2021

UNDERGRADUATE
HANDBOOK

FMAE ITB

FACULTY OF MECHANICAL AND AEROSPACE ENGINEERING
INSTITUT TEKNOLOGI BANDUNG

2021

UNDERGRADUATE HANDBOOK

FMAE ITB

www.ftmd.itb.ac.id

FMAE – ITB

Labtek II, 2nd Floor
Jl. Ganesha 10
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Man Standing on Stainless Steel Filamend
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Welcome Message from The Dean

Faculty of Mechanical and Aerospace Engineering Bandung Institute of Technology, or FMAE ITB, has a long track record and reputation since the inauguration of the Mechanical Engineering Program in 1941. Nowadays, the education program in FMAE ITB consists of the undergraduate program, master program, and doctoral program in Mechanical, Aerospace, and Material Engineering.

All undergraduate study programs have been accredited excellent by the Board of National Accreditation for Higher Education (BAN-PT) and accredited by the international accreditation board in Germany and Europe. Meanwhile, the master and doctoral program of FMAE ITB has been accredited excellent by BAN-PT as well.

In FMAE ITB, there are seven (7) research groups, such as energy conversion research group, mechanical design research group, mechanical production engineering research group, flight physics research group, lightweight structure research group, aircraft design, operation, and maintenance research group, and material science and engineering research group.

FMAE ITB will try to gain a good reputation globally and internationally, while still contributed to the national interest.

This Student Handbook contains information about FMAE, study program, research group, and facilities in FMAE. We hope that this guidebook will be useful for the undergraduate student in FMAE ITB.

Prof. Dr. Ir. Tatacipta Dirgantara, MT
Dean of Faculty of Mechanical and Aerospace Engineering

ITB Vision and Mission

Vision

ITB as an outstanding, distinguished, independent, and internationally recognized university that leads changes toward welfare improvement of the Indonesian nation and the world.

Mission

To innovate, share, and apply science, technology, art and humanity and to produce excellent human resources for better Indonesia and the world.

FMAE Vision and Mission

Vision

The Faculty of Mechanical and Aerospace Engineering shall be an institution of higher education and center of development for mechanical, aerospace and materials science and engineering, continuously striving for excellence, reliability, and respectability, and actively contributing to the nation's development and prosperity.

Mission

- Keeping up-to-date on the very latest knowledge and technology related to mechanical, aerospace and materials engineering through research and development activities
- Conducting higher and continuing education activities in mechanical, aerospace and materials engineering fields
- Disseminate knowledge, technology and industrial views to society both through its graduates, partnerships with industries or other institutions as well as services to society

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FTMD ITB

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Head of Material Science and Engineering Group
Dr. Arif Basuki
Head of Energy Conversion Group
Prof. Dr. Ari Darmawan Pasek
Head of Flight Physics Group
Dr. M. Agoes Moelyadi
Head of Lightweight Structure Group
Prof Dr. Ir. Tatacipta Dirgantara, MT
Head of Aircraft Design, Operation, and Maintenance Group
Dr. Taufiq Mulyando
Head of Mechanical Design Group
Prof. Dr. Zainal Abidin

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Yanti Nurhayanti, SE.
Staff of Sub-Division of Finance
Erlyana Saraswati, A.Md.
Staff of Sub-Division of Finance
Iis Kurniasih

Research Groups

Faculty of Mechanical and Aerospace Engineering (FMAE) ITB has 7 (seven) research group, such as:

Mechanical Design

The Mechanical Design group conducts research and development in the fields of design, structural analysis and machine material selection. This research group has established strong relationships with several industrial sectors including oil & gas, mining, automotive, railroad, manufacturing and even the health care sector. The collaboration carried out by this group is not only with national organizations but also with various international organizations related to education, research and development of mechanical design.

The main research topics within this group are,

a. design of mechanical components and equipment,
b. experimental stress analysis,
c. dynamics and vibration,
d. fracture mechanics,
e. rail and guided vehicle technology,
f. biomechanics.

Specific research fields currently being actively undertaken by this group include Mechanical Equipment; Component Design; Experimental Stress Analysis; Predictive Maintenance Technology: Vibration Analysis, Signal Processing, Fracture Mechanics; Railroad Vehicle Technology: Impact Energy Absorber, Composite Brake, Collision Feasibility, Rail dynamics; Biomechanics: Gait Analysis, Dental Biomechanics, Prosthetic Design, Collision Injury; Tasks at risk; Heavy Machinery and Material Handling Equipment.

Energy Conversion

In the Energy Conversion group, the research consists of the following main topics:

a. Thermo-fluid technique,

b. Power generation engineering,
c. Cooling technique,
d. Computational fluid dynamics,
e. New and renewable energy.

Each of the main topics focused on more specific applications, i.e., micro-gas turbines based on turbochargers, low cost solutions to improve the performance of dual-fuel vehicles, non-combustible hydrocarbon chillers as alternative coolants for energy conservation in cooling systems, study of diesel engine characteristics spray using CFD, and production of biofuels from biomass.

Material Science and Engineering

In the Materials Science and Engineering group, all aspects related to the structure, properties and characteristics of matter and their interactions are studied. With this provision, the material can be engineered so that it is superior and highly efficient.

Research on Materials Science and Engineering is categorized based on the type of material studied, namely metals, composites, polymers, ceramics, biomaterials, and recycled materials. In the 2010-2025 period, this group implementing a new approach and thinking: Problem Solving and Future Oriented Development. Development of Materials Science and Engineering is aimed at solving problems and challenges in the industry, health, defense & security and environment. Research is also focused on developing products for various purposes, i.e., construction; Sensors, Storage and Catalysts; Filters, Membranes and Insulation; Biomaterial Engineering.

Mechanical Production Engineering

The Mechanical Production Engineering group conducts research on the following main topics: Production Systems; Robotics and Automation; Machine Tools Design; Manufacturing Process; Industrial Metrology; Creativity and Innovation in Manufacturing Engineering.

Each of the main topics in this group is focused on specific applications such as product modeling and production facilities, autonomous production systems, robotic tele-operation, machine tool performance testing, piezoelectric based micro actuators, and product quality control.

