ASIIN Seal

Accreditation Report

Bachelor's and Master's Degree Programme
Geophysical Engineering

Provided by
Institute of Technology Bandung

Version: 08 December 2022

Table of Content

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]
Studi Sarjana Teknik Geofisika	Bachelor Geophysical Engineering	ASIINl	2016-2023	11
Studi Sarjana Teknik Geofisika	Master Geophysical Engineering	ASIIN	--	11
Date of the contract: 29 October 2021 **Submission of the final version of the self-assessment report:** 2022-05-02 **Date of the onsite visit:** 27-28 September 2022 **at: Bandung**				
Peer panel: Prof. Dr. Detlev Doherr, University of Applied Science Offenburg Febrina Sukmawati, Student of Gadjah Mada University Dr. Hans-Juergen Weyer, BDG ((Professional Association Of German Geologists)				
Representative of the ASIIN headquarter: Dr. Michael Meyer				
Responsible decision-making committee: Accreditation Commission for Degree Programmes				
Criteria used:				

[1] ASIIN Seal for degree programmes;

[2] TC: Technical Committee for the following subject areas: TC 01 - Mechanical Engineering/Process Engineering; TC 02 - Electrical Engineering/Information Technology; TC 03 - Civil Engineering, Geodesy and Architecture; TC 04 - Informatics/Computer Science; TC 05 - Physical Technologies, Materials and Processes; TC 06 - Industrial Engineering; TC 07 - Business Informatics/Information Systems; TC 08 - Agriculture, Nutritional Sciences and Landscape Architecture; TC 09 - Chemistry; TC 10 - Life Sciences; TC 11 - Geosciences; TC 12 - Mathematics; TC 13 - Physics.

European Standards and Guidelines as of May 15, 2015 ASIIN General Criteria, as of December 10, 2015 Subject-Specific Criteria of Technical Committee 10 – Life Sciences as of June 28, 2019 , Technical Committee 11 – Geosciences as of December 9, 2011	

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
Geophysical Engineering, B.Sc.	Studi Sarjana Teknik Geofisika	--	Level 6	Full	--	8 Semester	144 SKS, 200 ECTS	1998, Annually
Geophysical Engineering, M.Sc. 2/	Studi Magister Teknik Geofisika	Earthquake and Volcano Geophysics; Petroleum Geophysics; Geophysical Options	Level 7	Full time	--	x Semester	38 SKS, 100 ECTS	1993, each Semester

For the Bachelor's degree programme the institution has presented the following profile in the self-assessment report:

The university mentioned that the study aims are greatly influenced by the advancement of geophysical knowledge & technology, as well as by observation result of current aspect and future needs of the petroleum industry, mining, geothermal, geotechnics, and environmental and disaster-related matter.

ITB defined the following vision for the programme:
Constructing the undergraduate programme into an institution of higher-education, a center of advanced research, and innovative development, and as an entrepreneur in geophysical engineering field with the purpose to embody a very competitive world-class undergraduate programme through several steps, with the first step in ASEAN region, the second step in Southeast Asia region, and final step in the World.

To achieve that vision, the Undergraduate Programme in Geophysical Engineering (UPGE) has some missions as follows:

1. *Being able to deliver educational service, research, and social service in the geophysical engineering field to people, with first-class quality at national and/or international level.*

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

2. *Being able to lead and support the government sector, education sector, entrepreneurship sector, and the people of Indonesia to triumph in international competition in the geophysical engineering field.*
3. *Taking part in constructing industrial and informational Indonesian society in the geophysical engineering field.*

The Undergraduate Programme in Geophysical Engineering in the Faculty of Mining and Petroleum Engineering-ITB focuses its objectives to produce graduates who are capable to become professionals, such as researcher, lecturer, teacher, industrial expert, as well as entrepreneur. The objectives are as follows:

1. *Having an understanding of knowledge and methodology in a broad spectrum of geophysical engineering, including resource exploration, environmental geophysics, seismology, and tectonics, as well as having a problem-solving capability in their work.*
2. *Having a capability to acquire, process, and interpret the geophysical data for a broad spectrum of geophysical engineering, including resource exploration, environmental geophysics, seismology, and tectonics; and rise upon that foundation with advanced course work in geophysics to develop the in-depth knowledge which students need to pursue advanced-graduate study and professional career in government or private sector.*
3. *Keeping with development on students' geophysical fields of interest and their interactions with science and technology, industry, and life in general.*
4. *Having a capability to communicate ideas, both orally and in writing, either scientifically or popularly, to take appropriate initiatives, and to lead a working group in relevant fields.*
5. *Having a capability to continuously develop knowledge for further study, either formally or informally*.

