

MASTER PROGRAM
HANDBOOK

2021

FMAE
ITB



FACULTY OF MECHANICAL AND AEROSPACE ENGINEERING
INSTITUT TEKNOLOGI BANDUNG





2021

MASTER PROGRAM HANDBOOK

FMAE ITB

www.ftmd.itb.ac.id

FMAE – ITB

Labtek II, 2nd Floor
Jl. Ganesha 10
Bandung, 40132 Indonesia

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Man Standing on Stainless Steel Filamend
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This student handbook is an active document which is updated every year. FMAE ITB has the right to revise, add, and reduce the information contained in this student handbook. For more detailed information, students are advised to refer to the official documents from ITB or the rules from the FMAE and/or from the study program.

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FMAE – ITB

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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 Mechanical Engineering Program in 1941. Nowadays, the education program in FMAE ITB consists of 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 also by 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 master 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

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

Contact Us



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FTMD ITB

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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:

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

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.

1. *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)
 - △ 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
 - △ Several machining tools are available, i.e., workshop table, milling machine, cutting machine, sawing machine, and lathe machine.
- Material Identification and Characterization
 - △ Several supporting machines for material characterization are available in the metallography room, i.e., grinding and polishing machine.
- Welding Equipment
- Roll Machine
- Furnaces and Ceramics
 - △ Several furnaces are available to support ceramics-related researches, i.e., powder metallurgy (centrifugal atomizer).



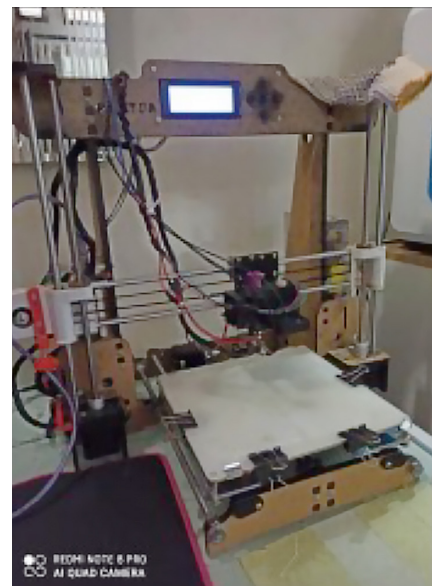
- Optic microscopic and other analytical tools.

2. *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.

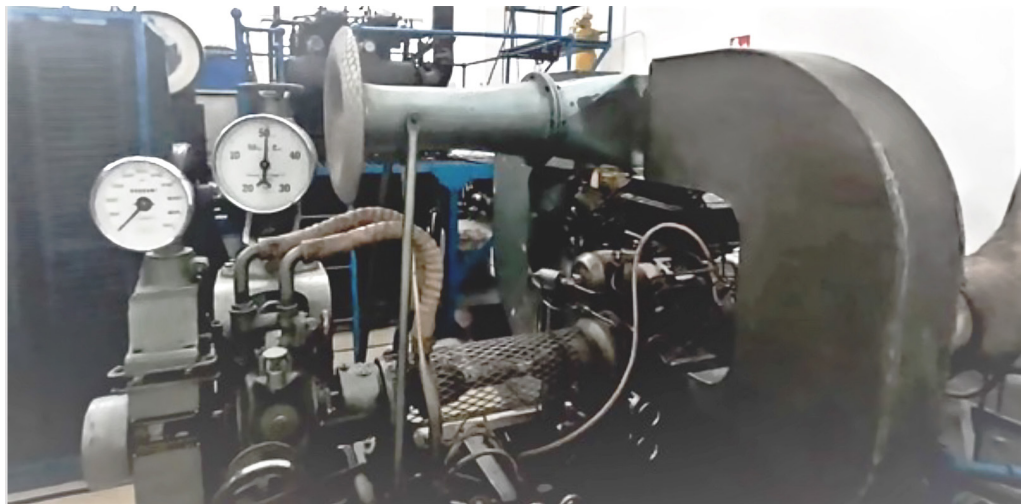
The facilities included as parts of this laboratory are:

- Extrusion tools, i.e., plastic pellets and extrusion machine.
- Filament 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.

