# ASIIN Seal & European Labels

# Accreditation Report

**Bachelor's and Master's Degree Programmes**
***Mechanical Engineering***
***Aerospace Engineering***

**Bachelor's Degree Programme**
***Materials Engineering***

**Master's Degree Programme**
***Materials Science and Engineering***

Provided by
**Institut Teknologi Bandung, Indonesia**

Version: 18.03.2022

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# A About the Accreditation Process

| Name of the degree programme (in original language) | (Official) English translation of the name | Labels applied for [1] | Previous accreditation (issuing agency, validity) | Involved Technical Committees (TC)[2] |
|---|---|---|---|---|
| Program Studi Sarjana Teknik Mesin | Undergraduate Program of Mechanical Engineering (UPMS) | ASIIN, EUR-ACE® Label | ASIIN, 1 July 2016 – 30 September 2021 | TC 01 |
| Program Studi Sarjana Teknik Dirgantara | Undergraduate Program of Aerospace Engineering (UPAE) | ASIIN, EUR-ACE® Label | ASIIN, 1 July 2016 – 30 September 2021 | TC 01 |
| Program Studi Sarjana Teknik Material | Undergraduate Program of Materials Engineering (UPMT) | ASIIN, EUR-ACE® Label | ASIIN, 1 July 2016 – 30 September 2021 | TC 01, TC 05 |
| Program Studi Magister Teknik Mesin | Master Program of Mechanical Engineering (MPMS) | ASIIN, EUR-ACE® Label | National Accreditation Agency for Higher Education in Indonesia (BAN-PT) | TC 01 |
| Program Studi Magister Teknik Dirgantara | Master Program of Aerospace Engineering (MPAE) | ASIIN, EUR-ACE® Label | National Accreditation Agency for Higher Edu- | TC 01 |

[1] ASIIN Seal for degree programmes; EUR-ACE® Label: European Label for Engineering Programmes.

[2] TC: Technical Committee for the following subject areas: TC 01 - Mechanical Engineering/Process Engineering; TC 05 - Materials Science, Physical Technologies.

| | | | | |
|---|---|---|---|---|
| | | | cation in Indonesia (BAN-PT) | |
| Program Studi Magister Ilmu dan Teknik Materia | Master Program in Materials Science and Engineering (MPMT) | ASIIN, EUR-ACE® Label | National Accreditation Agency for Higher Education in Indonesia (BAN-PT) | TC 01, TC 05 |

**Date of the contract:** 2021-01-14

**Submission of the final version of the self-assessment report:** 2021-06-21

**Date of the onsite visit:** 2021-11-22.-25.

**at: online**

**Peer panel:**

Dr. Gilbert Alexander Erdler, Siemens AG

Philipp Koch (Student), Technical University Munich

Prof. Dr. Daisy Nestler, Technical University Chemnitz

Prof. Dr. Jens Schuster, University of Applied Sciences Kaiserslautern

Prof. Dr. Olaf Wünsch, University Kassel

**Representative of the ASIIN headquarter:** Dr. Michael Meyer, Jing Zhang

**Responsible decision-making committee:** Accreditation Commission for Degree Programmes

**Criteria used:**

European Standards and Guidelines as of May 15, 2015

ASIIN General Criteria, as of December 10, 2015

Subject-Specific Criteria of Technical Committee 01 Mechanical Engineering/Process Engineering as of March 16, 2021

Subject-Specific Criteria of Technical Committee 05 – Materials Science, Physical Technologies as of September 29, 2016

# B Characteristics of the Degree Programmes

| a) Name | Final degree (original/English translation) | b) Areas of Specialization | c) Corresponding level of the EQF[3] | d) Mode of Study | e) Double/Joint Degree | f) Duration | g) Credit points/unit | h) Intake rhythm & First time of offer |
|---|---|---|---|---|---|---|---|---|
| Mechanical Engineering | Bachelor of Science (B.Sc.) | Mechanical Engineering Systems or Mechanical Production Engineering | Level 6 | Full time | / | 8 Semester | 144 credit points, equivalent to 226.5 ECTS | Fall Semester & 1941 |
| Aerospace Engineering | Bachelor of Science (B.Sc.) | | Level 6 | Full time | / | 8 Semester | 144 credit points, equivalent to 226.5 ECTS | Fall Semester & 1997 |
| Materials Engineering | Bachelor of Science (B.Sc.) | | Level 6 | Full time | / | 8 Semester | 144 credit points, equivalent to 226.5 ECTS | Fall Semester & 1994 |
| Mechanical Engineering | Master of Science (M.Sc.) | Production Engineering and Automation Design, Dynamics, and Control sustainable Energy Engineering | Level 7 | Full time | / | 4 Semester | 36 credit points, equivalent to 94.38 ECTS | Fall semester/summer semester/etc. & 1990 |
| Aerospace Engineering | Master of Science (M.Sc.) | Aerodynamics and Propulsion; Flight Mechanics; Lightweight Structures; and Aircraft Design, Operation, and Maintenance | Level 7 | Full time | / | 4 Semester | 36 credit points, equivalent to 94.38 ECTS | Fall semester/summer semester/etc. & 1999 |
| Materials Science and Engineering | Master of Science (M.Sc.) | | Level 7 | Full time | / | 4 Semester | 36 credit points, equivalent to 94.38 ECTS | Fall semester/summer semester/etc. & 1990 |

For the **Undergraduate Programme Mechanical Engineering (UPMS)**, the Institut Teknologi Bandung (ITB) has presented the following profile in the self-assessment report:

[3] EQF = The European Qualifications Framework for lifelong learning

The undergraduate programme of Mechanical Engineering (UPMS) develops the body of knowledge based on mechanical engineering science, defined as design, production/manufacturing, and operation of machines. The scope of mechanical engineering can be broadened to include product life cycle analysis, maintenance, and decommissioning/recycling using mechanical engineering science.

The body of knowledge of mechanical engineering science includes the classical mechanical engineering knowledges such as solid mechanics, dynamics and control, design and manufacture, materials engineering, production process and systems, thermal-fluid sciences, heat transfer, and applied mechanic; and modern mechanical engineering knowledge such as advance material, automation and control, mechatronics and robotics, computational mechanics, alternative energies, and sustainability.

Mechanical engineering requires basic knowledge of the engineering sciences, such as mathematics, physics, chemistry, and information technology, to support the development of undergraduate engineering expertise. Basic engineering science is delivered to obtain the necessary cognitive understanding level. Other knowledge is also provided to supply learning outcomes to students: Engineering Economics, Project Management, Entrepreneurship, Indonesian Language: Scientific Writing, and English.

For the **Undergraduate programme Aerospace Engineering (UPAE)**, ITB has presented the following profile in the self-assessment report:

Based on the 2019 curriculum, the focus of the UPAE includes aircraft airframe, construction, aerodynamics, flight mechanics, aircraft systems and spacecraft, and transportation system. Generally, the strict demands on aircraft development and operation and other aerospace industry-related requirements require engineering graduates with the following competencies: 1) A solid understanding of basic engineering science, including the functions and instruments used. 2) Extensive and detailed knowledge and understanding of basic engineering science and its application in aerospace engineering; and 3) Comprehensive and thorough knowledge and understanding of aerospace engineering. Therefore, to provide the graduates with those competencies, the UPAE delivery courses in the following categories:

1. **Basic Science**. Through basic science lectures, graduates are provided with comprehensive knowledge in basic engineering, including general methods and engineering science tools: Physics (solid and fluid mechanics, electrical theory, and thermodynamics); Chemistry; Mathematics (calculus, differential equations, linear algebra, numerical method); and Information technology and computational thinking.

2. **Basic Engineering Science**, including Engineering drawing; Statics, kinematics, and dynamics; Material strength; Material and manufacture; Engineering design; Thermal engineering; Instrumentation, measurement, and experiment; Data science and statistics; Industrial management; Sustainable environmental aspects; and Industrial exposure. UPAE graduates should be able to apply the above knowledge to "state-of-the-art" problems. Furthermore, they should independently apply their expertise to new conditions using problem analysis, appropriate model selection, and new model development. Lastly, they should absorb new developments in the field, evaluate their practical use, and apply them when needed.
3. **Aerospace Engineering**, including Aircraft aerodynamics; Flight performance and dynamics; Propulsion; Light structure; Aircraft systems; Airworthiness certification; Navigation and guidance; Capstone design project; Flight control (aeronautics option); Analysis and aerodynamics design (aeronautics option); Analysis and structure design (aeronautics option); Orbital mechanics, space environment, satellite dynamics, and attitude control (aeronautics option); Air transportation modeling (aviation option); Maintenance and management of aerospace industry (aviation option); and Flight operation: air traffic control (ATC), air transportation system, airport engineering (aviation option).

For the **Undergraduate programme Materials Engineering (UPMT)**, ITB has presented the following profile in the self-assessment report:

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:

a) Identifying, selecting materials, and product-making process.
b) Determining the structure of the material (atoms, molecules, crystals, macro, micro, and nano).
c) Testing of material properties (mechanical, physical, chemical, magnetic, and electronic).

d) Designing of materials (prediction of material properties and process-based material structure) and
e) Identifying and predicting the degradation (failure) of materials as well as preventing it.