Aircraft Design, Operation, and Maintenance

The Aircraft Design, Operations and Maintenance group has the goal and mission of increasing safety, efficiency and minimizing the social impacts (especially on the environment) of global air transport through innovations in control, optimization, system design and analysis. The objective and mission of this group are done by conducting research within the scope of the main topics:

a. aeronautical product design,
b. development of an unmanned aerial vehicle system (UAV),
c. air transport engineering and operations,
d. air transport modeling and analysis,
e. development of flight engineering simulators,
f. airline reliability and maintenance program engineering,
g. aviation safety analysis,
h. airport system analysis, and
i. propulsion and turbomachinery.

The focus of these main topics includes national glider design, human powered aerial vehicles, UAV development, airline fuel conservation, airline cost and revenue analysis, airline fleet planning studies, modeling, and simulation of departure/ arrival traffic at airports, turbine engine design and analysis.

Flight Physics

The Flight Physics group deals with the aspects of physical phenomena and the control of a flying vehicle. This group conducts research on the following main topics: Fluid Dynamics; Flight Dynamics and Control Systems; Astrodynamics.

Each main topic is focused on specific applications such as vortex element method (VEM) development, system development and particle image velocimetry (PIV) dynamics, influence of wing configuration on wing aerodynamic performance, rocket propulsion and dynamics, development of aircraft engineering simulators, control applications on systems dynamics, and space mission reconstruction and analysis.

Lightweight Structure

A lightweight structure is a structure that has significant savings in terms of weight compared to normal structures, but with the same strength, so that the structure becomes more efficient. This advantage makes the concept of lightweight structures widely applied in various fields, including aerospace or flying vehicles. The development of lightweight structures study in FMAE is always adjusted to the latest developments in the world. The Lightweight Structures group conducts research with the following main topics:

a. Aircraft structural damage tolerance,
b. Numerical methods in structural analysis,
c. Structural analysis and testing,
d. Digital Image Correlation (DIC),
e. Environmentally friendly composite materials, and
f. three-dimensional construction for industrial components.

Each of the main topics focuses on more specific applications, such as calculating crack growth and predicting the residual strength of aircraft structures, finite element analysis including non-linear analysis, bending analysis and testing of thin wall structures, and experimental methods of structures using DIC.

Laboratories

Main aspect to support the education and research in the university is laboratory facility. This facility is critical to do some testing, either by using numerical method or experimental, in order to create a solid foundation in research. Therefore, FMAE ITB provides laboratory to accommodate students to develop their ideas in each research group to the maximum. The laboratories in FMAE are also meet the standard of international accreditation board, ASIIN. Each laboratory in FMAE is not exclusively for a specific research group, but also have an opportunity to do collaborative research between research groups. Some of the laboratories used by the researchers of FMAE ITB also managed by Gedung Litbang Integrasi dan Aplikasi ITB, which are: Dynamics Laboratory, Thermodynamics Laboratory, and Thermal Energy Laboratory.

Mechanical Production Laboratory

The Production Engineering Laboratory is located in one of the oldest buildings in FMAE. This laboratory contains tools used for machining processes, such as lathes, machining tools, milling machines, drill machines, etc. These tools can be used for lab demonstration purposes, such as manufacturing process and mechatronics. In addition, these tools can also be used to work on subject assignments (for example: Imitation Engineering), design assignments and final projects. Apart from the machining tools, the production engineering laboratory is also equipped with several other facilities, namely classrooms, computer labs and 3D printers.

Industrial Metrology Laboratory

The Industrial Metrology Laboratory (bunker) is located underground, with the aim that the laboratory equipment is protected from environmental influences such as temperature, humidity and dust. In this laboratory, there are various kinds of measurement tools. The simplest are the length measuring instruments, such as calipers and micrometers. Furthermore, there is a shape measurement tool. Example: Profile Projector that can be used to determine the shape of a thread in detail. In this laboratory, there is also a tool to measure the roundness and roughness of an object.

Metallurgy and Material Laboratory

The Metallurgy and Material Engineering Laboratories are located at Jalan E Kampus ITB Ganesa. The laboratory is used for research and academic activities by the students and lecturers in FMAE.

A. *Metal Laboratory*

The metal laboratory has several tools that students usually use for practicum purposes in Materials Engineering courses, namely: Mechanical Testing Practicum, Material Processing Practicum, Engineering Practicum and Material Characterization as well as Materialography and Diffraction. In addition, students also use for service courses by Mechanical Engineering (Material Engineering and Material Structure and Properties) and Aerospace Engineering (Aircraft Materials and Manufacturing Methods I).

The following facilities are also parts of the Metal Laboratories:

- Testing (Mechanical and Corrosion)
    - Δ Several mechanical testing tools are available for: microvickers hardness test, bending test, tensile test, torsional test, fatigue test, impact test. In addition, Corrosion testing laboratory is also available.
- Machining
    - Δ Several machining tools are available, i.e., workshop table, milling machine, cutting machine, sawing machine, and lathe machine.
- Material Identification and Characterization
    - Δ Several supporting machines for material characterization are available in the metalography room, i.e., grinding and polishingmachine.
- Welding Equipment
- Roll Machine
- Furnaces and Ceramics
    - Δ Several furnaces are available to support ceramics-related researches, i.e., powder metallurgy (centrifugal atomizer).

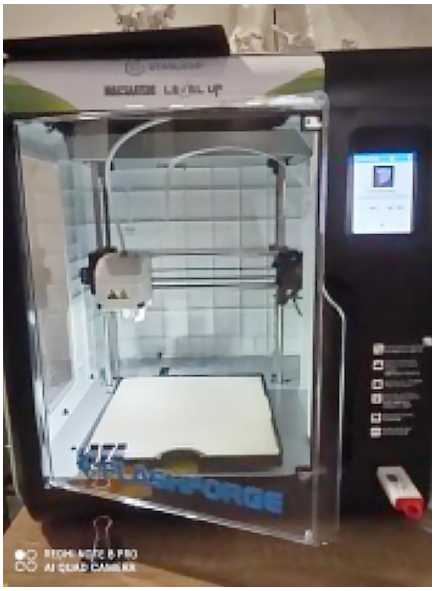
- Optic microscopic and other analytical tools.