This capability enables the graduates to be professionals who take a part as a leading role as researcher, lecturer, teacher, industrial expert, as well as entrepreneur in national and international development. The Bachelor National Qualification Frameworks (NQF) of Indonesia are:

1. Capable of applying science, technology, and art within her/his expertise and adaptable to various situations faced during solving a problem.
2. Mastering in-depth general and specific theoretical concepts of a certain knowledge and capable of formulating related problem-solving procedures
3. Capable of taking strategic decisions based on information and data analysis and provides direction in choosing several alternative solutions
4. Responsible for her/his own job and can be assigned to take responsibility of the attainment of organization's performances

The Programme Learning Outcomes (PLO) for the graduates are the following:

1. They understand basic knowledge such as mathematics, physics and chemistry which form the basis for geophysical observation and measurement.
2. They understand basic geological knowledge such as physical geology, earth structure and composition, earth tectonics, and earth evolution process.
3. They are able to identify the physical processes governing the behavior of common geophysical systems in the natural system.
4. They are able to quantitatively describe the behavior of natural systems and the principles of geophysical data acquisition, processing, and interpretation with physics-based mathematical models.
5. They are able to explain and apply the principles of geophysical methods for natural resource explorations, natural hazards, engineering and environmental matters.
6. They are able to investigate mathematical models by solving the governing equations with a combination of analytical and computational methods in order to achieve better sub-surface interpretation.
7. They are able to effectively communicate their scientific knowledge through written and oral presentations, able to interpret and evaluate the pub published literature and oral and poster presentations at scientific seminars.
8. They are able to demonstrate a good teamwork, leadership, positive attitude, responsibility, work ethics, entrepreneurship skill, and other personal qualities & interpersonal capabilities.

For the Master ’s degree programme, the institution has presented the following profile in the self-assessment report:

The Master Programme in Geophysical Engineering (MPGE) has a vision as follows:
“To become a postgraduate (master) higher education institution that can act as a research center for the development of superior and respected geophysical science and technology at regional and international levels and is able to produce graduates who can keep up with developments in the field of Geophysical Engineering and are able to compete to meet the needs research, education, and industry at the regional and global levels.”

To achieve that vision, the Master Programme in Geophysical Engineering (MPGE) has some missions as follows:

1. Implementing the Tri-Dharma of Higher Education in the form of Education, Research, and Community Service in the field of innovative and high-quality Geophysical Engineering.
2. Being able to lead and support the government sector, education sector, entrepreneurship sector, and essentially the people of Indonesia to triumph in international competition in the geophysical engineering field.

3. Supporting business/industry, government, and society, in general, is responding to global changes and local challenges through collaborative programs with central/local governments and national/international companies in the form of research, advocacy, and product development.

The purpose of education for each stratum at ITB is for graduates to be able to contribute positively in realizing the ideals of society, both in the scientific community and the professional community, as well as in the general public.

The NQF description includes four elements: attitudes and values, work ability, mastery of knowledge, and authority and responsibility. Achievements for level 8 include:
1. Capable of developing knowledge, technology, or/and art within her/his 8xpertise's or professional domain through research; producing innovative and reputable creations.
2. Capable of solving science, technology or/and art problems within her/his scientific expertise through inter-, multi- and trans-discipline approach.
3. Capable of organizing, leading, and cultivating research and development useful to science and valuable to human civilization as well as obtaining national and international recognition.

The formulation of Educational Objectives the Master Programme in Geophysical Engineering is to produce graduates who are able to adapt and develop to:
1. Implementing and developing comprehensive geophysical science and technology which includes data acquisition and processing as well as modelling and interpretation within the framework of exploration of earth resources, geotechnical and environmental studies, and mitigation of earth disasters.
2. Capable of innovating in the field of Geophysics to synthesize and draw in-depth conclusions from a research activity, in addition to having depth and breadth in Geophysical science and technology.
3. Capable of collaborating across scientific fields in solving earth problems
4. Excellent graduates so that they are able to have a career or take part in doctoral education programs both at home and abroad.
5. To be a pioneer in the development of geophysical science and technology in solving actual problems.