For the **Master programme Mechanical Engineering (MPMS)**, ITB has presented the following profile in the self-assessment report:

Mechanical engineering is a scientific discipline that applies the basic science of engineering, physics, mathematics, industrial experience, and essential material science to design, analyze, manufacture, and maintain mechanical systems and in the power generation system and thermo-fluid engineering. In addition, research and development activities are also carried out to deepen the scientific field, which involves other disciplines. Mechanical Engineering is one of the branches of science with the oldest and most comprehensive coverage in engineering.

In the Master Program of Mechanical Engineering, the body of knowledge is similar to the undergraduate program. However, students are directed to pursue their expertise in a more specific field and/or develop it with other scientific disciplines. Therefore, in its implementation, three options were explicitly developed:

1. Automation and Production Engineering
   In this option, students will concentrate on automation processes and production system engineering, which are oriented towards continuous improvement of product quality following the times.
2. Design, Dynamics, and Control
   This line of mechanical engineering branch focus on the mechanical design process involving the latest industrial fields, sports, and medical sciences, as well as industrial applications of the phenomenon of vibration and control systems.
3. Sustainable Energy Engineering
   In this Option, students will learn more about the energy engineering process that prioritizes sustainable aspects. Students will focus on studying the energy generation process that relies on new and renewable energy sources and engineering techniques to improve efficiency in existing systems. In addition, this Option provides options for students who want to develop knowledge on efficient refrigeration and air conditioning processes

In addition to specific engineering abilities described in the three Options above, students are also equipped with basic abilities as prospective researchers such as advanced engineering mathematics, research methods, and scientific paper writing techniques. With this

provision, master students have good attributes in publishing the results of their work/research on a broader community, be it the professional or scientific community or the community.

For the **Master programme Aerospace Engineering (MPAE)**, ITB has presented the following profile in the self-assessment report:

The Master Programme in Aerospace Engineering is aimed to increase the level of mastery of knowledge and abilities that have been acquired by participants during the undergraduate level education, so that they are more active and play a role, both in mastering and applying their knowledge. The master's education program of ITB is scientific in nature, which emphasizes the ability to develop science more deeply and emphasizes the ability to apply knowledge professionally

The programme educational objectives (PEO) of MPAE are as follows:

1. Having moral integrity, discipline, and mutual respect, fairness, and responsibility.
2. Having the ability to consolidate/build knowledge and skills in the field of Aerospace Engineering and interdisciplinary science.
3. Having the ability to create and innovate, working effectively both individually and in groups, communicating well orally and in writing, learning throughout life, and adapting to the research environment.

Learning outcomes (PLO) are targets that must be achieved by students of the MPAE so that by the time they graduate from the MPAE, graduates will have the ability in accordance with the PEO of the MPAE. The PLOs for graduates from MPAE are:

A. The ability to identify, formulate, and solve complex engineering problems by applying innovative engineering, science, and mathematical methods and tools.
B. The ability to consolidate and deepen knowledge in interdisciplinary fields.
C. The ability to apply analysis, synthesis, optimization, and creativity in the engineering design process, resulting in a design that meets the desired needs.
D. The ability to design, develop and perform appropriate experiments, analyse and interpret data, and use engineering judgments to conclude.
E. The ability to communicate effectively orally and in writing with a wide range of scientific audiences in a national and international context.
F. The ability to take responsibility ethically and professionally in technical situations and make informed judgments considering the impact of engineering solutions in a global, economic, social, and environmental context.

G. The ability to play an influential role in teams setting goals, planning tasks, meeting activity schedules, and analysing risks and uncertainties to responsibly integrate them into their actions.

For the **Master Programme Materials Science and Engineering (MPMT)**, ITB has presented the following profile in the self-assessment report:

**Program educational objectives (PEOs)** of the MPMT focus on producing graduates with the following competencies:

1. Moral integrity, discipline, respect, sense of justice and responsibility.
2. An ability to consolidate/ develop knowledge and skills in Materials Engineering and interdisciplinary fields.
3. 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 intended learning outcomes** for graduates of MPMT 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.

# C Peer Report for the ASIIN Seal[4]

## 1. The Degree Programme: Concept, content & implementation

**Criterion 1.1 Objectives and learning outcomes of a degree programme (intended qualifications profile)**

**Evidence:**

- Self-Assessment Report
- Curricula of the degree programmes
- Module Descriptions
- Discussions during the audit (online)

**Preliminary assessment and analysis of the peers:**
In the discussion with the rectorate, the peers learned that the current strategic focus of ITB is to strengthen the management system and interdisciplinary collaborations. And the scientific research of the university focuses on four areas, including information technology, transportation, energy, and health. During the audit process, the peers observed that the educational objectives of the degree programmes were in line with the overall strategic focus of ITB.

For the undergraduate programmes and master programmes under review, ITB presents extensive descriptions of the programme educational objectives (PEO) and learning outcomes (PLO) in the self-assessment report (SAR). These descriptions are revised according to the requirements of the last ASIIN accreditation. Improvements are presented in the Appendix J to the SAR. For each degree programme, objective-module-matrices are shown in the SAR, matching educational objectives, learning outcomes, modules and the ASIIN subject-specific criteria (SSC).

The programme objectives and the intended learning outcomes for each degree programme are published on the website of the faculty of mechanical and aerospace engineering (https://www.ftmd.itb.ac.id/en/outcomes/) and can be accessed by students, teaching

[4] This part of the report applies also for the assessment for the European subject-specific labels. After the conclusion of the procedure, the stated requirements and/or recommendations and the deadlines are equally valid for the ASIIN seal as well as for the sought subject-specific label.

staff and anyone else interested. With the spirit of continuous improvement in mind, these PLOs are updated and improved regularly.

The peers analysed the described PEOs and agree that they are overall relevant to the Indonesian National Qualification Framework (KKNI). After assessing the learning outcomes, the peers agree that they are overall consistent with the expectations of the European Qualifications Framework level 6 and level 7as well as the respective Subject-Specific Criteria of the ASIIN Technical Committee 01-Mechanical and Process Engineering and 05-Materials Science Engineering. Furthermore, they comply with the standards and criteria of the EUR-ACE label.

In the process of discussing with alumnus and industry partners, the experts positively noted that there is good communication between ITB and the industry partners.

When formulating educational objectives and learning outcomes, ITB considers the actual needs of employers and the newest technological developments. However, a fixed mechanism for the exchange between the university and the partners from the industry does not exist yet. In order to efficiently update and improve the programme objectives, the peers suggest to set up a mechanism between ITB and industry, for example an Industry Advisory Board, to institutionalize the feedbacks from industry regarding the study aims and qualification profile of the graduates.

**Criterion 1.2 Name of the degree programme**

**Evidence:**

- Self-Assessment Report
- Discussion during the audit (online)

**Preliminary assessment and analysis of the peers:**
The names of the three undergraduate and three master programmes are published on the subject specific webpage. The peers confirm that the titles of the programmes under review, properly reflects the intended aims and the learning outcomes.

**Criterion 1.3 Curriculum**

**Evidence:**

- Self-Assessment Report
- Objective-module-matrices
- Curricula of the degree programmes
- Module Descriptions

- Discussions during the audit (online)

**Preliminary assessment and analysis of the peers:**
In the self-assessment report, ITB states that the curricula of all the degree programmes are reviewed and revised every five years. The curriculum 2019 is the latest version applied for all three undergraduate degree programmes, replacing the previously implemented curriculum 2013. In accordance with the recommendation of the previous ASIIN accreditation in the year 2016, more practical training courses have been incorporated into the new curriculum. All programmes are considered by the peer group as well-established and academically sound.

For the undergraduate programmes, the curricula are divided into two stages, a common preparatory stage for one year (Tahap Persiapan Bersama/TPB) and the subject-specific stage for three years. At the preparatory stage, all students of the Faculty of Mechanical and Aerospace Engineering take the same lectures together, that include Mathematics, Physics, Chemistry, basic engineering subjects, also English and Sports. After the TPB stage, students will need to select from the three study programs mechanical engineering, aerospace engineering and materials engineering. There is a selecting procedure that is described in more detail in criterion 1.4 (Admission requirements).

ITB provides module-objective-matrices for each degree programme depicting which module contributes to the fulfilment of which learning outcome; the respective contribution was specified in terms of “high”, “medium” or “low” contribution. In the first and second years the curricula ensure that the students obtain strong scientific foundation, followed by various practical projects to get the approach to real engineer life. The students are well-prepared for the upcoming new technologies.

For the common preparatory stage, the peers confirmed that modules like “Elementary Physics”, “General Chemistry”, “Mathematics”, “Statics”, “Introduction to engineering and Design”, “Engineering Drawing” and “Introduction to Mechanical, Materials and Aerospace” equip the students with basic knowledge in mathematics, science, and engineering. When analyzing more specifically the undergraduate level from the second to the fourth year, the peers came to the following conclusions for the three undergraduate programmes:

The curriculum of the **Bachelor Programme Mechanical Engineering (UPMS)** includes compulsory courses, compulsory option courses and elective courses. Each course is a separate module. In the second year, the curriculum contains modules like “Mechanics and Strength of Materials”, “Basic of Engineering Thermodynamics”, “Kinematics and Dynamics of Machinery”, “Basic Design of Machine Elements”, “Basic Fluid Mechanics”, which provide the

students a good foundation of knowledge in mathematics, science, engineering and engineering design as well. The competence to work in multidisciplinary and multicultural teams is also considered and covered by the modules. The third year contains modules about “Engineering Measurement”, “Manufacturing Process”, “Introduction to Control Systems”, “Engineering Product Design”, “Energy Conversion System”, “Basic of Mechatronics” and “Industrial Metrology”. Before entering the third year, students must choose one of the two options, Mechanical Engineering Systems or Mechanical Production Engineering and complete 14 credits in the chosen option. In the last year of the programme, students start in the 7$^{th}$ semester the final project and have one year time to finish it. At this final stage of education, students also do practical work in industry. The final project can also be conducted in the industry with an ITB professor as the first supervisor. Apart from that, students are allowed to take elective courses. At the beginning of each semester, the students will be informed which of the elective courses are available.