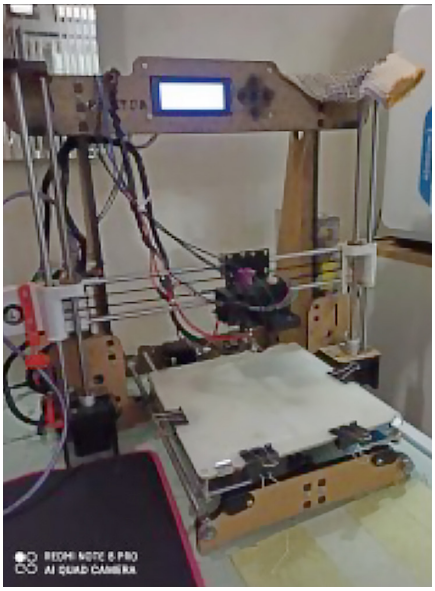
B. ***Polymer-Composite Laboratory***

This laboratory provides tools which are used for students lab demonstrations on several courses in Material Engineering, i.e., Polymer Chemistry, Polymer Materials, Polymer Composites, Rubber Technologies, Polymer Composite Manufacturing Process and Material Optical Characteristics.

The facilities included as parts of this laboratory are:

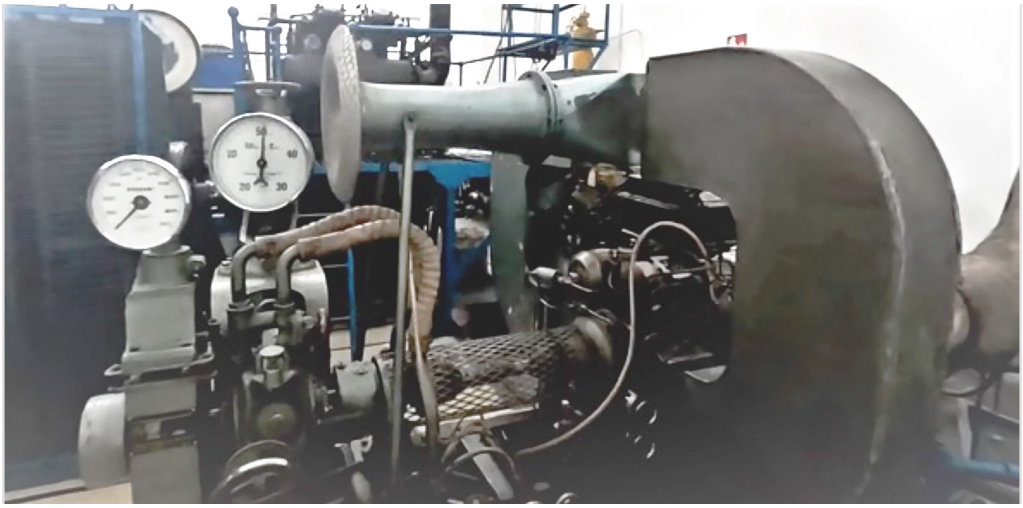
- Extrusion tools, i.e., plastic pellets and extrusion machine.
- Fillament and 3D printing machine.
- Double Roll Milling
- Viscometer
- Injection Molding
- Compression Molding
- Spin Coater
- Melt Flow Indexer
- Fume Hood
- Supporting equipments for composite testing and manufacturing.





Combustion Motor and Propulsion System Laboratory

In the combustion motor and propulsion system laboratory, the available tools are used for two types of lab demonstration, namely Basic Machine Phenomenon (FDM) and Machine Performance Testing (PPM). For FDM lab demonstration, there is a module on the bomb calorimeter – which purposed to measure the calorific value of a fuel. As for the PPM lab demonstration, modules on gas turbines and diesel engines are given. In the gas turbine module, the power produced by the engine will be measured by a hydraulic dynamometer that is connected to the turbine. Whereas in the diesel engine module, there are two diesel engines in which its power is measured by two different types of dynamometers, namely electric dynamometers and Eddy Current (EC) dynamometers.



Fluid Machinery Laboratory

The Fluid Machinery Laboratory has a pipe friction testing tool that students usually use for lab demonstration on basic machine phenomena. In this tool, the friction phenomenon in the pipe is observed by measuring the static pressure of each pipe size variation through a manometer. This laboratory also has several tools used for laboratory performance testing, namely: centrifugal pump testing equipment, Kaplan turbine testing module, and piston turbine testing equipment. In addition, the Fluid Machinery Laboratory is also equipped with a micro-hydro turbine testing device which has a maximum capacity of five meters. This tool can be used for the needs of various studies conducted in this laboratory.

Refrigeration Engineering Laboratory

The Refrigeration Engineering Laboratory has several tools that students usually use for practicum purposes in two Mechanical Engineering courses, namely: Basic Mechanical Phenomena and Mechanical Performance Testing. For practicum in the Basic Machine Phenomenon course, this laboratory has a slide bearing module and a multipurpose air duct module (SUS). By conducting experiments using the slide bearing module, students can vary the speed of the slide bearing to see the effect on the pressure distribution in the slide bearing. Meanwhile, the SUS module can be used by students to study flow characteristics by doing several treatments, such as adding humidity and changing the flow temperature. This laboratory is also equipped with a cooling engine module for machine performance testing courses. Through the two air channels in it, to heat and cool the air, students can use this module to understand the phenomena that occur in a cooling engine cycle.

Thermal Energy Laboratory

The Thermal Energy Laboratory is one of the oldest laboratories for Mechanical Engineering ITB, which has been around for more than 50 years. One of the main tools contained in this laboratory is the mini Steam Power Plant (PLTU) which has a capacity of 1.5 KW. PLTU Mini uses diesel fuel with water as the working fluid. This tool is used by students for the purposes of two practicums in Mechanical Engineering lectures, namely: Testing of Mechanical Achievement and Basic Mechanical Phenomena. With this tool, students can learn how to measure the efficiency of a PLTU and measure the quality and energy content of the mixed steam released.

Thermal Engineering Laboratory

In this laboratory there are several test equipment for heat transfer / engineering problems such as convection and conduction tests. There is also an engine for combustion test simulation and Schlieren analysis.

Machinery Mechanics and Construction Laboratory

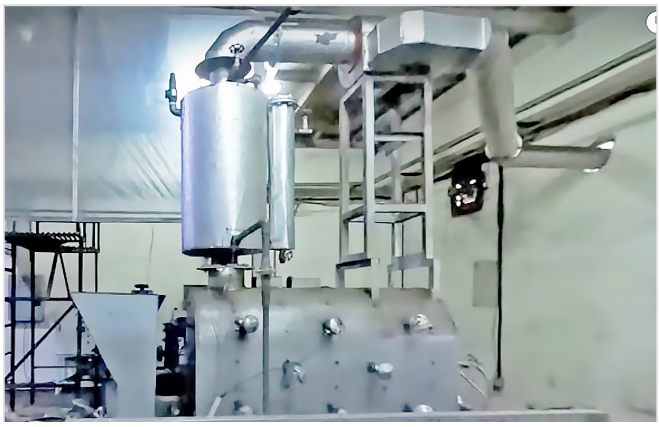
In this laboratory, there are several test equipment for mechanical cases, such as: torsion, deflection, and buckling tests. In addition, there are also several tools for machining processes such as grinding machines, saws, cutters, and drilling machines.