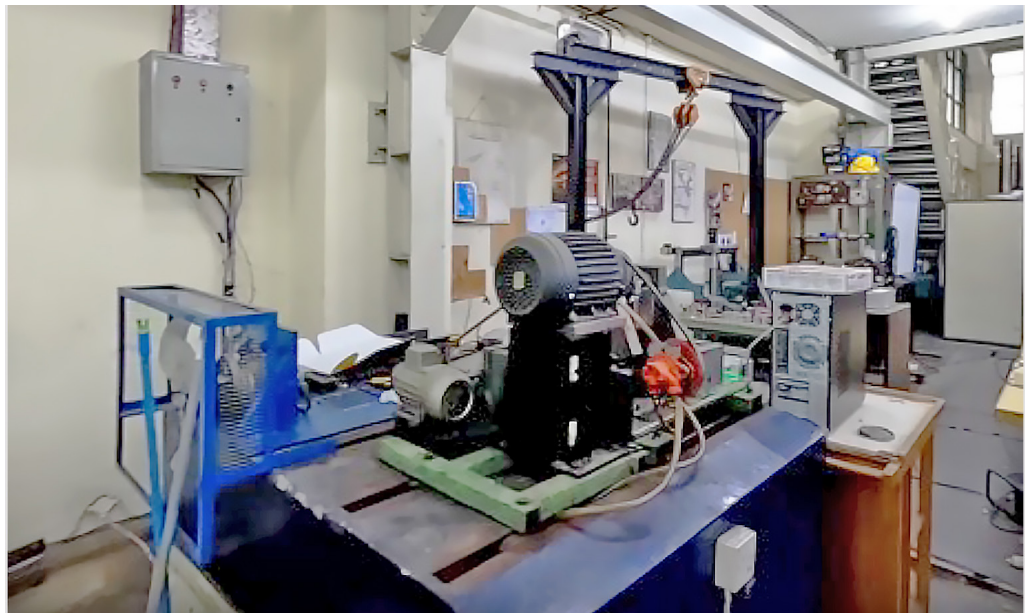
Thermodynamics Laboratory

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.



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.

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).

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.

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.

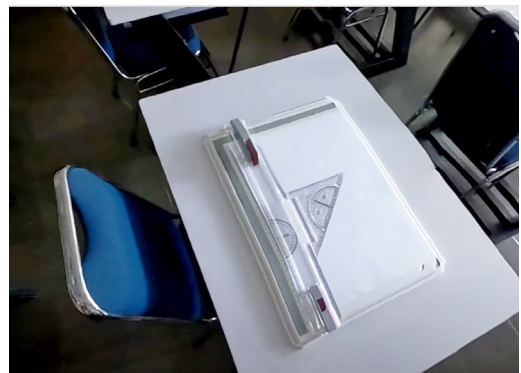
Aircraft Design Studio

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 Graduate and Programs

Mechanical Engineering Graduate Program

Compulsory Courses for All Sub-Major of S2 Mechanical Engineering Major

SEMESTER 1		
Code	Courses	Credits
MS5100	Research Methodology	3
Semester 1 Credits:		3

SEMESTER 2		
Code	Courses	Credits
MS5200	Writing for Scientific Works and Thesis MS	3
Semester 2 Credits:		3

SEMESTER 3		
Code	Courses	Credits
MS6090	Thesis I	3
Semester 3 Credits:		3

SEMESTER 4		
Code	Courses	Credits
MS6091	Thesis II	3 (3)
Semester 4 Credits:		3

Compulsory Courses for Production Engineering and Automation Sub-Major

SEMESTER 1		
Code	Courses	Credits
MS5130	Product Design and Development	3
MS5131	Manufacturing Processes and Product Life-Cycles	3
Semester 1 Credits:		6

SEMESTER 2		
Code	Courses	Credits
MS5230	Geometric Dimensioning and Tolerancing	3
MS5231	Modelling of Manufacturing System	3
Semester 2 Credits:		6

Compulsory Courses for Sustainable Energy Engineering Sub-Major

SEMESTER 1			SEMESTER 2		
Code	Courses	Credits	Code	Courses	Credits
MS5120	Thermofluid Engineering	3	MS5220	Energy Sustainability	3
MS5121	Energy Conversion Analysis Methods	3	MS5221	Modelling and Optimization of Thermal System	3
Semester 1 Credits:		6	Semester 2 Credits:		6