The curriculum of the **Bachelor Programme Aerospace Engineering (UPAE)** includes in the second academic year modules about Engineering Mathematics, Engineering Analysis, Numerical Methods, Thermal Engineering, Kinematics and Dynamics, Aircraft Materials and Manufacturing Methods I&II, Fluid Dynamics, Dynamic System which highly contribute to building up fundamental knowledge in mathematics, science, and engineering. The curriculum provides two options, Aeronautics and Aviation. The students are allowed to select an option started in the first semester of their third year in which students are obligated to take lectures corresponding to the chosen option. In the last academic year, the students start in the first semester with their undergraduate thesis.

The curriculum of the **Bachelor Programme Materials Engineering (UPMT)** covers in the second year the fundamentals of materials engineering, containing courses like Chemistry of Solid Materials, Electronic & Magnetic Materials, Mechanical Properties of Materials, Thermodynamics of Materials, Materialography and Diffraction and Ceramic Materials. The third year covers material processing, and the 4th year covers the integration of materials engineering, material processing, and related aspects. Students can choose elective courses from inside UPMT or other undergraduate programmes in ITB. The content of the curriculum of individual modules is coordinated to avoid unintended overlaps.

In the **Master Programme Mechanical Engineering (MPMS)**, students are directed to pursue mechanical engineering science in a more specific field and/or develop it with other scientific disciplines. There are three options offered in the MPMS, namely Production Engineering and Automation; Design, Dynamics, and Control; and Sustainable Energy Engineering. Unlike the undergraduate programme, lectures will be dominated by elective

courses. Some of the compulsory courses include Technical Analysis. Apart from that, students are required to take a thesis which is equivalent to 6 credits. Students will then conduct a thesis exam to complete their study period in the master program.

All graduate students must take the compulsory courses Research Methodology in the first semester and Scientific Writing in the second semester. At the same time, they need to visit four compulsory courses from their respective options in these two semesters. Compulsory courses for the **option Production Engineering and Automation** are Product Design and Development, Manufacturing Processes and Product Life Cycles, Geometric Dimensioning and Tolerancing, and Modeling of Manufacturing System. The **option Design, Dynamics, and Control** contains compulsory courses Finite Element Method for Design, Applied Engineering Mathematics, System Dynamics, Measurement, Signal Processing and Applied Statistics. There are Thermofluid Engineering, Energy Conversion Analysis Method, Energy Sustainability and Modeling and Optimization of Thermal System in the **sustainable Energy Engineering option**. In the second year of study, the master's students mainly deal with the final thesis. At the same time, they also attend elective courses that contribute to their research and final project. With the approval of the thesis supervisor, the thesis can also be conducted outside of ITB at a company.

The **Master Programme Aerospace Engineering (MPAE)** is aimed to increase the level of mastery of knowledge and abilities that have been acquired by participants during the undergraduate level education, so that they are more active and play a role, both in mastering and applying their knowledge. The master's education program of ITB is scientific in nature, which emphasizes the ability to develop science more deeply and emphasizes the ability to apply knowledge professionally.

In the Aerospace Engineering Master Program, there are four options that can be chosen, consisting of Aerodynamics and Propulsion; Flight Mechanics; Lightweight Structures; and Aircraft Design, Operation, and Maintenance. All master students of MPAE must take the compulsory courses Research Methodology and Advanced Mathematics in the first semester. Within the first academic year, they need to visit four compulsory courses in their respective options. In the second academic year, students are ready to start research activities. In Thesis I course, students start doing surveys and compiling research proposals. In addition, they take 6 credits of elective courses that support the research activities. In the fourth semester, they take Thesis II course to do research according to the proposal that has been made and take another 6 credits of elective courses. The elective courses can be taken from those available at MPAE or from other study programs according to the guidance and approval of the thesis supervisor.

Statistics have been made by the study programme MPAE to show the contribution of the compulsory courses to the intended learning outcomes for each pathway. Figures 1.3-1.6 in the SAR show that the intended learning outcomes are covered in case of all options.

In the **Master Programme Materials Science and Engineering (MPMT)**, the students are required to complete a minimum of 32 credits including thesis, distributed over four semesters, alike in the other two master programmes. In the first academic year, students need to complete several compulsory courses, which include the Structure and Mechanical Properties of Materials, Advanced Material Characterization and Material Selection and Design. In the second academic year, students are required to take a thesis and 9 credits of elective courses. Prospective students are highly recommended to study the research first, if they communicate with the research supervisors and get the approval. Thus, students can design elective courses according to their research interests. Students could choose to focus on a specific subject such as composite materials, ceramic materials, metallurgy and failure-related topics such as cracking and corrosion.

The peers reviewed the curricula of all the programmes to identify whether the available modules are able to support the students to achieve the described qualification objectives. They take into consideration the study plans, objective-module-matrices and the individual module descriptions. The peers assessed that the curricula of all the programmes under review, detailed in the annex of this accreditation report, are well-founded, match international standards and thus allow the students to become well prepared for national and international occupations. Overall, the peers conclude that the curricula implement the intended learning outcomes adequately.

Out of their discussion with representatives of industry the peers learn that the graduates of the Faculty of Mechanical and Aerospace Engineering (FMAE) are generally well qualified for the labour market. The employers confirmed that the graduates have in-depth knowledge and are good at problem-solving. They learn fast and can quickly adapt to the new work environment. On the other side, the representatives of industry mentioned that for daily work it would be helpful, if students would have more intense practical experiences and more distinct soft skills. Therefore, the peers recommend to increase the opportunities of the students to get practical experiences in labs and to train their team working and communication skills.

**Criterion 1.4 Admission requirements**

**Evidence:**

- Self-Assessment Report

- Ministry of Education Regulation No. 034/2010
- Discussions during the audit (online)

**Preliminary assessment and analysis of the peers:**
According to the self-assessment report, the management of student admission for all faculties and schools within ITB is organized centrally by the Directorate of Education of ITB. Since 2011, ITB uses a nationwide admission system. Based on Ministry of Education Regulation No. 034/2010, student admission for state universities is categorized into two types: student admission based on written and skill test or student admission based on academic performance. Through law No. 12/2012 of the Republic of Indonesia, the country also mandates all state universities to recruit students with high academic performance but have financial difficulties or come from the frontier, outer or most minor developed parts of the country, with a proportion of at least 20% of the new students to be admitted to the university. These students are offered full scholarship.

Most of the new students choose their study programme after a general preparatory year (TPB) in the faculty of Mechanical and Aerospace Engineering. The students can choose one of the three study programmes within the faculty, namely mechanical engineering, aerospace engineering and materials engineering. The first criterion follows the wish of the students. In case of insufficient capacity of a study programme however, the scoring formula of each programme will be used to calculate the weighted score of the applicants. The remaining students are placed at their second or third choice of study programme with a similar process.

Some first-year students who apply for Specialization Program (*Program Peminatan*) in the admission process enter after TPB stage directly into the respective study programme. In mechanical engineering, this program is offered to students with significant interests. In Materials engineering, this program aims to attract applicants as the programme is relatively new and needs to be promoted.

During the discussion with the students, the peers gained the impression that they are well-informed about the admission requirements and procedures as all necessary information is available on the webpage of ITB. Consequently, the peers assess the process to be transparent and adequate for selecting the best students for each degree programme.

**Final assessment of the peers after the comment of the Higher Education Institution regarding criterion 1:**

As the university did not comment the report the peers confirm their preliminary assessment that the criterion is fulfilled. They suggest to recommend to institutionalize the feedback from industry regarding the study aims and qualification profile of the graduates and

to recommend to increase the opportunities of the students to get practical experiences in labs and to train their team working and communication skills.

# 2. The degree programme: structures, methods and implementation

**Criterion 2.1 Structure and modules**

**Evidence:**

- Self-Assessment Report
- Curricula of the degree programmes
- Module Descriptions
- Objective-module-matrices
- Discussion during the audit (online)

**Preliminary assessment and analysis of the peers:**
The structure of the programmes under review is clearly outlined on the specific websites for each study programme. The programmes consists of modules, which comprise a sum of teaching and learning. The module descriptions are also published on the subject specific website. Based on the analysis of the sequence of modules and the respective module descriptions the peers concluded that the structure of both programmes ensures that the learning outcomes can be reached.

All three undergraduate programmes under review consist of two phases, the common preparatory level (TPB) and the subject-specific undergraduate level. Each level consists of modules, which comprise a sum of teaching and learning. In the subject-specific undergraduate level, the students can choose different options provided by the study programmes according to their own interests. At the same time, students can choose elective courses from the list of elective courses of their study programme, or even select courses across majors. The different combinations of compulsory courses, option compulsory courses and elective courses help students reach the learning outcomes. In addition, the objectives of each module also help students achieve the corresponding qualification level and the overall learning outcomes.