Mechanical Design Laboratory

In this laboratory, there is a universal testing machine that can be used in mechanical cases such as: tensile tests, compression tests, bending tests, and shearing tests. In addition, this laboratory is also equipped with several test rigs for testing mechanical components such as leaf springs, air springs, and disc brakes.

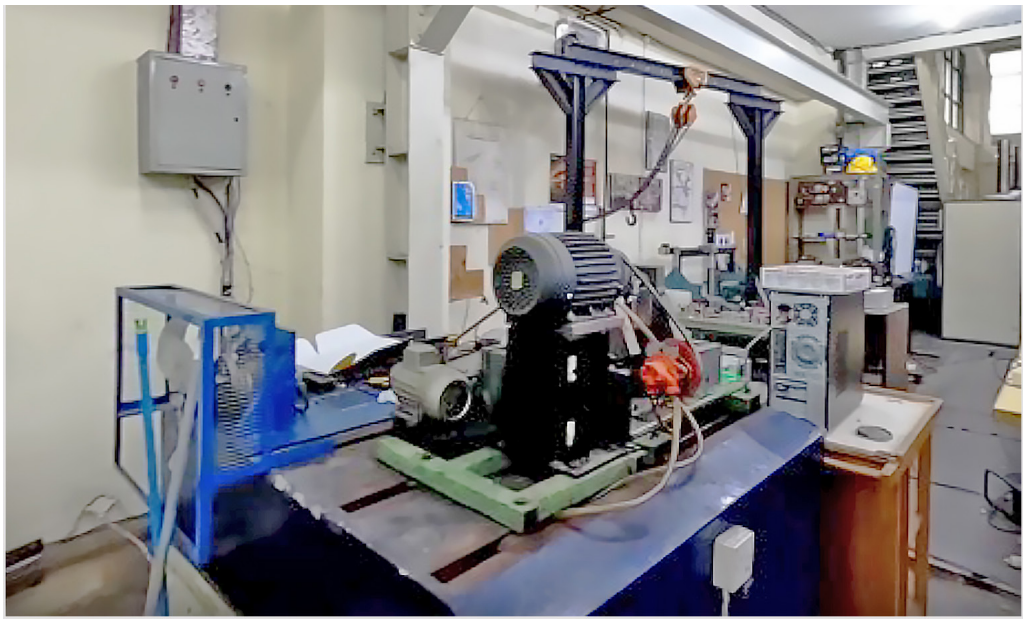
Thermodynamics Laboratory

The thermodynamics laboratory is located on the third floor of the ITB Inter-University Center for Technology and Science (PAU) building. One of the activities routinely carried out in this laboratory is conduction testing and convection testing. In addition, research is often carried out using bomb calorimeters. In this laboratory, two computers are also provided to perform numerical simulations of Computational Fluid Dynamics (CFD). In the subject of coal, this laboratory has a briquette machine, which is a tool for making powder into solids that have a higher density than the constituent materials. In the subject of biomass, there is a hydrothermal device that functions to improve the quality of a material that wants to be used as an alternative fuel as well as a pyrolysis device used to produce oil from plastic. Then, there is also an incinerator which functions to burn the material or fuel until it runs out and cold storage which functions as a storage area for materials that can be maintained at a temperature.



Dynamics Laboratory

The Dynamics Laboratory has various capabilities in the fields of vibration and control. Students can use various tools in this laboratory to learn how slide bearings work, measure deflection and stress on a cantilever bar, how the electric drive system works, how to recognize signal characteristics, and so on. This laboratory is also equipped with various tools that researchers can use for testing, i.e., the display of inclined and straight gears, tools for testing the resonance of a system, and others.



Aerospace Engineering Laboratory

In order to support the courses and researches related to Aerospace Engineering, FMAE facilitates students, researchers, and lecturers with the following laboratories:

A. Aerodynamics

This laboratory has a subsonic wind tunnel with closed and open circuits. In addition, there are also tools to measure the lift and drag generated by an object passed by air flow in a wind tunnel.

B. Lightweight Structure

In this laboratory, researchers can carry out several structural tests thanks to the availability of measuring and testing instruments in it. Among these tools are the strain gage (to measure strain), LVDT (Linear Variable Differential Transformer) and dial gage as a deflection measuring tool, and piezoelectric (to measure the acceleration of structures due to vibration).

C. Flight Mechanics

In this laboratory, researchers can study the workings of various instruments on aircraft, including: static pitot, airspeed indicator, altimeter, vertical speed indicator, alpha-beta vanes, accelerometer, and gyroscope.

D. Astrodynamics

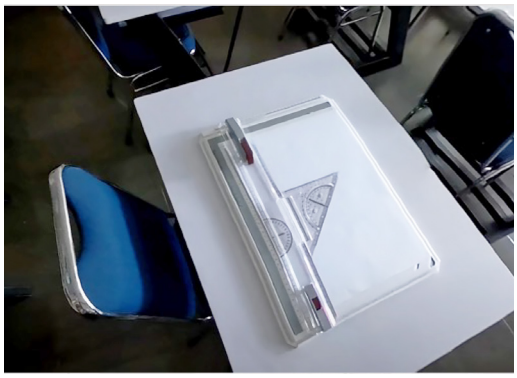
In this laboratory, researchers can do satellite tracking for satellites that are open to research and the public. The following are some of the tools available in this laboratory: a computer and satellite tracking software, an antenna and a rotator, and a transceiver for sending and receiving signals to and from satellites.

E. Aircraft Design Studio

In this laboratory, researchers can design small prototype aircraft and UAV / Drone designs thanks to the availability of supporting tools, such as: adhesive tools, screwdrivers and keys of various sizes, and cutting tools.

Drawing and Computation Laboratory

To accommodate the learning and research activities that require computational simulations, FMAE provides computational facilities that academicians can use for their respective needs. This computational facility is equipped with computational software that is commonly used for various research within the FMAE scientific scope, i.e., Solidworks, Autocad, Ansys, Matlab, and others. This facility can also be used by students for various practical needs in the courses of Mechanical Engineering Drawing, Technical Analysis and Numerical Methods, Computational Aerodynamics, and Introduction to Control Systems.