The Programme Learning Outcomes (PLO) for the graduates are the following:
1. They have capabilities in the application and development of comprehensive geophysical science and technology which includes data acquisition and processing as well as modeling and interpretation within the framework of earth resource exploration, geotechnical, environmental or earth disaster mitigation.
2. They have creativity, are able to carry out analysis and synthesis and draw in-depth conclusions from an application of geophysical science and technology.

3. They have the ability to work independently or in a team and can effectively communicate the results of geophysical data interpretation into geological and engineering languages.
4. They have the ability to participate in further education programs (doctoral programs) both at home and abroad.
5. They have a pioneering spirit and leadership in improvement efforts in their community.

C Peer Report for the ASIIN Seal

1. The Degree Programme: Concept, content & implementation

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

Evidence:

- Self-Assessment Reports
- Study plans of the degree programmes
- Module descriptions
- Webpage of all study programmes
- Discussions during the audit

Preliminary assessment and analysis of the peers:
The auditors base their assessment of the learning outcomes as provided on the websites and in the Self-Assessment Reports of the three Bachelor's degree programmes under review. They refer to the Subject-Specific Criteria (SSC) of the respective Technical Committee for Geosciences.

The peers come to the following conclusions:

The auditors hold the view that the objectives and intended learning outcomes of both degree programmes under review are reasonable and well founded.

Regarding the underlying bases in the bachelor's degree programme the students should have basic knowledge and understanding of the natural sciences, of the essential features, processes, materials, and of the of the key aspects and concepts of geology. Furthermore, the peers found adequate intended learning outcomes regarding to engineering abilities in analysis, design and implementation, technological, methodological and transferable skills and additional professional competences to confirm the engineering aspect in the title of the programme. In the master's degree programme the university intends to deepen these abilities adequately from the point of view of the peers. Due to the geological specifications

in Indonesia the peers understands that the university is concentrating on earth resources exploration, geotechnical and environmental aspects and the mitigation of natural hazards.

The peers appreciate that different stakeholders (alumni, industrial and governmental representatives) are involved in the constant review and development of the study programmes. They highlight that the faculty receives a permanent feedback about the demands of the labour market from an advisory board established at the faculty.

Before the pandemic there was a high demand at the labor market and graduates had good chances to find jobs immediately after the graduation. During the pandemic the demand decrease due to the low oil price and increase currently because of the energy crisis in Europe.

In summary, the auditors are convinced that the intended qualification profiles of both programmes under review allow students to take up an occupation, which corresponds to their qualification. The peers conclude that the objectives and intended learning outcomes of the degree programmes adequately reflect the intended level of academic qualification and correspond sufficiently with the ASIIN Subject-Specific-Criteria (SSC) of the Technical Committee 11 – Geosciences

Criterion 1.2 Name of the degree programme

Evidence:

- Self-Assessment Report
- Discussions during the audit

Preliminary assessment and analysis of the peers:
The auditors confirm that the English translation names of the degree programmes under review correspond with the intended aims and learning outcomes. The understand that the programmes differ to programmes named Geophysics by the intensity of mathematics and engineering contents.

Criterion 1.3 Curriculum

Evidence:

- Self-Assessment Reports
- Study plans of the degree programmes
- Module descriptions
- Webpages of all study programmes
- Discussions during the audit

Preliminary assessment and analysis of the peers:

During the first year of the bachelor`s degree programme the fundamentals in mathematics and natural sciences are treated as well as fundamentals of engineering and design, mineral and energy resources and informatics. Additional students were introduced how to write scientific papers and visits an English language module. The second year contains specific fundamentals of geophysics such as tectonphysics, seismology, mineralogy, petrology and physical geology, wave theory and electronics and computing in geophysics. Additional students get special knowledge of geomathematics and a general introduction surveying and visits a course in religion and ethics.