The content of master programmes is a linear continuation of the undergraduate education or is an interaction of several disciplines that are formed following scientific developments or demands. All master study programmes are divided into modules. In the Faculty of Mechanical and Aerospace Engineering, each course is an independent module, comprising a

sum of teaching and learning, whose contents are concerted. The curriculum structure of the master study programmes is formulated to ensure that the students obtain in-depth analytical, methodological, and scientific competencies, as well as expanding and broadening the acquired competencies. The peers consider the structure of all degree programmes as clearly described and appreciate that the Syllabus and curriculum for each degree programme is outlined on the website of the faculty.

The Faculty Mechanical and Aerospace Engineering encourages students to participate in student mobility programs with the objective to gain various academic and social experiences and international exposure as well. The faculty also supports students financially in form of scholarships. The programme coordinators informed that in the year 2021, 21 students went abroad for exchange for one or two semesters. The undergraduate students could join the exchange programmes in their $7^{th}$ or $8^{th}$ semester, while for master students, it's more flexible. The faculty carried out several strategies to ensure the program student graduate on time, after one semester or one year at a partner university, which has also been confirmed by students. One of the strategies is the credit transfer from the partner university to FMAE in the form of compulsory or elective courses. According to the statistics from the SAR the numbers of both undergraduate and master students who participate in exchange programs have been increasing. This may relate to the fact that credit points can be easily recognized afterwards. The Guidelines for Credit Earning and Credit Transfer at Institut Teknologi Bandung provide a clear regulation for recognition of credit points. In the last ASIIN accreditation, the peers had recommended improving the opportunities for students to complete a period of vocational practice or stay at a different HEI abroad without any prolongation of the studies. With various possibilities of exchange programs and the measures to comply with the standard period of study, the peers are aware that the recommendations from the last accreditation process are very well taken into account.

Based on the analysis of the curricula and the module descriptions, the peers confirmed that the objectives of the modules and their respective content help to reach both the qualification level and the overall intended learning outcomes.

**Criterion 2.2 Work load and credits**

**Evidence:**

- Self-Assessment Report
- Curricula of the degree programmes
- Module Descriptions
- Discussions during the audit (online)

**Preliminary assessment and analysis of the peers:**
ITB uses credit units (CU) for measuring the activity load for each course. One CU is equivalent to about 3 hours of workload per week. The minimum total number of credits for graduation of the bachelor programme is 144 CU distributed over eight regular semesters, that means each semester includes about 18 CU. And the total workload for a student to complete the master's degree programme is 36 CU. At ITB, a regular semester has 16 (sixteen) weeks of academic activities which are used at least 14 (fourteen) weeks for lectures and 2 (two) weeks for examinations.

According to the self-assessment report, the average study time of the students is longer than the normal period. The peers discussed with the programme coordinators and the students about the workload. No systematic problems were identified from the responses from programme coordinators and students. According to the students, some of them study longer because they want to do longer internships or research. Others might have personal reasons. The programme coordinators explained that exceeding the standard period of study was mainly due to the final thesis. The faculty had realized this problem and divided the final thesis since the 2019 curriculum over two semesters (instead of one semester) for all bachelor's and master's programmes. In Thesis I, students conduct literature studies and compile research proposals to be carried out with their supervisor. In Thesis II, students conduct the research based on the previously prepared proposals, report the whole research in form of thesis, and then defend the thesis in the final presentation.

Comparing to the objectives and the content of the courses the workload defined for the single modules seems to be realistic for the peers besides for the final theses. The students confirm this impression. ITB does not define any deadline for the submission of the thesis I and thesis II within the two semesters students may work on it. Therefore, students invest regularly more time than defined via credit points. Additionally the peers got the impression that the task of the theses could not be easily handled within the foreseen processing time.

From the point of view of the auditors, it is necessary to ensure that the student workload and the credit points correspond for the final theses as well. Additionally, they recommend to define a deadline to work on the final theses

**Criterion 2.3 Teaching methodology**

**Evidence:**

- Self-Assessment Report
- Module descriptions

- Discussions during the audit (online)

**Preliminary assessment and analysis of the peers:**
According to the self-assessment report and the discussions with the teaching staff, the peers learned that the teaching methods generally consist of class lecture, online class, project-based learning class, tutorials, laboratory activities, homework assignments, independent study, seminars, student presentations, field trips, practical work and final project. The different teaching methods and evaluation criteria lead to a balance between attendance-based learning and self-study. The peers conclude that the teaching methods and instruments used support the students in achieving the learning outcomes.

During the Covid-19 pandemic time, ITB has transformed all the teaching activities to online activities. The LMS platform which has been developed initially for online and blended learning, has been activated and used to support teaching and learning activities. In addition, almost all lecturers are using MS Teams as well as other online communication/conference platforms and have been acting creatively in terms of teaching methods. During the audit, one lecturer reported that he recorded a complete session of his own lectures and made them available to ITB students and learners from other universities nationwide via the Internet. Many other innovative teaching methods during the pandemic were presented by the lecturers during the discussion, which convinced the peer group of the assurance of the quality of teaching and learning.

**Criterion 2.4 Support and assistance**

**Evidence:**

- Self-Assessment Report
- Discussions during the audit (online)

**Preliminary assessment and analysis of the peers:**
During the discussions with the programme coordinators, the teachers and especially with the students, the peers appreciated the comprehensive advisory system for all students. The programme coordinators explained that an academic advisor is appointed to each student as soon as he or she starts the common preparatory stage in the first year. Each academic advisor is responsible for 30 to 40 students. The programme coordinators told that an academic advisor has intensive contact with the students and is usually available for any consultation a student may need, even for personal issues. In the academic information system of the university, the academic advisor has the access to all the academic data of the students. At the beginning of each semester, based on the prior performance, the academic advisor gives considerations concerning the courses a student should take, for undergraduate and master programmes. The role of the academic advisor will be handed over

to the final project supervisor as the students start with the final project. Academic advisors are also involved in career counselling, selection of research division, application for grants and scholarships and coaching for extracurricular activities. As the peers asked what if or whether there had been conflicts or problems between students and their academic advisors, the students as well as the lecturers confirmed that never happened. Should it occur, the student could report the case to the programme coordinator or the Head of the faculty.

During the Discussions with the students, the peers learned that for each undergraduate study programme, there are student organizations to provide non-academic programs for the students during their study. They organize event, study excursions and seminars, supporting the education process. The student organizations also help disabled students or students with financial difficulties.

Apart from the student advisory system, ITB also offers several other means to aid its students: the international office supports international mobility, the student agency manages and organizes all types of scholarships, and the career centre helps students to explore their career options.

In summary, the peers are satisfied with the support and assistance the students at ITB receive.

**Final assessment of the peers after the comment of the Higher Education Institution regarding criterion 2:**

As the university did not comment the report the peers confirm their preliminary assessment that the criterion is not completely fulfilled. They suggest a requirement to ensure that the student workload and the credit points correspond for all mandatory elements of the programmes (final theses). Additionally, they suggest to recommend to define a period of time to work on the final theses.

# 3. Exams: System, concept and organisation

**Criterion 3 Exams: System, concept and organisation**

**Evidence:**

- Self-Assessment Report
- Module Descriptions
- Discussions during the audit (online)

**Preliminary assessment and analysis of the peers:**
The peers positively note that all examinations of the degree programmes under review follow the ITB Regulations for Student and Academic Affairs and all the exams are conducted with principle of fairness, relevance and accountability. According to the programme coordinators, there are different types of examination methods including written examination, quizzes, laboratory work, assignment (reading, small projects, simulation, report, etc.), presentation, seminar and discussion. The type of assessment or the combination of several methods are used or designed based on the nature and characteristics of each course to evaluate the knowledge, skills and competences of the students properly and are visible in the module descriptions. Evaluations are held at least twice in one semester, in the middle and at the end of one semester.

The peers noticed that for many courses, more than two exams are conducted within one semester and asked therefore, whether the students experience too much learning stress as a result. The programme coordinators explained, that at the beginning of each semester, the lecturer announces the course regulations, including the types of examinations, percentage of each in the final grade and examination dates. If there are several exams within a semester for a course, then the exams are usually short and serve to check the students' learning progress in phases.

The peers wanted to know if there is a centralized board of examination at ITB, which is responsible for exam-related matters. The programme coordinators explained that ITB do not have a board of examination. If the students have complaints or concerns about the examination results, they can report it first to their lecturer and, if necessary, to the Quality Assurance department.

As regards the final thesis, final project courses are managed through the Final Project Information Management System (SIPINTAR) to ensure the courses are carried out properly. During the last accreditation, it was recommended by the ASIIN experts, to extend the cooperation with industry and increase the number of final theses written at private companies. The programme coordinators and the industry partners confirmed that there had been more opportunities for students to be exposed to the real industry and collect hands-on experience. Furthermore, some lecturers are involved in the industry and they bring real case and provide it as topic of student final project. In this case, the final project can be conducted outside the university. The first supervisor had to be staff member of ITB, whereas the project is co-supervised by an expert from the industry.