Curricula of Undergraduate Programs

Tahap Persiapan Bersama (TPB)

SEMESTER 1		
Code	**Courses**	**Credits**
MA1101	Mathematics IA	4
FI1102	Elementary Physics IB	3
KI1002	General Chemistry B	4 (1)
KU1001	Sports	2
KU1102	Introduction to Computation	3
MS1100	Introduction to Mechanical, Material, and Aerospace Engineering	1
Semester 1 Credits:		**17**

SEMESTER 2		
Code	**Courses**	**Credits**
FI1202	Elementary Physics IIB	3
KU1202	Introduction to Engineering and Design	3
MS1200	Engineering Drawing	2
MS1210	Statics	3
MA1204	Mathematics IIC	4
KU1024	English	2
KU1011	Indonesian Language: Scientific Writing	2
Semester 2 Credits:		**19**

Mechanical Engineering

SEMESTER 3		
Code	**Courses**	**Credits**
MS2100	Introduction to Mechanical Engineering	2
MS2102	Introduction to Engineering Analysis	3
MS2101	Mechanical Drawing	2 (1)
MS2110	Mechanics and Strength of Materials	3
MS2111	Kinematics and Dynamics of Machinery	4
MS2120	Basic of Engineering Thermodynamics	3
MS2140	Engineering Materials	2 (1)
Semester 3 Credits:		**19**

SEMESTER 4		
Code	**Courses**	**Credits**
MS2200	Statistics	2
MS2201	Numerical Analysis	2
MS2202	System Dynamics	2 (1)
MS2203	Electric Motors and Drives	3 (1)
MS2210	Basic Design of Machine Elements	3
MS2220	Basic Fluid Mechanics	2
MS2240	Structures and Properties of Materials	2 (1)
Semester 4 Credits:		**17**

SEMESTER 5		
Code	**Courses**	**Credits**
MS3100	Engineering Measurement	2 (1)
MS3110	Basic of Mechanical Vibrations	2
MS3120	Basic Heat Transfer	3
MS3130	Manufacturing Process	4 (1)
KU2071	Pancasila and Civic Education	2
Semester 5 Credits:		**13**

SEMESTER 6		
Code	**Courses**	**Credits**
MS3200	Basic Pheomenon on Mechanical Engineering	1 (1)
MS3201	Introduction to Control Systems	3 (1)
MS3203	Engineering Product Design	3
MS3221	Energy Conversion System	3
MS3202	Basic of Mechatronics	2 (1)
MS3230	Industrial Metrology	3 (1)
Semester 6 Credits:		**15**

SEMESTER 7		
Code	**Courses**	**Credits**
MS4101	Sustainability Aspects in Mechanical Engineering	2
MS4102	Mechanical Maintenance	3
MS4091	First Final Project	2 (2)
MS4100	Engineering Product Prototyping	2
Semester 7 Credits:		**9**

SEMESTER 8		
Code	**Courses**	**Credits**
MS4090	Industrial Internship	1 (1)
MS4092	Comprehensive Examination	1
MS4093	Second Final Project	3 (3)
MS4200	Engineering Management and Business	2
KU206X	Religion and Ethics	2
Semester 8 Credits:		**9**

Compulsory Courses for Mechanical Systems Sub-Major

SEMESTER 5		
Code	**Courses**	**Credits**
MS3111	Mechanical Engineering Design	3
MS3121	Fluid Mechanics	2
Semester 5 Credits:		**5**

SEMESTER 6		
Code	**Courses**	**Credits**
MS3220	Thermal Engineering	3
Semester 6 Credits:		**3**

SEMESTER 7		
Code	**Courses**	**Credits**
MS4103	Mechatronics	2 (1)
MS4120	Mechanical Installation System	3
MS4121	Mechanical Engineering Laboratory	1 (1)
Semester 7 Credits:		**6**

SEMESTER 8		
Code	**Courses**	**Credits**
Semester 8 Credits:		**0**

Compulsory Courses for Production Engineering Sub-Major

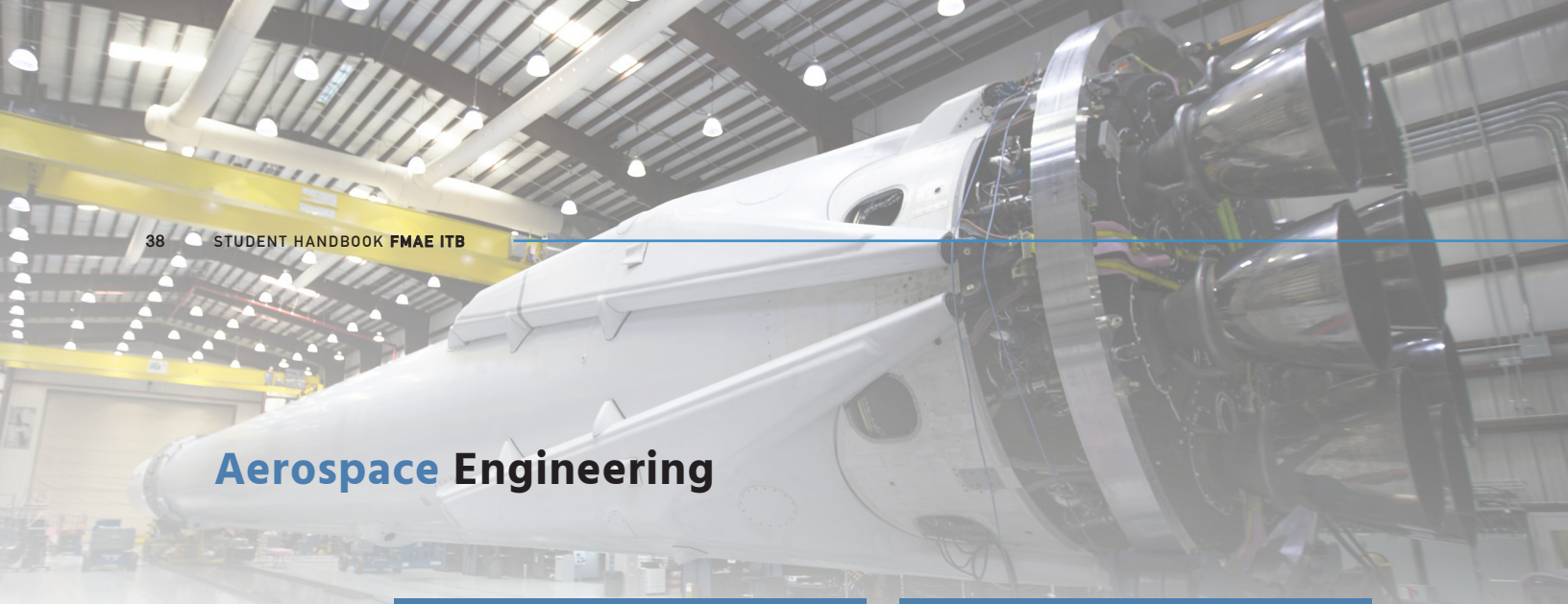
SEMESTER 5		
Code	**Courses**	**Credits**
MS3131	Analysis of Materials and Information Flows	3 (1)
MS3132	Production Cost Estimation	3
Semester 5 Credits:		**6**