In the third year students get familiar with specific methods in geophysics and engineering and more deepened fundamentals like thermo- and fluid- and geodynamics, geoelectricity and electromagnetism, gravity and sedimentology as well as geostatistic, geophysical signal and analysis or earth crust mechanics. Additional there is a field camp of two weeks included in the third year. During the fourth year the final project stands in the focus imbedded in modules about reflection of seismic data and volcanology and geothermal exploration, geophysical inversions and a communication course as well as and management course. Students can select an individual specialization by choosing elective courses from the second to the fourth year. Therefore students get advices from professors which courses should be chosen to get a special specialization.

In the master's degree programme the students choose one the three offered specifications in "Earthquake and Volcano Geophysics", "Petroleum Geophysics" or "Applied Geophysics". Mandatory for all students are the courses advanced mathematics, advanced wave and field and advanced signal analysis. The specifications includes up to six mandatory courses and one elective course.

From the point of view of the peers both programmes are structured very well. The curricula implement all the defined study aims and learning outcomes. Especially the panel appreciates the broad range of elective courses offered to the students. Several modules include activities to train communication skills and teamwork.

Due to the high number of elective courses, they also appreciate that there is a advisory system to inform students about the offered elective courses and to advise them which modules would fit best with their interests.

The peers learn that statistics is dealt in both programmes. They understand that in the bachelor programme mostly examples are given to the students while in in the master programme the theoretical background including mathematical surrounding are taught.

They understand that even the master programme includes some geological fundamentals, as these fundamentals are only electives in the bachelor programme. Although the teaching staff advices students during their bachelor studies to select some basic in geology as well it would be useful from the point of view of the peers to implement some mandatory geological fundamentals as well.

The panel additional learns that drill hole measurements or drill hole technics are not included in specific courses during the bachelor studies but that different drilling technics are handled application oriented in some modules. With regard to the concentration of the programmes on earth resources exploration, geotechnical and environmental aspects and the mitigation of natural hazards the peers recommend to include aspects of drilling technics more intensively in the programmes.

Out of the discussion with representatives of the industry the peers learn that graduates are qualified very well in their specific field and only need short time to become full members of the company staff. Only regarding their economical knowledge, their communication skills and their teamwork abilities the representatives of the industry see some room for improvement. The peers can follow this impression as in the curricula economical aspects are included only rudimentary and only small group works and presentations are included in some of the modules. Therefore they recommend to offer more opportunities for the students to train this aspects.

Regarding the religion courses the peers know from other accreditation procedures at ITB that there is not only a Islamic course offered but courses for all religions found in Indonesia. For the completion of the documentation the peers ask for the course descriptions of these modules as well.

Overall the peers come to the conclusion that the curricula of both programmes implement the intended learning outcomes in a good manner. From their point of view the curricula are linked very well to the actual field specific research discussions and students are well prepared for all sorts of engineering activities in the field of earth resources exploration and the mitigation of natural hazards.

Criterion 1.4 Admission requirements

Evidence:

- Self-Assessment Reports
- Discussions during the audit

Preliminary assessment and analysis of the peers:
The peers were explained that admission to the undergraduate programmes of ITB is conducted centrally by the ITB and the national committee on student selection for university studies. The management of student admission is centrally-organized at the Directorate of Education of ITB for all faculties and schools within ITB. Since 2011, ITB had been using the national-level student admission system. The national admission committee is composed from all state university delegates.

60% of the students got their admission regarding to their school grades the other 40% by later additional examinations. In case of more applications than available study places there is a ranking of the grades. The students apply for faculty not for single programme and take their choice after the first common year. The purpose of this "First Common Year Programme" is to ensure that all students have the same knowledge and scientific foundation before entering the actual degree programmes. At the end of this first year, each student proposes three choices of study programmes they want to enter. Based on the performance of the students in the first year, the best students are admitted to the first choice. If all places in a degree programme are occupied, students are distributed into the programmes of the second choice and so on.

In addition, through the Law of the Republic of Indonesia the government mandates all state universities to recruit students who have a high academic-performance but not the financial resources to pay the tuition fees. At least 20% of the new students admitted to the university have a background that does not allow them to pay the tuition fees. The government covers the financial expenses and provides incentives to the university to implement this policy.