In summary, the peers conclude that the criteria regarding the examination system, concept and organization are fulfilled, and the examinations are suitable to verify if the intended learning outcomes are achieved.

**Final assessment of the peers after the comment of the Higher Education Institution regarding criterion 3:**

As the university did not comment the report the peers confirm their preliminary assessment that the criterion is completely fulfilled.

# 4. Resources

**Criterion 4.1 Staff**

**Evidence:**

- Self-Assessment Report
- Staff Handbook
- Evaluation of Academic Staff
- Discussions during the audit (online)

**Preliminary assessment and analysis of the peers:**

In the self-assessment report, the Faculty of Mechanical and Aerospace Engineering presents data about the number and overall qualifications of the staff members for all degree programmes under review. During the discussions with the staff, the peers gained a good impression of the quality of the teaching personnel. According to the national regulations, lecturers who teach bachelor programmes must have a master's degree and only lecturers with a doctoral degree are allowed to teach and supervise master students. At ITB, young staff members are encouraged to study for a doctorate. Looking at the statistics, the auditors welcomed that the average percentage of doctoral degree holder in the faculty exceeds 70%. The peers asked about the procedure of the recruitment of new academic staff. The programme coordinators explained that all the permanent staff members of a state-owned university are state employees in Indonesia and will be recruited and paid by the government. Since 2013, ITB has been given an autonomous status by the Indonesian Government so that ITB can also recruit its own staff as the employees of ITB.

In terms of gender, the peers noticed that the percentage of female staff members is very limited. In the undergraduate programme Material Sciences, the ratio of female lecturers is highest at about 25%. The faculty explained that this phenomenon is in part due to the nature of the engineering study programmes. But in general, more female colleagues are highly welcomed.

Regarding workload, in accordance with Government Regulation No. 37/2009 concerning University Lecturer Workloads, each academic staff is required to have an academic workload of at least 12 credits and a maximum of 16 credits per semester. This includes academic activities such as teaching and supervising, research activities including publications of papers, community service activities and other supporting work, including being a part of committee members for a university or government office, being a national delegation for international conferences or meetings, writing learning materials, etc. The programme coordinators explained that the head of each research group distributes the workload between teaching and research evenly. For thesis/research class, meetings are conducted once a week. For the final project course, the teaching is organized as supervision. Students are able to come for supervising sessions at any time during weekdays; in some case they schedule appointment with their supervisor.

The research activities at the Faculty of Mechanical and Aerospace Engineering are carried out by research groups. Each research group has specific research topics within the fields of mechanical engineering, aeronautics and astronautics and materials engineering. In the self-assessment report the faculty presents a number of main research activities for each degree programme. During the discussions with the responsible persons of the faculty, the peers learned that many research projects are organized between ITB, industry partners and the government. The lecturers also take part in international research projects. The dean informed that 20% - 30% of the lecturers are currently working on international projects, e.g. on global topics such as renewable energy, resource efficiency and so on.

The peers confirmed that the quantity and qualification of the teaching staff ensures the implementation of the academic activities and the advisory system.

**Criterion 4.2 Staff development**

**Evidence:**

- Self-Assessment Report
- Discussions during the audit

**Preliminary assessment and analysis of the peers:**
In the discussions with the programme coordinators and teaching staff, the peers learned that ITB offers centrally various courses and workshops for academic and non-academic staff to enhance the competence and to support their career development. Concerning teaching and research, the head of the research groups plays an important role in managing and monitoring the career development of the members, providing guidance in conducting teaching, research, and community services.

ITB supports academic staff members with a master's degree to continue their study to doctoral level. The peers asked if there are opportunities for the academic staff to go abroad for exchange programs. The programme coordinators explained, that ITB has many partner universities over the world. The staff members can apply for scholarship programs and conduct research activities at the partner university abroad. Besides, the Faculty of Mechanical and Aerospace Engineering helps to spread information about different programs and sometime even supports financially to make it easier for the stuff to go abroad.

In consideration of the teaching load, the peers are impressed by the research activities at the faculty. Comparing to international universities the percentage of lecturers concentrating on teaching activities is high with 70-80%. The peers learn out of the discussion with the lecturers that most of them would like to increase their own research projects.

When the peers asked about sabbaticals, the teachers answered that the Indonesian Ministry of Education has such program, and the Indonesian universities should support lecturers to go abroad for academic exchange. As the peers learned that the percentage of teachers who actually participated in a sabbatical term or year accounted for less than 5% of the overall number of staff, they recommended to increase the opportunities of the lecturers for research activities (e.g. sabbaticals).

**Criterion 4.3 Funds and equipment**

**Evidence:**

- Self-Assessment Report
- Discussions during the audit (online)

**Preliminary assessment and analysis of the peers:**

During the discussions with the programme coordinators, a 5-year-concept for upgrading and maintaining the mechanical engineering laboratories and equipment has been presented. The implementation had started in the year of 2017, after the ASIIN accreditation. According to the plan, Rp 24B (ca. €1,5 Mio) have been used for new equipment and Rp 6.8B (ca. €400 000) have been invested for renovation and maintenance. The modernization of the laboratory equipment and the renovation of infrastructure were demonstrated to the peer group in form of a video. Further fund will be allocated for procurement of modern laboratory equipment and for hiring new Technician, according to ITB. For the year 2022 there are Rp 11B (ca. €667 000) planned. The peers are aware that the laboratories are well equipped and believe that students can benefit from it. For the future, the experts would recommend continuous improvement and modernization of the equipment in the laboratories.

The peers appreciated the effort the faculty has made in the last few years. As the experts have observed that a few new devices and machines shown in the video are very expensive and therefore asked if students have access to all those new devices. The programme coordinators explained that some of the new equipment is specially purchased for educational purpose, for experiments and practical courses. Some of them are allowed to be used by students independently, others need to be accompanied by lab staff.

Concerning the safety standards in laboratories, FMAE has made improvements to meet the requirement of ASIIN accreditation. Necessary safety equipment and safety procedures in laboratories have been provided. The peers were told that the lab coordinator is the main executive for safety instructions, ensuring that all the safety equipment is available in the laboratories. When students enter the lab, the lab technician will first give safety instructions. Depends on the type of devices they intend to use, specific instructions for equipment may be necessary. The peers also asked about standard procedures in the event of accidents and hazard warnings. After the evaluation, the peer group would recommend constantly evaluating the safety measurements for laboratories.

In the discussions with the program coordinators, the experts learned that the number of students is increasing every year, especially the number of postgraduate students. Because of this, the capacity regarding workspace, workstations and classrooms needs to be considered. The peers would recommend evaluating whether the available workstations and workspaces in the laboratories are adequate to the number of students.

**Final assessment of the peers after the comment of the Higher Education Institution regarding criterion 4:**

As the university did not comment the report the peers confirm their preliminary assessment that the criterion is fulfilled. They suggest recommendations about the research activities of the lecturers about the laboratories regarding workstations, workspace, equipment and safety measurments.

# 5. Transparency and documentation

**Criterion 5.1 Module descriptions**

**Evidence:**

- Self-Assessment Report
- Module Descriptions

**Preliminary assessment and analysis of the peers:**
The Module Handbook for the degree programmes under review can be found in the appendix (Appendix A-01 to A-06) to the self-assessment-report. The peers positively noted that most of the information that is important for teaching and learning is contained in the module descriptions. Each course is a separate module and has its own module identification code. The descriptions of each module include information about the persons responsible for each module, the teaching methods, workload, the awarded credit points, the intended learning outcomes, the module content, the admission requirements, and the forms of assessment.

In the most modules, however, the competency descriptions are missing. Since this field is mandatory and is part of the intended learning outcomes, the peers request the programme coordinators to arrange the completion. Out of the discussion with programme coordinators, teaching staff and students as well as the assessment of the exams and theses, they get the impression that competences are well trained in all programmes. Therefore, it is not a problem of the curricula but only a problem of presentation in the module descriptions.

The peers also noticed that most of the reference materials and books are relatively old, therefore, they require updating the reading list in the module descriptions. In addition, it is necessary adding descriptions about how results of different exams are taken into account for the final module grade and the date of the last modification of the module descriptions. Since the module handbook is not available for the public over ITB website, the peers ask to ensure that the module descriptions are available to all stakeholders.

**Criterion 5.2 Diploma and Diploma Supplement**

**Evidence:**

- Samples of Graduation Certificates
- Samples of Academic Transcripts
- Samples of Diploma Supplement (SKPI)

**Preliminary assessment and analysis of the peers:**
The peers comprehend that after graduation the graduates will obtain a Graduation Certificate, an Academic Transcript, and a Diploma Supplement (SKPI). The certificate of graduation is signed by the Rector of ITB, and since April 2020, students will automatically receive certificates of graduation in both Indonesian and English. Every faculty in ITB formulates Diploma Supplement (SKPI) under the supervision of ITB Directorate of Education. SKPI must conform the Directorate General of Higher Education and the Indonesian Qualification Framework (Ministry of Education Decree No. 59/2018).

The Diploma Supplement contains all necessary information about the degree programme including acquired soft skills and awards (extracurricular and co-curricular activities). The Transcript of Records lists all the courses that the graduate has completed, the achieved credits, grades, and cumulative GPA. Within the documents statistical data as set forth in the ECTS User's Guide are included to allow readers to categorise the individual result/degree.