SEMESTER 6		
Code	**Courses**	**Credits**
MS3231	Quality Control	2
Semester 6 Credits:		**2**

SEMESTER 7		
Code	**Courses**	**Credits**
MS4130	Manufacturing Automation System	3
MS4131	Industrial Manufacturing Process	3
Semester 7 Credits:		**6**

SEMESTER 8		
Code	**Courses**	**Credits**
Semester 8 Credits:		**0**

Elective Courses of S1 Mechanical Engineering Major			
Code	**Courses**	**Credits**	**Intake Semester Recommendation**
MS4087	Digital Circuits	3	3
MS4088	Signals and Systems	3	6
MS4012	Refrigeration and Cryogenic System	3	7
MS4013	Internal Combustion Engines	3	7
MS4014	Gas Turbine	3	7
MS4015	Heat Exchanger	3	7
MS4031	Theory of Ground Vehicles	3	7
MS4032	Finite Element Analysis	3 (1)	7
MS4033	Machine Tools in Industrial Process	3	7
MS4034	Piping System Design and Construction	3	7
MS4035	Biomechanics	3	7
MS4036	Risk Based Inspection	3	7
MS4051	Dies and Mold	3	7
MS4052	Machining Process	3	7
MS4053	Jig and Fixture	3	7
MS4054	Testing of Machine Tool	3 (1)	7
MS4055	Tooling System	3	7
MS4056	Numerical Control of Machine-Tool System	3	7
MS4089	Mechatronics System Design	3	7
MS313X	Subs	3	
MS4001	Special Topics in Mechanical Engineering	3	
MS4011	Design of Fluid System	3	



Aerospace Engineering

SEMESTER 3		
Code	**Courses**	**Credits**
AE2100	Introduction to Aerospace Engineering	2
AE2101	Engineering Mathematics	3
AE2102	Thermal Engineering	4
AE2103	Kinematics and Dynamics	3
AE2130	Aircraft Materials and Manufacturing Methods I	3
MS2110	Mechanics and Strength of Materials	3
Semester 3 Credits:		**18**

SEMESTER 4		
Code	**Courses**	**Credits**
AE2200	Intrumentation, Measurements and Experimentation	3
AE2201	Engineering Analysis and Numerical Method	3
AE2202	Fluid Dynamics	3
AE2203	Dynamical System	3
AE2204	Data Sciences and Statistics	3
AE2230	Aircraft Materials and Manufacturing Methods II	2
Semester 4 Credits:		**17**

SEMESTER 5		
Code	**Courses**	**Credits**
AE3141	Aircraft Systems	3
AE3100	Mechanical Vibrations	3
AE3110	Aerodynamics I	3
AE3120	Aircraft Aerodynamics and Flight Performances	4
AE3140	Airworthiness Certification	3
AE3130	Lightweight Structure Analysis	3
Semester 5 Credits:		**19**

SEMESTER 6		
Code	**Courses**	**Credits**
AE3200	Control Engineering	3
AE3211	Aircraft Propulsion	3
AE3220	Flight Dynamics	3
AE3201	Astronautics	3
Semester 6 Credits:		**12**

SEMESTER 7		
Code	**Courses**	**Credits**
KU206X	Religion and Ethics	2
AE4000	Aspect of Sustained Environment	2
AE4020	Flight Communication, Navigation, and Surveillance	2
AE4098	Undergraduate Thesis I	2
Semester 7 Credits:		**8**

SEMESTER 8		
Code	**Courses**	**Credits**
AE4097	Comprehensive Examination	1
KU2071	Pancasila and Civic Education	2
AE4099	Undergraduate Thesis II	3
AE4090	Profession and Communicty Development A	1 (1)
TI4004	Industrial Management B	2
Semester 8 Credits:		**9**

Compulsory Courses for Aeronautics Sub-Major

SEMESTER 5		
Code	**Courses**	**Credits**
Semester 5 Credits:		**0**

SEMESTER 6		
Code	**Courses**	**Credits**
AE3210	Aerodynamics II	3
AE3230	Lightweight Structure Design	3
Semester 6 Credits:		**6**

SEMESTER 7		
Code	**Courses**	**Credits**
AE4040	Aircraft Design	4
AE40X5	Aerospace Computational Method	3
Semester 7 Credits:		**7**

SEMESTER 8		
Code	**Courses**	**Credits**
Semester 8 Credits:		**0**

Compulsory Courses for Aviation Sub-Major

SEMESTER 5		
Code	**Courses**	**Credits**
Semester 5 Credits:		**0**

SEMESTER 6		
Code	**Courses**	**Credits**
AE3240	Air Transportation	3
AE3241	Air Transportation Modeling	2
AE3242	Airport System	2
Semester 6 Credits:		**7**

SEMESTER 7		
Code	**Courses**	**Credits**
AE4041	Aviation System Planning	4
AE4042	Aircraft Maintenance Engineering	2
Semester 7 Credits:		**6**

SEMESTER 8		
Code	**Courses**	**Credits**
Semester 8 Credits:		**0**

Elective Courses of S1 Mechanical Engineering Major			
Code	**Courses**	**Credits**	**Intake Semester Recommendation**
AE4015	Computational Aerodynamics	3	7
AE4016	Experimental Aerodynamics	3	7
AE4019	Special Problem in Aerodynamics and Propulstion	3	7
AE4025	Flight Simulation Engineering	3	7
AE4026	Attitude Dynamics & Control	3	7
AE4029	Special Problem in Flight Mechanics	3	7
AE4035	Finite Element Method	3	7
AE4037	Impact Mechanics	3	7
AE4091	Profession and Community Development B	2 (2)	7
AE4092	Profession and Community Development C	3 (3)	7
AE4093	Profession and Community Development D	4 (4)	7
AE4027	Avionic Systems	3	8
AE4036	Aircraft Loads	3	8
AE4039	Special Problem in Lightweight Structure	3	8
AE4049	Special Problem in Aircraft Operation and Maintenance	3	8

