

## Undergraduate Program of Materials Engineering (UPMT)

<b>Name of the program (original language)</b>	Program Studi Sarjana Teknik Material
<b>Name of the program (English translation)</b>	Undergraduate Program of Materials Engineering (UPMT)
<b>Final degree</b>	Sarjana Teknik (S.T.)/Bachelor of Science (B.Sc.)
<b>Standard period of study</b>	4 – 4.5 years
<b>Credit points (according to ECTS)</b>	144 credit points, equivalent 200 ECTS credit points
<b>Type (several can be indicated)</b>	Full time / part time / distance learning / dual degree / cooperative or sandwich course / intensive program/ etc.
<b>Website of the higher education institution</b>	ftmd.itb.ac.id/program-studi-teknik-mesin/
<b>Programs start date within the academic year</b>	July
<b>Program Inception</b>	1994
<b>Intake rhythm</b>	Annually
<b>Expected intake number of students</b>	75 students a year
<b>Faculty/department</b>	Faculty of Mechanical and Aerospace Engineering
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<b>Last accreditation issued by</b>	ASIIN Accreditation
<b>Duration of the last accreditation</b>	1 Jul 2016 – 30 Sept 2021

The Undergraduate Program of Materials Engineering is an interdisciplinary subject that is relatively new to science and engineering and is still developing together with other disciplines. For the engineering aspect, Materials Engineering students study the use of materials science knowledge to solve problems. As for the science aspect, Materials Engineering students learn how to relate the structure of materials with their properties. Both elements of materials engineering are intended to improve the quality of existing materials and develop new materials by building a deep understanding of the relationship between microstructure-chemical composition-synthesis-process.

Taking part in the field of materials engineering requires the following technical skills and methods:

- Identifying, selecting materials, and product-making process;
- Determining the structure of the material (atoms, molecules, crystals, macro, micro, and nano);
- Testing of material properties (mechanical, physical, chemical, magnetic, and electronic);
- Designing of materials (prediction of material properties and processbased material structure); and
- Identifying and predicting the degradation (failure) of materials as well as preventing it.

Several activities are commonly conducted in Materials Engineering, such as:

- a. Using handbooks, databases, software, and the Internet to determine materials and processes;
- b. 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;
- c. Using materials processing equipment such as heating and melting furnaces, welding, spraying, and coating equipment; and
- d. 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.

### Program Educational Objective (PEO)

Referring to the latest curriculum document of curriculum 2019, the program educational objectives (PEOs) of the UPMT focus on producing graduates who can contribute positively to academic, professional, and public society, both at the national and international level.

The PEO of UPMT based on the latest curriculum 2019 document program are:

- PEO 1 Have integrity, discipline, respect, fairness, and responsibility;
- PEO 2 Have a good understanding of mathematics, science, and engineering and can apply their knowledge and expertise in various materials engineering professions;
- PEO 3 Have the character and skills in leadership, communication, teamwork, upholding professional attitudes, caring about social problems, and adapting according to developments in the career environment.

The PEOs are also relevant with the Indonesian National Qualification Framework (KKNI), as shown in the following table.

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

PEO	Indonesian National Qualification Framework (KKNI)			
	Applying science, technology, and/or art in their expertise and being adaptable to various situations faced during solving a problem	Mastering in-depth general and specific theoretical concepts of specific knowledge and formulating related problem-solving procedure	Making strategic decisions build upon data and information analysis and giving a clue in choosing several alternatives solution	Being responsible for their own work and accountable for the achievement of the organization's work
Objective 1			V	V
Objective 2	V	V	V	
Objective 3	V	V	V	V

### Program Learning Outcome (PLO)

Learning outcomes are designed based on the Program Educational Objectives of UPMT. Learning outcomes are targets that must be achieved by students of the UPMT so that by the time they graduate from the UPMT, graduates will have the ability in accordance with the

Program Educational Objectives of the UPMT. The learning outcomes of UPMT ITB are published and updated on a regular basis.

The current learning outcomes for graduates from UPMT based on the latest curriculum 2019 document program are:

- A. An ability to identify, formulate, and solve complex engineering problems by applying the principles of Materials Engineering, science, and mathematics;
- B. An ability to develop and perform appropriate experiments, analyze and interpret data, and use Materials Engineering judgments to draw conclusions;
- C. An ability to apply Materials Engineering designs to produce solutions that meet specific needs by taking into account health, safety, and welfare aspects as well as global, cultural, social, environmental, and economic factors;
- D. An ability to function effectively as an individual or team whose members together play a role in leadership, creating a collaborative and inclusive environment, set goals, plan tasks, and meet goals;
- E. An ability to apply ethical and professional responsibility in engineering situations and make judgments must consider the impact of engineering solutions in the context of global, economic, environmental, societal, and nationalistic spirit;
- F. An ability to communicate effectively with various audiences; and
- G. An ability to acquire and apply new knowledge as needed, using appropriate learning strategies.

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.