**Criterion 5.3 Relevant rules**

**Evidence:**

- Self-Assessment Report
- Discussions during the audit (online)

**Preliminary assessment and analysis of the peers:**
The peers acknowledged that all relevant rules related to curricular activities, including all necessary rights and duties of both ITB and students, are stated in the "Academic and Student Regulations". This regulation is available online within ITB network (https://akademik.itb.ac.id). However, this site can only be accessed inside campus through intranet. The peers understood that the students received all relevant course material in the language of the degree programme including the syllabus at the beginning of each semester.

In addition, most information is also available on the intranet accessible for all students.

**Final assessment of the peers after the comment of the Higher Education Institution regarding criterion 5:**

As the university did not comment the report the peers confirm their preliminary assessment that the criterion is not completely fulfilled. They suggest to rewrite the module descriptions so as to include the intended competences of students as well (not only knowledge), current literature, information how results of different exams are taken into account for the final module grade and the date of the last update. Ensure that the module descriptions are available to all stakeholders.

# 6. Quality management: quality assessment and development

**Criterion 6 Quality management: quality assessment and development**

**Evidence:**

- Self-Assessment Report

- Discussions during the audit (online)

**Preliminary assessment and analysis of the peers:**
According to the self-assessment report, ITB applies two types of quality assurance systems for maintaining and improving the educational quality, namely the Internal Quality Assurance (IQA) and the External Quality Assurance (EQA). IQA encompasses all activities focused on the improvement and embedding of the teaching and learning quality within the university. Meanwhile, EQA focuses on both national and international accreditations. National accreditation is conducted by the National Accreditation Agency for Higher Education (NAAHE), or BAN-PT in Indonesian, under the Ministry of Education and Culture.

At ITB, there is continuous improvement of all institutional programs and activities through monitoring, assessment, and evaluation processes. The quality assurance system is implemented at the university level by Quality Assurance Unit (Satuan Penjaminan Mutu – SPM), which is supported by the Quality Control Unit/ QCU (Gugus Kendali Mutu – GKM) at the faculty level and the degree programme level (PATF) and consists of multiple external and internal procedures.

Several instruments are used to perform the quality assessment, including Course and PLO assessment, Evaluation of lecturers by students, and ITB Tracer Study.

Each learning outcome (PLO) is assessed using the course assessment score and the course contribution to the PLO. The measurement of course assessment score is conducted by the faculty and the Study Program Quality Control Group every semester. The course contribution to PLO can be seen in the Appendix G to the self-assessment report. There have been improvements in the assessment methods. Currently, the Assessment Methods 2.1 is being implemented.

At the end of semester, there is an evaluation of each lecturer by students (Evaluasi Dosen oleh Mahasiswa or EDOM). Students fill a questionnaire which include several evaluation criteria. During the discussions with the students, the peers learned that the students do not know the evaluation results, nor can they really judge if changes take place based on their evaluation. Sometimes they get information about changes or improvements from students of the following year. The students explained that they could approach the lecturers in the middle of a semester if they were discontent with certain aspects of a lecture or have some ideas or suggestions on the content of the course, most of the lecturers will give feedback or accept the recommendations of the students.

The Tracer Study aims to measure the educational results, particularly in the transition from higher education to industry fields. Furthermore, through the User Survey, the university expects to seek the discrepancies between the quality of graduates and the quality

expected by the industries. At ITB, the Tracer Study is carried out at the university level under ITB Career Center.

From the documents presented and from the discussions during the online visit, the peers gain a positive impression of the quality management procedures that are in place at ITB and for the programmes under review.

**Final assessment of the peers after the comment of the Higher Education Institution regarding criterion 6:**

As the university did not comment the report the peers confirm their preliminary assessment that the criterion is completely fulfilled.

# D Additional Documents

No additional documents needed

# E Comment of the Higher Education Institution

The university did not provide any comment on the report

# F Summary: Peer recommendations

The peers recommend the award of the seals as follows:

| Degree Programme | ASIIN-seal | Subject-specific label | Maximum duration of accreditaiton |
|---|---|---|---|
| Ba Mechanical Engineering | With requirements for one year | | 30.09.2028 |
| Ma Mechanical Engineering | With requirements for one year | | 30.09.2027 |
| Ba Aerospace Engineering | With requirements for one year | | 30.09.2028 |

| Degree Programme | ASIIN-seal | Subject-specific label | Maximum duration of accreditaiton |
|---|---|---|---|
| Ma Aerospace Engineering | With requirements for one year | | 30.09.2027 |
| Ba Materials Engineering | With requirements for one year | | 30.09.2028 |
| Ma Materials Science and Engineering | With requirements for one year | | 30.09.2027 |

**A) Accreditation with or without requirements**

## Requirements

A 1. (ASIIN 2.2) Ensure that the student workload and the credit points correspond for all mandatory elements of the programmes (final theses).

A 2. (ASIIN 5.1) Rewrite the module descriptions to include the intended competences of students as well (not only knowledge), current literature, information how results of different exams are taken into account for the final module grade and the date of the last update. Ensure that the module descriptions are available to all stakeholders.

## Recommendations

E 1. (ASIIN 1.1) It is recommended to institutionalize the feedback from industry regarding the study aims and qualification profile of the graduates.

E 2. (ASIIN 1.3) It is recommended to increase the opportunities of the students to get practical experiences in labs and to train their team working and communication skills.

E 3. (ASIIN 2.2) It is recommended to define a period of time to work on the final theses.

E 4. ASIIN 4.2) It is recommended to increase the opportunities of the lecturers for research activities (e.g. sabbaticals).

E 5. (ASIIN 4.3) It is recommended to evaluate whether the available workstations and workspaces in labs are adequate to the number of students.

E 6. (ASIIN 4.3) It is recommended to continuously improve and modernize the equipment of the laboratories.

E 7. (ASIIN 4.3) It is recommended to evaluate constantly the safety measurements for laboratories.

# G Comment of the Technical Committees

## Technical Committee 01 – Mechanical Engineering/Process Engineering (07.03.2022)

*Assessment and analysis for the award of the ASIIN seal:*

The Technical Committee discusses the procedure and follows the assessment of the peers without any changes.

The Technical Committee 01 – Mechanical Engineering/Process Engineering recommends the award of the seals as follows:

| **Degree Programme** | **ASIIN-seal** | **Subject-specific label** | **Maximum duration of accreditaiton** |
|---|---|---|---|
| Ba Mechanical Engineering | With requirements for one year | | 30.09.2028 |
| Ma Mechanical Engineering | With requirements for one year | | 30.09.2027 |
| Ba Aerospace Engineering | With requirements for one year | | 30.09.2028 |
| Ma Aerospace Engineering | With requirements for one year | | 30.09.2027 |
| Ba Materials Engineering | With requirements for one year | | 30.09.2028 |
| Ma Materials Science and Engineering | With requirements for one year | | 30.09.2027 |

## Technical Committee 05 – Materials Science, Physical Technologies (10.03.2022)

*Assessment and analysis for the award of the ASIIN seal:*

The Technical Committee discusses the procedure and follows the assessment of the peers without any changes.

The Technical Committee 05 – Materials Science, Physical Technologies recommends the award of the seals as follows:

| **Degree Programme** | **ASIIN-seal** | **Subject-specific label** | **Maximum duration of accreditaiton** |
|---|---|---|---|
| Ba Materials Engineering | With requirements for one year | | 30.09.2028 |
| Ma Materials Science and Engineering | With requirements for one year | | 30.09.2027 |

# H Decision of the Accreditation Commission

The Accreditation Commission decides to award the seals as followed:

| **Degree Programme** | **ASIIN-seal** | **Subject-specific label** | **Maximum duration of accreditaiton** |
|---|---|---|---|
| Ba Mechanical Engineering | With requirements for one year | | 30.09.2028 |
| Ma Mechanical Engineering | With requirements for one year | | 30.09.2027 |
| Ba Aerospace Engineering | With requirements for one year | | 30.09.2028 |
| Ma Aerospace Engineering | With requirements for one year | | 30.09.2027 |

| Degree Programme | ASIIN-seal | Subject-specific label | Maximum duration of accreditaiton |
|---|---|---|---|
| Ba Materials Engineering | With requirements for one year | | 30.09.2028 |
| Ma Materials Science and Engineering | With requirements for one year | | 30.09.2027 |

## Requirements

A 1. (ASIIN 2.2) Ensure that the student workload and the credit points correspond for all mandatory elements of the programmes (final theses).

A 2. (ASIIN 5.1) Rewrite the module descriptions so as to include the intended competences of students as well (not only knowledge), current literature, information how results of different exams are taken into account for the final module grade and the date of the last update. Ensure that the module descriptions are available to all stakeholders.

## Recommendations

E 1. (ASIIN 1.1) It is recommended to institutionalize the feedback from industry regarding the study aims and qualification profile of the graduates.

E 2. (ASIIN 1.3) It is recommended to increase the opportunities of the students to get practical experiences in labs and to train their team working and communication skills.

E 3. (ASIIN 2.2) It is recommended to define a period of time to work on the final theses.

E 4. ASIIN 4.2) It is recommended to increase the opportunities of the lecturers for research activities (e.g. sabbaticals).

E 5. (ASIIN 4.3) It is recommended to evaluate whether the available workstations and workspaces in labs are adequate to the number of students.