For the master's degree programme, it is required that prospective students have an undergraduate educational background in the fields of Geophysics and Geophysical Engineering with good achievements. Applicants graduated in physics, geological engineering, petroleum engineering, mining engineering, and other engineering study programs, can join the programme by taking additional courses (matriculation) to strengthen the basic of geophysical knowledge with a maximum number of 12 credits.

In general, the selection of applicants for the ITB postgraduate programme consists of 3 stages:

- Formal assessment of the required documents
- English knowledge
- Academic aptitude test

Additionally, there is a so-called fast-track programme for excellent students in the bachelor programme. Those bachelor students can already take master's courses during their fourth year. In principle, the fast-track program has the same total workload and PLO, but the programme starts earlier and requires a shorter time registered as students in the master's programme. 5-6 students are using this way to enter the master's degree programme.

In summary, the auditors find the terms of admission to be binding and transparent. They confirm that the admission requirements for both programmes ensure that students have the needed pre-qualifications to achieve the intended learning outcomes.

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

After the onsite visit the university submits course descriptions for all religious modules. The peers find the descriptions well balanced for all religions. In total, they confirm their preliminary assessment and see the criterion fulfilled but recommend to include aspects of drilling technics more intensively in the programme and to offer more opportunities for the students to improve their economic knowledge, their communication skills and their teamwork abilities. .

2. The degree programme: structures, methods and implementation

Criterion 2.1 Structure and modules

Evidence:

- Self-Assessment Report
- Study plans of the degree programmes
- Module descriptions
- Discussions with programme coordinators, teaching staff and students

Preliminary assessment and analysis of the peers:

The structure of the programmes under review is clearly outlined on the subject specific website 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. The programmes also offers several elective courses, which allows students to define an individual focus. Based on the analysis of the curriculum 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.

In order to support the international mobility of students the faculty has established several student exchange programmes with international universities. For the recognition of courses finished abroad ITB has defined transparent regulations. The peers appreciate that students are very interested in the exchange programmes and that there is a high student demand. On the other hand, they learn that most of the students could not finance a semester abroad. Therefore they recommend to offer grants for students in order to support their academic mobility.

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 weeks of academic activities. In its documentation

During the onsite visit the peers discuss with programme coordinators and students about the current workload in both programmes. Out of these discussions no systematic problems were identified. This confirms the impression of the peers that the workload defined for the single modules seems to be realistic comparing it with the objectives and the content of the courses.

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.

Criterion 2.3 Teaching methodology

Evidence:

- Self-Assessment Reports
- Study plans of the degree programmes
- Module descriptions
- Discussions during the audit

Preliminary assessment and analysis of the peers:
Various teaching and learning methods (including lectures, computer training and classroom and lab exercises, individual and group assignments, seminars and projects, etc.) have been implemented. Structured activities include tutorials, homework, assignments (reading or problem exercises) and practical activities. The most common method of learning is class session, with several courses having integrated laboratory practices.

In summary, the peer group considers the teaching methods and instruments to be suitable to support the students in achieving the intended learning outcomes. In addition, they confirm that the study concept of all three undergraduate programmes comprises a variety of teaching and learning forms as well as practical parts that are adapted to the respective subject culture and study format. In this context they appreciate the implementation of two weeks of field work in the bachelor’s degree programme.

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 programme coordinators, teaching staff and with students, the peers appreciated the comprehensive advisory system at ITB. An academic advisor is appointed to each student as soon as she or he starts the common first year. Each academic advisor is responsible for 30 to 40 students. Students explain 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. The role of the academic advisor will be handed over to the final project supervisor as soon as 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.

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. Also the university offers support in case of mental issues of the students.

In summary, the peers are impressed by the satisfaction of the students with the advisory and support systems of ITB:

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

As the university do not comment the criterion, the peers confirm their preliminary assessment. They find the criterion fulfilled but recommend to improve the support of the student's academic mobility.

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. There are different types of examination methods in use 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.

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 do not comment the criterion, the peers confirm their preliminary assessment. They find the criterion 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:
The Faculty of Mining and Petroleum Engineering which offers the study programmes under review consists 9 Full Professors, 8 Associated Professors, 13 Assistant Professors and 9 Lecturers.

