTS)	36 credit points, equivalent 90 ECTS credit points
Type (several can be indicated)	Full time / part time / distance learning / dual degree / cooperative or sandwich course / intensive program/ etc.
Website of the higher education institution	ftmd.itb.ac.id/program-studi-teknik-mesin/
Programs start date within the academic year	August/January
Program Inception	1990
Intake rhythm	Biannually
Expected intake number of students	20 students / semester
Faculty/department	Faculty of Mechanical and Aerospace Engineering
Official contact person for publication on the web	Rachman Setiawan ST, M.Sc., Ph.D.
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Last accreditation issued by	BAN-PT (National Accreditation for Higher Education)
Duration of the last accreditation	2 September 2016- 2 September 2021

Materials Science and Engineering is a relatively new inter-disciplinary field as they are still growing and developing together. The engineering field in Materials Science and Engineering includes the knowledge from materials science to answer the needs and demands of society for materials. Meanwhile, the science field presents in the form of basic knowledge of materials is an attempt to determine the relationship between material structure and its properties. Both fields in Materials Science and Engineering are aimed at improving the quality of existing materials and developing new materials, by building a deep understanding of the microstructure-chemical composition-synthesisprocess relationship. In addition, technology to convert materials into components is also a focus in this field.

Several activities are commonly conducted in materials science and engineering, such as:

- Using handbooks, databases, software, and the Internet to determine materials and processes;
- Determining properties and structure of materials by using materials characterization equipment such as universal mechanical testing, optical microscopy, electron microscopy (SEM and TEM), spectroscopy (OES, EDS, FTIR, AAS), and X-ray diffraction;
- Using materials processing equipment such as heating and melting furnaces, welding, spraying, and coating equipment; and
- Participating in professional organizations such as INDOCOR, ASM, NACE, ISIJ, AIP, ASME, ASTM, SAE, ASCOATINDO, ISMM, IWS-API, APLI, MRS, ACerS, JCS, IPR, HPI, and MMI.

The master's program is a linear continuation of the undergraduate education or is an interaction of several disciplines that are formed following scientific developments or demands. The curriculum of the Master's Program in Materials Science and Engineering is formulated to address both national and global future challenges in Engineering.

Program Educational Objective (PEO)

Referring to the latest curriculum document of curriculum 2019, the program educational objectives (PEOs) of the MPMT focus on producing graduates with the following competencies:

- a. Moral integrity, discipline, respect, sense of justice, and responsibility;
- b. An ability to consolidate/ develop knowledge and skills in Materials Engineering and interdisciplinary fields; and
- c. An ability to be creative and innovative, work individually (independently) and/or in a team effectively, communicate, conduct lifelong learning, and adapt to the research environment.

The PEOs above are formulated by referring to the Indonesian National Qualification Framework (KKNI):

- a. Qualification A: Applying science, technology, and/or art in their expertise and being adaptable to various situations when solving a problem;
- b. Qualification B: Mastering in-depth general and specific theoretical concepts of certain knowledge and formulating related problem-solving procedures;
- c. Qualification C: Making strategic decisions based on data and information analysis and giving a clue in choosing several alternative solutions; and
- d. Qualification D: Being responsible for their own work and accountable for achieving the organization's work.

Table 1.1 shows the correlation between the PEOs of the MPMT and the Indonesian National Qualification Framework (KKNI).

Table 1.1 Relationship between PEOs of the UPMS and Indonesian National Qualification Framework (KKNI)

PEO	Indonesian National Qualification Framework (KKNI)			
	Qualification A	Qualification B	Qualification C	Qualification D
Objective 1				√
Objective 2	√	√	√	√
Objective 3	√	√	√	√

Program Learning Outcome (PLO)

The learning outcomes (LOs) of MPMT are formulated based on discussion results in several workshops and evaluations involving academic staff and stakeholders, including alumni. The learning outcomes are published and updated regularly. The current learning outcomes for graduates from MPMT based on the latest curriculum 2019 document program are:

- A. An ability to identify, formulate, and solve complex engineering problems by applying innovative methods and tools of engineering, science, and mathematics/materials science and engineering;
- B. An ability to consolidate and deepen knowledge in an interdisciplinary field;

- C. An ability to apply analysis, synthesis, optimization, and creativity in the engineering design process, resulting in designs that meet desired needs;
- D. An ability to design, develop and conduct appropriate experimentation, analyze and interpret data, and use engineering/scientific judgment to draw conclusions;
- E. An ability to communicate effectively orally and written with a range of scientific audiences in national and international contexts;
- F. An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments must consider the impact of engineering solutions in global, economic, environmental, and societal contexts;
- G. An ability to function effectively on teams that establish goals, plan tasks, meet deadlines, and analyze risk and uncertainty to integrate them into their actions in a responsible manner; and
- H. An ability to recognize the ongoing need for additional knowledge and locate, evaluate, integrate, and apply this knowledge appropriately.

The learning outcomes of UPMS are reviewed by the Faculty of Mechanical and Aerospace Engineering at the end of each semester through a course achievement assessment, a student questionnaire, and lecturer portfolios.