E 6. (ASIIN 4.3) It is recommended to continuously improve and modernize the equipment of the laboratories.

E 7. (ASIIN 4.3) It is recommended to evaluate constantly the safety measurements for laboratories.

# Appendix: Programme Learning Outcomes and Curricula

For all bachelor's degree programmes the following modules are compulsory:

| | Codes | Courses | CU |
|---|---|---|---|
| 1 | KU206X | Religion and Ethics | 2 |
| 2 | KU2071 | *Pancasila* and Civic | 2 |
| 4 | KU1102<br>AE2201<br>AE3241<br>AE40X5 | **Computational Thinking Related Courses**<br>Introduction to Computation<br>Engineering Analysis and Numerical Methods<br>Air Transport Modeling<br>Aerospace Computational Method | 3 |
| 5 | AE2204<br>KU1102 | **Artificial Intelligence Related Course**<br>Data Science and Statistics Introduction to Computation | |
| makai6 | AE2204<br>KU1102 | **Big Data Analysis Related Course**<br>Data Science and Statistic Introduction to Computation | 3 |
| 7 | AE4000 | **Environmental Related Course**<br>Sustainable Environmental Aspect | 2 |
| 8 | AE4000 | **Sustainability Related Course**<br>Sustainable Environmental Aspect | |
| | | **Total** | **14** |

For the Bachelor's degree programme in Mechanical Engineering the following **curriculum** is presented:

| Semester I | | | | Semester II | | | |
|---|---|---|---|---|---|---|---|
| **No** | **Codes** | **Courses** | **CU** | **No** | **Codes** | **Courses** | **CU** |
| 1 | MA1101 | Mathematics IA | 4 | 1 | FI1202 | Elementary Physics IIB | 3 |
| 2 | FI1102 | Elementary Physics IB | 3 | 2 | KU1202 | Introduction to Engineering and Design | 3 |
| 3 | KI1002 | General Chemistry B | 4(1) | 3 | KU1204 | English | 2 |
| 4 | KU1011 | Indonesian Language: Scientific Writing | 2 | 4 | MA1201 | Mathematics II C | 4 |
| 5 | KU1001 | Sports | 2 | 5 | MS1200 | Engineering Drawing | 2(1) |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 6 | KU1102 | Introduction to Computation | 3(1) | 6 | MS1210 | Statics | 3 |
| 7 | MS1100 | Introduction to Mechanical, Material and Aerospace Engineering | 1 | | | | |
| | | **Total** | **19** | | | **Total** | **17** |

| **Semester III** | | | | **Semester IV** | | | |
|---|---|---|---|---|---|---|---|
| **No** | **Codes** | **Courses** | **CU** | **No** | **Codes** | **Courses** | **CU** |
| 1 | MS2100 | Introduction to Mechanical Engineering | 2 | 1 | MS2200 | Statistics | 2 |
| 2 | MS2102 | Introduction to Engineering Analysis | 3 | 2 | MS2201 | Numerical Analysis | 2 |
| 3 | MS2101 | Mechanical Drawing | 2(1) | 3 | MS2202 | System Dynamics | 2(1) |
| 4 | MS2110 | Mechanics and Strength of Materials | 3 | 4 | MS2203 | Electric Motors and Drives | 3(1) |
| 5 | MS2111 | Kinematics and Dynamics of Machinery | 4 | 5 | MS2210 | Basic Design of Machine Elements | 3 |
| 6 | MS2120 | Basic of Engineering Thermodynamics | 3 | 6 | MS2220 | Basic Fluid Mechanics | 3 |
| 7 | MS2140 | Engineering Materials | 2(1) | 7 | MS2240 | Structure and Properties of Materials | 2(1) |
| | | **Total** | **19** | | | **Total** | **17** |

| **Semester V** | | | | **Semester VI** | | | |
|---|---|---|---|---|---|---|---|
| **No** | **Codes** | **Courses** | **CU** | **No** | **Codes** | **Courses** | **CU** |
| 1 | MS3100 | Engineering Measurement | 2(1) | 1 | MS3200 | Basic Phenomenon on Mechanical Engineering | 1(1) |
| 2 | MS3110 | Basic of Mechanical Vibration | 2 | 2 | MS3201 | Introduction to Control Systems | 3(1) |
| 3 | MS3120 | Basic Heat Transfer | 3 | 3 | MS3202 | Basics of Mechatronics | 2(1) |
| 4 | MS3130 | Manufacturing Process | 4(1) | 4 | MS3203 | Engineering Product Design | 3 |
| 5 | KU2071 | Pancasila and Civic Education | 2 | 5 | MS3221 | Energy Conversion System | 3 |
| 6 | MS3111 | Mechanical Engineering Design | 3 | 6 | MS3230 | Industrial Metrology | 3(1) |
| 7 | MS3121 | Fluid Mechanics | 2 | 7 | MS3220 | Thermal Engineering | 3 |
| | | **Total** | **18** | | | **Total** | **18** |

| **Semester VII** | | | | **Semester VIII** | | | |
|---|---|---|---|---|---|---|---|
| **No** | **Codes** | **Courses** | **CU** | **No** | **Codes** | **Courses** | **CU** |
| 1 | MS4101 | Sustainability Aspects in Mechanical Engineering | 2 | 1 | MS4090 | Industrial Internship | 1(1) |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 2 | MS4102 | Mechanical Maintenance | 3 | 2 | MS4092 | Comprehensive Examination | 1 |
| 3 | MS4091 | First Final Project | 2(2) | 3 | MS4093 | Second Final Project | 3(3) |
| 4 | MS4100 | Engineering Product Prototyping | 2 | 4 | MS4200 | Engineering Management and Business | 2 |
| 5 | MS4103 | Mechatronics | 2(1) | 5 | KU206X | Religion and Ethics | 2 |
| 6 | MS4120 | Mechanical Installation System | 3 | 6 | MSXXXX | Mechanical Engineering Elective Course | 3 |
| 7 | MS4121 | Mechanical Engineering Laboratory | 1(1) | 7 | MSXXXX | Mechanical Engineering Elective Course | 3 |
| 8 | MSXXXX | Mechanical Engineering Elective Course | 3 | 8 | xxXXXX | Other Elective Course | 3 |
| | | **Total** | **18** | | | **Total** | **18** |

For the Bachelor's degree programme in Aerospace Engineering the following **curriculum** is presented:

| **Semester I** | | | | **Semester II** | | | |
|---|---|---|---|---|---|---|---|
| **No** | **Codes** | **Courses** | **CU** | **No** | **Codes** | **Courses** | **CU** |
| 1 | MA1101 | Mathematics IA | 4 | 1 | MA1204 | Mathematics IIC | 4 |
| 2 | FI1102 | Elementary Physics IB | 3 | 2 | FI1202 | Elementary Physics IIB | 3 |
| 3 | KI1002 | General Chemistry B | 4 | 3 | KU1024 | English | 2 |
| 4 | KU1102 | Introduction to Computation | 3 | 4 | MS1200 | Engineering Drawing | 2 |
| 5 | KU1011 | Indonesian Language: Scienti-fic Writing | 2 | 5 | KU1202 | Introduction to Engineering and Design | 3 |
| 6 | KU1001 | Sports | 2 | 6 | MS1210 | Statics | 3 |
| 7 | MS1100 | Introduction to Mechanical and Aerospace En-gineering | 1 | | | | |
| | | **Total:** | **19** | | | **Total:** | **17** |
| **Semester III** | | | | **Semester IV** | | | |
| **No** | **Codes** | **Courses** | **CU** | **No** | **Codes** | **Courses** | **CU** |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 1 | AE2100 | Introduction to Aerospace Engineering | 2 | 1 | AE2200 | Instrumentation, Measurements, and Experimentation | 3 |
| 2 | AE2101 | Engineering Mathematics | 3 | 2 | AE2201 | Engineering Analysis and Numerical Method | 3 |
| 3 | AE2102 | Thermal Engineering | 4 | 3 | AE2202 | Fluid Dynamics | 3 |
| 4 | AE2103 | Kinematics and Dynamics | 3 | 4 | AE2203 | Dynamical System | 3 |
| 5 | AE2130 | Aircraft Materials and Manufacturing Methods I | 3 | 5 | AE2204 | Data Sciences and Statistics | 3 |
| 6 | MS2110 | Mechanics and Strength of Materials | 3 | 6 | AE2230 | Aircraft Materials and Manufacturing Methods II | 2 |
| | | **Total:** | **18** | | | **Total:** | **17** |
| **Semester V** | | | | **Semester VI** | | | |
| **No** | **Codes** | **Courses** | **CU** | **No** | **Codes** | **Courses** | **CU** |
| 1 | AE3100 | Mechanical Vibrations | 3 | 1 | AE3200 | Control Engineering | 3 |
| 2 | AE3110 | Aerodynamics I | 3 | 2 | AE3201 | Astronautics | 3 |
| 3 | AE3120 | Aircraft Aerodynamics and Flight Performances | 4 | 3 | AE3210 | Aerodynamics II | 3 |
| 4 | AE3130 | Lightweight Structure Analysis | 3 | 4 | AE3211 | Aircraft Propulsion | 3 |
| 5 | AE3140 | Airworthiness Certification | 3 | 5 | AE3220 | Flight Dynamics | 3 |
| 6 | AE3141 | Aircraft Systems | 3 | 6 | AE3230 | Lightweight Structure Design | 3 |
| | | **Total:** | **18** | | | **Total:** | **17** |
| **Semester VII** | | | | **Semester VIII** | | | |
| **No** | **Codes** | **Courses** | **CU** | **No** | **Codes** | **Courses** | **CU** |
| 1 | KU206X | Religion and Ethics | 2 | 1 | KU2071 | Pancasila and Civic Education | 2 |
| 2 | AE4000 | Aspect of Sustained Environment | 2 | 2 | AE4099 | Undergraduate Thesis II | 3 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 3 | AE4040 | Aircraft Design | 4 | 3 | AE4097 | Comprehensive Examination | 1 |
| 4 | AE4020 | Flight Communication, Navigation, and Surveillance | 2 | 4 | AE4090 | Profession and Community Development A | 1 |
| 5 | AE4098 | Undergraduate Thesis I | 2 | 5 | TI4004 | Industrial Management B | 2 |
| 6 | AE40X5 | Aerospace Computational Method | 3 | | | | |
| | | **Total:** | **15** | | | **Total:** | **9** |