Materials Engineering

SEMESTER 3		
Code	**Courses**	**Credits**
MT2104	Mathematics for Materials Engineering	3
MT2105	Chemistry of Solid Materials (P)	3
MT2106	Electronic & Magnetic Materials	3
MT2100	Introduction to Materials Engineering	2
MT2101	Mechanical Properties of Materials	2
MT2102	Mechanics of Materials	3
MT2103	Spectroscopy and Thermal Analysis (P)	2
MS2101	Mechanical Drawing	2 (1)
Semester 3 Credits:		**20**

SEMESTER 4		
Code	**Courses**	**Credits**
MT2204	Numerical Analysis of Materials Engineering	2
MT2231	Polymer Chemistry (P)	3
MT2202	Thermodynamics of Materials	3
MT2203	Materialography and Diffraction (P)	2
MT2224	Ceramic Materials	3
MT2205	Mechanical Testing Practical Course	1 (1)
MT2216	Metallic Materials	3
Semester 4 Credits:		**17**

SEMESTER 5		
Code	**Courses**	**Credits**
MT3101	Transport Phenomena in Materials Engineering	3
MT3132	Polymer Materials (P)	3
MT3103	Materials Processing Practical Course	1 (1)
MT3004	Electrochemistry and Corrosion	3
MT3114	Phase Transformation	3
MT3125	Ceramic Raw Materials (P)	3
MT3116	Manufacturing Processes of Metallic Materials	3
Semester 5 Credits:		**19**

SEMESTER 6		
Code	**Courses**	**Credits**
MT3221	Ceramics Processing	3
MT3203	Engineering and Characterization of Materials Practical Course	1 (1)
MT3234	Composite Materials (P)	3
MT3205	Computational Methods in Materials Engineering (P)	3 (1)
MT3236	Polymer Processing	3
KU2071	Pancasila and Civic Education	2
Semester 6 Credits:		**15**

SEMESTER 7		
Code	**Courses**	**Credits**
KU206X	Religion and Ethics	2
MT4001	Experimental Design	3
MT4002	Project on Materials Selection and Product Processing Oriented	3
MT4003	Materials Technology Seminar	1
MT4004	Aspects of Sustainability in Materials Technology	2
Semester 7 Credits:		**11**

SEMESTER 8		
Code	**Courses**	**Credits**
MT4006	Management and Entrepreneurship in Materials Engineering	2
MT4005	Principle of Materials Design	2
MT4091	Industrial Internship	2
MT4092	Final Project	5
Semester 8 Credits:		**11**

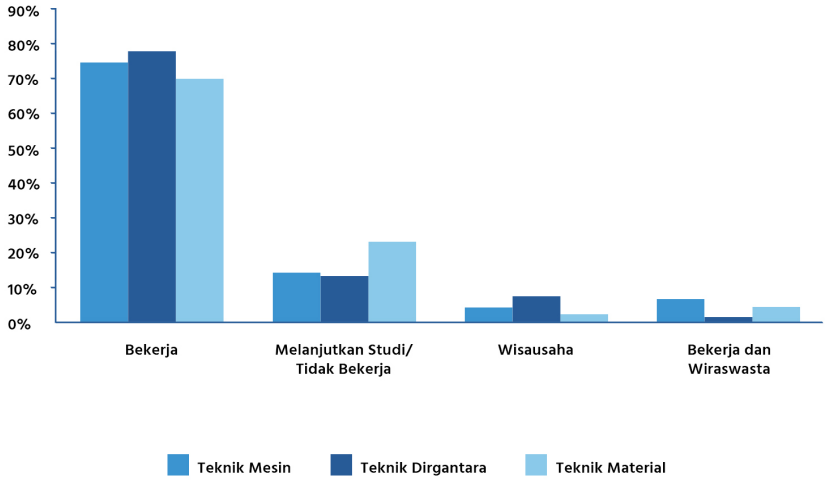
Elective Courses of S1 Mechanical Engineering Major			
Code	**Courses**	**Credits**	**Intake Semester Recommendation**
MT3239	Biobased Polymers	3	6
MT4007	Biomaterials	2	7
MT4011	Melting & Solidification Processing	2	7
MT4012	Corrosion Prevention Techniques	2	7
MT4013	Properties and Treatment of Surface	2	7
MT4021	Conventional Ceramics	2	7
MT4022	Ceramics Refractory	2	7
MT4031	Rubber Technology	2	7
MT4032	Fiber Technology	2	7
MT4033	Manufacturing of Polymeric Composite	2	7
MT4041	Non Destructive Testing	2	7
MT4045	Nano Materials	2	7
MT4093	Capita Selecta of Materials Engineering A	2	7
MT4008	Fracture Mechanics of Materials	2	8
MT4009	Materials Joining Technology	2	8
MT4014	Heat Treatment	2	8
MT4023	Cement and Concrete	2	8
MT4024	Ceramics Plant Design	2	8
MT4042	Optical Properties of Materials	2	8
MT4043	Magnetic Materials Engineering	2	8
MT4044	Failure Analysis	2	8
MT4094	Capita Selecta of Materials Engineering B	2	8
MT4095	Capita Selecta of Materials Engineering C	3	8
MT4096	Capita Selecta of Materials Engineering D	3	8
MT3217	Plasticity and Deformation Process	3	
MT3228	Advanced Ceramics	3	
MT4046	Degradation of polymer materials	2	

Career Prospects of Faculty of Mechanical and Aerospace Engineering ITB Graduates

Graduates of Faculty of Mechanical and Aerospace Engineering ITB has a chance to start their career in several institutions, such as government agency, state-owned enterprise, private-owned enterprise, academic and research institution, even become an entrepreneur.

The bar chart below shows the job status of FMAE batch 2012 graduates', which collected by ITB Career Center. More than 70% of mechanical engineering, aerospace engineering, and material engineering graduates' already have a job. Among this group, 70% of mechanical engineering graduate, 68% aerospace engineering graduate, and 52% material engineering graduate work in the same field as their studies in university, while the rest are working in a different sector.