Compulsory Courses for Design, Dynamics and Control Sub-Major

SEMESTER 1			SEMESTER 2		
Code	Courses	Credits	Code	Courses	Credits
MS5110	Finite Element Method for Design	3	MS5210	System Dynamics, Measurement, Signal Processing	3
MS5111	Applied Engineering Mathematics	3	MS5211	Applied Statistic	3
Semester 1 Credits:		6	Semester 2 Credits:		6

Elective Courses for S2 Mechanical Engineering Major		
Codes	Courses	Credits
MS6001	Special Topics in Mechanical B	2
MS6010	Control Engineering	3
MS6011	Advanced CAD/CAE	3
MS6012	Methodology and Design Optimization	2
MS6013	Advance Mechanic in Designing Process	3
MS6020	Advanced Thermofluid Engineering	3
MS6021	Technology of Solar Energy	3
MS6022	Heat Exchanger	2
MS6023	Integration of Renewable Energy on Grid	2
MS6030	Reverse Engineering	3
MS6031	Precision Engineering	3
MS6032	Production System	2
MS6033	Industrial Robotic	2

Aerospace Engineering Graduate Program

Compulsory Courses for All Sub-Major of S2 Aerospace Engineering

SEMESTER 1			SEMESTER 2		
Code	Courses	Credits	Code	Courses	Credits
AE5001	Advanced Mathematics	3			
MS5100	Research Methodology	3			
Semester 1 Credits:		6	Semester 2 Credits:		0

SEMESTER 3			SEMESTER 4		
Code	Courses	Credits	Code	Courses	Credits
AE6090	Thesis I	3 (3)	AE6091	Thesis II	3 (3)
Semester 3 Credits:		3	Semester 4 Credits:		3

Compulsory Courses for Flight Mechanics Sub-Major

SEMESTER 1			SEMESTER 2		
Code	Courses	Credits	Code	Courses	Credits
AE5020	Advanced Flight Performance	3	AE5021	Flight Control	3
			AE5022	Advanced Flight Dynamics	3
			AE5023	Advanced Astrodynamics	3
Semester 1 Credits:		3	Semester 2 Credits:		9

Compulsory Courses for Aerodynamics and Propulsion Sub-Major

SEMESTER 1			SEMESTER 2		
Code	Courses	Credits	Code	Courses	Credits
AE5012	Viscous Flow	3	AE5010	Turbulent Flows	3
			AE5011	Computational Fluid Dynamics I	3
			AE5013	Compressible Flow	3
Semester 1 Credits:		3	Semester 2 Credits:		9

Compulsory Courses for Aircraft Design, Operation, and Maintenance Sub-Major

SEMESTER 1			SEMESTER 2		
Code	Courses	Credits	Code	Courses	Credits
AE5040	Flight Operations	3	AE5041	Management of New Product Development	3
			AE5042	Aviation Business	3
			AE5043	Design Project	3
Semester 1 Credits:		3	Semester 2 Credits:		9

Compulsory Courses for Lightweight Structures Sub-Major

SEMESTER 1			SEMESTER 2		
Code	Courses	Credits	Code	Courses	Credits
AE5030	Advanced Finite Element Method	3	AE5003	Continuum Mechanics I	3
			AE5031	Mechanics of Structural Composite	3
			AE5032	Experimental Solid Mechanics	3 (1.5)
Semester 1 Credits:		3	Semester 2 Credits:		9

Elective Courses for S2 Aerospace Engineering Major			
Codes	Courses	Credits	Recommended Semester to Take
AE5014	Propulsion Aerodynamics	2	1
AE5033	Aeroelasticity	3	1
AE5034	Structural Damage Tolerance	3	1
AE5044	Human Factor Engineering	2	1
AE5045	System Safety Engineering	2	1
AE5046	Aircraft Maintenance Management	2	1
AE6010	Computational Fluid Dynamics II	2	3
AE6020	Introduction to Flight Test Technique	2	3
AE6021	Advanced Control Engineering	2	3
AE6092	Minor Research	3 (3)	3
AE5002	Differential Equations	3	
AE5004	Special Topics in Aerospace A	2	
AE5047	Aircraft Accident Investigation	2	
AE6000	Continuum Mechanics II	3	