For the Bachelor's degree programme in Materials Engineering the following **curriculum** is presented:

| **Semester I*** | | | | **Semester II*** | | | |
|---|---|---|---|---|---|---|---|
| No | Codes | Courses | CU | No | Codes | Courses | CU |
| 1 | MA1101 | Mathematics IA | 4 | 1 | MA1204 | Mathematics IIC | 4 |
| 2 | FI1102 | Elementary Physics IB | 3 | 2 | FI1202 | Elementary Physics IIB | 3 |
| 3 | KI1002 | General Chemistry IB | 4 | 3 | KU1202 | Introduction to Engineering and Design | 3 |
| 4 | KU1001 | Sports | 2 | 4 | MS1200 | Engineering Drawing | 2 |
| 5 | KU1102 | Introduction to Computation | 3 | 5 | MS1210 | Statics | 3 |
| 6 | MS1100 | Introduction to Mechanical, Material, and Aerospace Engineering | 1 | 6 | KU1024 | English | 2 |
| | | | | 7 | KU1011 | Indonesian Language: Scientific Writing | 2 |
| | | **Total** | **17** | | | **Total** | **19** |
| **Semester III** | | | | **Semester IV** | | | |
| No | Codes | Courses | CU | No | Codes | Courses | CU |
| 1 | MT2104 | Mathematics for Materials Engineering | 3 | 1 | MT2204 | Numerical Analysis of Materials Engineering | 2 |
| 2 | MT2105 | Chemistry of Solid Materials (P) | 3 | 2 | MT2231 | Polymer Chemistry (P) | 3 |
| 3 | MT2106 | Electronic and Magnetic Materials | 3 | 3 | MT2202 | Thermodynamics of Materials | 3 |
| 4 | MT2100 | Introduction to Materials Engineering | 2 | 4 | MT2203 | Materialography and Diffraction (P) | 2 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 5 | MT2101 | Mechanical Properties of Materials | 2 | 5 | MT2224 | Ceramic Materials | 3 |
| 6 | MT2102 | Mechanics of Materials | 3 | 6 | MT2205 | Mechanical Testing Practical Course | 1 |
| 7 | MT2103 | Spectroscopy and Thermal Analysis | 2 | 7 | MT2216 | Metallic Materials | 3 |
| 8 | MS2101 | Mechanical Drawing | 2 | | | | |
| | | **Total** | **20** | | | **Total** | **17** |
| **Semester V** | | | | **Semester VI** | | | |
| No | Codes | Courses | CU | No | Codes | Courses | CU |
| 1 | MT3004 | Electrochemistry and Corrosion | 3 | 1 | MT3221 | Ceramics Processing | 3 |
| 2 | MT3101 | Transport Phenomena in Materials Engineering | 3 | 2 | MT3203 | Engineering and Characterization of Materials Practical Course | 1 |
| 3 | MT3103 | Materials Processing Practical Course | 1 | 3 | MT3234 | Composite Materials (P) | 3 |
| 4 | MT3114 | Phase Transformation | 3 | 4 | MT3205 | Computational Methods in Materials Engineering (P) | 3 |
| 5 | MT3116 | Manufacturing Processes of Metallic Materials | 3 | 5 | MT3236 | Polymer Processing (P) | 3 |
| 6 | MT3132 | Polymeric Materials (P) | 3 | 6 | KU2071 | Pancasila and Civic Education | 3 |
| 7 | MT3125 | Ceramic Raw Materials (P) | 3 | 7 | MTxxxx | Elective Course (Inside Material Eng. Program) | 2 |
| | | **Total** | **19** | | | **Total** | **18** |
| **Semester VII** | | | | **Semester VIII** | | | |
| No | Codes | Courses | CU | No | Codes | Courses | CU |
| 1 | MT4001 | Experimental Design | 3 | 1 | MT4005 | Principle of Materials Design | 2 |
| 2 | MT4002 | Project on Materials Selection Product Processing Oriented | 3 | 2 | MT4006 | Management and Entrepreneurship in Materials Engineering | 2 |
| 3 | MT4003 | Materials Technology Seminar | 1 | 3 | MT4091 | Industrial Internship | 2 |
| 4 | MT4004 | Aspect of Sustainability in Materials Technology | 2 | 4 | MT4092 | Final Project | 5 |
| 5 | KU206x | Religion and Ethics | 2 | 5 | MTxxxx | Internal Elective Course | 2 |
| 6 | MTxxxx | Internal Elective Course | 2 | 6 | YYxxxx | External Elective Course | 2 |
| 7 | MTxxxx | Internal Elective Course | 2 | 7 | YYxxxx | External Elective Course | 3 |
| 8 | MTxxxx | Internal Elective Course | 2 | | | | |
| | | **Total** | **17** | | | **Total** | **18** |

For the Master's degree programme in Mechanical Engineering the following **curriculum** is presented:

| **Semester I** | | | | **Semester II** | | | |
|---|---|---|---|---|---|---|---|
| **No** | **Codes** | **Courses** | **CU** | **No** | **Codes** | **Courses** | **CU** |
| 1 | MS5100 | Compulsory: Research Methodology | 3 | 1 | MS5200 | Compulsory: Scientific Writing | 3 |
| 2 | MS51xx | First Compulsory Course | 3 | 2 | MS52xx | Third Compulsory Course | 3 |
| 3 | MS51xx | Second Compulsory Course | 3 | 3 | MS52xx | Fourth Compulsory Course | 3 |
| **Total** | | | **9** | **Total** | | | **9** |
| **Semester III** | | | | **Semester IV** | | | |
| **No** | **Codes** | **Courses** | **CU** | **No** | **Codes** | **Courses** | **CU** |
| 1 | MS6090 | First Thesis | 3 | 1 | MS6091 | Second Thesis | 3 |
| 2 | MS60xx | First Elective Course | 3 | 2 | MS60xx | Third Elective Course | 3 |
| 3 | MS60xx | Second Elective Course | 3 | 3 | MS60xx | Fourth Elective Course | 3 |
| **Total** | | | **9** | **Total** | | | **9** |

For the Master's degree programme in Aerospace Engineering the following **curriculum** is presented:

| **Semester I** | | | | **Semester II** | | | |
|---|---|---|---|---|---|---|---|
| No | Codes | Courses | CU | No | Codes | Courses | CU |
| 1 | MS5100 | Research Methodology[1] | 3 | 1 | AE5010 | Turbulent Flow[3] | 3 |
| 2 | AE5001 | Advanced Mathematics[2] | 3 | 2 | AE5011 | Computational Fluid Dynamics I[3] | 3 |
| 3 | AE5012 | Viscous Flow[3] | 3 | 3 | AE5013 | Compressible Flow[3] | 3 |
| **Total** | | | **9** | **Total** | | | **9** |
| **Semester III** | | | | **Semester IV** | | | |
| 1 | AE6090 | Thesis I[1] | 3 | 1 | AE6091 | Thesis II[1] | 3 |
| | | Elective Course | 6 | | | Elective Course | 6 |
| **Total** | | | **9** | **Total** | | | **9** |

For the Master's degree programme in Materials Engineering the following **curriculum** is presented:

| Semester I | | | | Semester II | | | |
|---|---|---|---|---|---|---|---|
| No | Codes | Courses | Credits | No | Codes | Courses | Credits |
| 1 | MT6000 | Research Methodology | 3 | 1 | MT6001 | Scientific Writing Methods and Ethics | 3 |
| 2 | MT6002 | Engineering of Metallic Materials | 3 | 2 | MT6006 | Materials Degradation: Analysis, Modelling, and Simulation | 3 |
| 3 | MT6003 | Engineering of Ceramic Materials | 3 | 3 | MT6005 | Determination of Structure and Chemical Composition of Materials | 3 |
| 4 | MT6004 | Engineering of Polymeric and Composite Materials | 3 | | | | |
| | | Total | 12 | | | Total | 9 |
| Semester III | | | | Semester IV | | | |
| No | Codes | Course | Credits | No | Codes | Course | Credits |
| 1 | MT6098 | MT6098 Thesis I: Research Design | 3 | 1 | MT6099 | Thesis II: Research Implementation and Publication | 3 |
| | | Total | 3 | | | Total | 3 |