Status Pekerjaan



The opportunity of graduates to work in several sectors, even outside their specialities, can be achieved one of ITB education philosophy and also applied in the FMAE ITB, which is to create alumni that able to adapt and learn independently to keep up with the rapid development of technology. This objective was chosen with the hope

that ITB alumni are flexible during their professional career, which very dynamic.

In specific, working field that filled by FMAE graduates are:

Mechanical Engineering

Mechanical engineering study is applicable in wide sectors of mechanical process and equipment, for example:

1. ***Automotive***

   Design, manufacture, quality control, and other processes within the auto motive industry (motorbikes, cars, trucks, even heavy transport vehicles).

2. ***Manufacture***

   Essential goods factory (e.g., medicine, foods, clothes), machine factory, automotive factory, etc.

3. ***Operation and Maintenance***

   Mechanical maintenance for low-cost operation, engine failure repair, and productivity enhancement for maximizing profits.

4. ***Power Plant***

   Power plant machine components such as turbine, pump, compressor, hydraulics equipment, boiler, fan/blower, controller equipment, and electrical grids.

5. ***Oil and Gas***

   Drilling process as well as production equipment operation and maintenance.

Aerospace Engineering

A specific dedication of aerospace engineering graduates is required in two job sectors:

1. ***Aerospace Industry***

   a. Manufacture industry (PT. DI),
   b. Avionics/optronics components (LEN, PT. INTI), hydraulics/ land

ing-gear components, other standard components.

c. Maintenance service (ACS-PT.DI, GMF-AeroAsia, INDO-PELITA, MMF, Koharmat-AU), airline/air charter service (PT. GIA, PT. MNA), and satellite telecommunication service (Satelindo, PSN, Telkom, Kohanudnas)

2. ***Aviation Institution***

   a. Research institution (Puspiptek/BPPT, Dislitbang AU, LAPAN)
   b. Education/training institution (ITB, AAU, Sekbang-AU,etc)
   c. Government institution (Ministry of Transportation)

Aerospace engineering graduates also hired around the globe; the sectors are for example:

3. ***Aircraft manufacture industries*** *such as Embraer (Brazil), Boeing (USA), de Havilland (Canada), and Airbus (Europe).*
4. ***Airlines industries*** *such assuch as Cathay Pacific and Air Asia*
5. ***Research/education institutions*** *such as NLR (Netherlands and NTU (Singapore)*

Material Engineering

Material engineering graduates are highly appreciated in the following sectors:

1. ***Manufacture Industry***

   Numerous industries related to materials in the production process, product development, quality control, and equipment maintenance.

2. ***Energy and Mineral Resources***

   Engineer of welding, inspection, and production equipment maintenance.

3. ***Education***

   Lecturer in higher educational institution, industry skills training institution, etc.

Our graduates are easily connected to numerous businesses and industries fully supported by ITB Career Center. ITB Career Center is a career counseling office that actively delivers recruitment events, career counseling sessions, job fairs, and other career services.

The office also provides a comprehensive directory of ITB graduates' careers.

Here are some of the companies that hired our graduates:

Student Affairs

Study Program Student Association

Faculty of Mechanical and Aerospace Engineering ITB have three (3) study programs, each has its own student organization, such as:

Mahasiswa Teknik Material (MTM)

Material Engineering Student Association consists of ITB material engineering students, which was founded on 30 September 1998. Before it, the students of this study program are members of Mechanical Engineering Student Association (HMM ITB) up until a separation is initiated by Eko Sugiharto, material engineering student batch 1994, which led to a standalone student association for material engineering student.

MTM secretariate located in ITB Ganesha Campus, road E, beside the Labtek X, which is one of the main building of material engineering lecture. Near the secretariate, there are some facilities, such as open area and a small park which can be used for discussion, refreshing, and do some outdoor activities. Inside the secretariate, there are also some facilities, for example TV, Refrigerator, Locker, WiFi, speaker, projector, even a table tennis equipment.

Some of typical agendas that are usually held by MTM ITB are Materials Matter, MTM ITB Graduation Ceremony, and EMINEX. MTM also focused to introduced the material engineering program to the public through media in form of audio (podcast), visual (infographic), and audiovisual (YouTube Video).

For further information about MTM ITB, please visit the MTM ITB official website (**http://mtm.ftmd.itb.ac.id**) or look at several Instagram account of MTM ITB: (**@mtmitb, @chimpitb, @deformasi.mtm, @dpamtm, @wisudamtmitb**)

Keluarga Mahasiswa Teknik Penerbangan (KMPN)

Aerospace Engineering Student Association 'Otto Lilienthal' ITB is a student association which cover all undergraduate program of aerospace engineering student in Bandung Institute of Technology. KMPN was founded on 6 August 1997 and located in road D ITB Ganesha Campus, behind the main building of FMAE ITB. KMPN ITB aims

to support the education process held in Aerospace Engineering Study program, also provide a place for aspirations from the aerospace engineering student.
For further information about KMPN ITB, please visit the KMPN ITB official website (**http://kmpn.ae.itb.ac.id**) or KMPN ITB official Instagram account:
(**@kmpn_itb, @ac_itb, @wisudakmpn**)

Himpunan Mahasiswa Mesin (HMM)

Mechanical Engineering Student Association (HMM) is a group consist of mechanical engineering student in ITB. In the beginning, HMM was named Himpunan Mahasiswa Bangunan Mesin dan Listrik or Mechanical and Electrical Engineering Student Association, founded in December 1946, which then changed to HMM in March 1956. HMM secretariate is located in road D, ITB Ganesha Campus, behind the faculty main building, which is a very strategic location due to its closeness to some facilities, such as canteen, laboratory, and lecture class. HMM ITB has several major events, such as M-Days, HMM Graduation Ceremony, and CMM.
For further information about HMM ITB, please visit the HMM ITB official website (**http://hmm.itb.ac.id**) or HMM ITB official Instagram account:
(**@hmm_itb, @career.hmm, @ meifitb, @wisudahmmitb**)

Students Activities Unit

The students' activities unit is a club where the students can develop their interest or hobbies, besides formal education which is taught in class. These activity clubs are differentiated into several sectors, such as spiritual club, sports, education, research and study, media, and culture. Students activities unit are independent in the KM ITB organizational structure but still coordinate with the KM ITB executives. During its operation, the unit has full control of the program and activities of its members. Besides, there are also activities, which focused on social community services for those who interested in collaboration and produce an idea that may affect society.

Credits

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