Material Engineering Graduate Program

Compulsory Courses for S2 Materials Engineering Major

SEMESTER 1			SEMESTER 2		
Code	Courses	Credits	Code	Courses	Credits
MT6000	Research Methodology	3	MT6001	Scientific Writing Methods and Ethics	3
MT6002	Engineering of Metallic Materials	3	MT6006	Materials Degradation: Analysis, Modeling and Simulation	3
MT6003	Engineering of Ceramic Materials	3	MT6005	Determination of Structure and Chemical Composition of Materials	3
MT6004	Engineering of Polymeric and Composite Materials	3			
Semester 1 Credits:		12	Semester 2 Credits:		9

SEMESTER 1			SEMESTER 2		
Code	Courses	Credits	Code	Courses	Credits
MT6098	Thesis I – Research Design	3 (3)	MT6099	Thesis II – Research Implementation and Publication	3 (3)
Semester 3 Credits:		3	Semester 4 Credits:		3

Elective Courses of S1 Mechanical Engineering Major			
Code	Courses	Credits	Intake Semester Recommendation
MT5001	Metallurgy of Metal Manufacturing Processes	2	3
MT5002	Failure Analysis and Engineering Life Assessment	2	3
MT5003	Surface Degradation of Metals: Corrosion and Wear	2	3
MT5004	Engineering of Bio-based Polymers	2	3
MT5005	Fabrication and Reparation of Polymeric Composites	2	3
MT5006	Physical Properties of Polymers	2	3
MT5007	Structure, Properties and Application of Refractory Materials	2	3
MT5008	Metal and Ceramic Powder Processing	2	3
MT5009	Engineering of Clay-Based Ceramics	2	3
MT5010	Biocompatibility of Materials	3	3
MT5011	Processing of Nanomaterials	3	3
MT5012	Capita Selecta 1: Special Application of Materials	3	3
MT5013	Kinetics and Non-equilibrium Phase Transformation	3	3
MT5014	Plastic Deformation and Fracture of Metals	3	3
MT5015	Atomic-Scale Modeling of Materials	3	3
MT5016	Nondestructive Testing (NDT) and Inspection (NDI)	3	3
MT5017	Materials for Energy Conversion and Storage Devices	3	3
MT5018	Capita Selecta 2: Novel Characterization in Materials Science and Engineering	3	3

Mechanical Engineering

Career Prospects:

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

- ***Automotive***
Design, manufacture, quality control, and other processes within the automotive industry (motorbikes, cars, trucks, even heavy transport vehicles).
- ***Manufacture***
Essential goods factory (e.g., medicine, foods, clothes), machine factory, automotive factory, etc.
- ***Operation and Maintenance***
Mechanical maintenance for low-cost operation, engine failure repair, and productivity enhancement for maximizing profits.
- ***Power Plant***
Power plant machine components such as turbine, pump, compressor, hydraulics equipment, boiler, fan/blower, controller equipment, and electrical grids.
- ***Oil and Gas***
Drilling process as well as production equipment operation and maintenance.

Aerospace Engineering

Career Prospects:

Aerospace Engineering

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

- ***Aerospace Industry***
 - ⊙ Manufacture industry (PT. DI),
 - ⊙ Avionics/optronics components (LEN, PT. INTI), hydraulics/ landing-gear components, other standard components.
 - ⊙ 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)
- ***Aviation Institution***
 - ⊙ Research institution (Puspiptek/BPPT, Dislitbang AU, LAPAN)
 - ⊙ Education/training institution (ITB, AAU, Sekbang-AU, etc)
 - ⊙ Government institution (Ministry of Transportation)

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

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

Materials Engineering

Career Prospects:

Material Engineering

Material engineering graduates are highly appreciated in the following sectors:

- Manufacture Industry
- Numerous industries related to materials in the production process, product development, quality control, and equipment maintenance.
- Energy and Mineral Resources
- Engineer of welding, inspection, and production equipment maintenance.
- 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' career.



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