The peers confirm that the teaching staff covers all core content of geophysical engineering adequately. They are impressed by the extended research activities of the teaching staff with partners all over the world. Nevertheless, the peers highlight especially the intensive cooperation with industry and the number of common research projects concentrated on national/regional issues. The got the impression that the teaching staff and the faculty in total is very well involved in national and international research activities and academic networks.

Criterion 4.2 Staff development

Evidence:

- Self-Assessment Report
- Discussions during the audit

Preliminary assessment and analysis of the peers:
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.

The peers discuss with the members of the teaching staff the opportunities to develop their personal skills and learn that the teachers are satisfied with the internal qualification programme, their opportunities to further improve their didactic abilities.

In summary, the auditors confirm that the university offers sufficient support mechanisms and opportunities for members of the teaching staff who wish to further develop their professional and teaching skills.

Criterion 4.3 Funds and equipment

Evidence:

- Self Assessment Report
- online visit of the laboratories, lecture rooms, and the library
- Discussions with representatives of ITB management, programme coordinators, lecturers, business representatives, students

Preliminary assessment and analysis of the peers:
The peers were explained that financial sources for ITB originated from government funding, society funding, and tuition fees. The report provided an overview of the "operational budget" and the "research grants" for the Faculty. The operational funds were distributed to the Faculties and Schools of ITB based on a specific formula depending on the number of students. The salary for staff members included a basic salary from government and incentives depending on additional efforts of staff members. The management of ITB stressed that even if the contributions from private businesses decreased to zero due to bad economic developments, ITB would still be capable to maintain its operations.

The peers were convinced that the financial means were sufficient and secured for the timeframe of the accreditation.

The financing of the equipment is ensured mostly by external funds (third party money). In general the panel sees the equipment of the laboratories adequate or even very well but the quantity of computer workstations seems not to match with the number of students. Therefore, the peers recommend to increase them.

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

As the university do not comment the criterion, the peers confirm their preliminary assessment. They find the criterion fulfilled but recommend to improve the number of work places for the self-studies of the students.

5. Transparency and documentation

Criterion 5.1 Module descriptions

Evidence:

- Self-Assessment Report
- Module descriptions

Preliminary assessment and analysis of the peers:
The students, as all other stakeholders, have access to the module descriptions via universities homepage.

After studying the module descriptions, the peers confirm that they include all necessary information about the persons responsible for each module, the teaching methods and work load, the awarded credit points, the intended learning outcomes, the content, the applicability, the admission and examination requirements, and the forms of assessment and details explaining how the final grade is calculated. They remark that not for all modules the content of the courses and the teaching methods are transparently described and recommend to revise those descriptions.

Criterion 5.2 Diploma and Diploma Supplement

Evidence:

- Self-Assessment Reports
- Sample Diploma for each degree programme
- Sample Diploma Supplement for each degree programme

Preliminary assessment and analysis of the peers:
The peers confirm that the students of all degree programmes under review are awarded a Diploma and a Diploma Supplement after graduation. The diploma supplement contains detailed information about the educational objectives, intended learning outcomes as well as about the educational system of Indonesia and statistical data according to the ECTS-Users‘ guide in addition to the final grade.

Criterion 5.3 Relevant rules

Evidence:

- Self-Assessment Reports
- All relevant regulations as published on the university’s webpage

Preliminary assessment and analysis of the peers:
The auditors confirm that the rights and duties of both ITB and the students are clearly defined and binding. All rules and regulations are published on the university's website and hence available to all stakeholders. In addition, the students receive all relevant course material in the language of the degree programme at the beginning of each semester.

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

As the university do not comment the criterion, the peers confirm their preliminary assessment. They find the criterion fulfilled but recommend to make the content and the teaching methods more transparent in some of the module descriptions.

6. Quality management: quality assessment and development

Criterion 6 Quality management: quality assessment and development

Evidence:

- Self Assessment Report
- Regulations for Academic and Student Affairs Institut Teknologi Bandung, 2014.
- Discussions with representatives of ITB management, programme coordinators, lecturers, business representatives, students

Preliminary assessment and analysis of the peers:
Internal evaluation of the quality of the degree programmes is mainly provided through student and alumni surveys and was implemented in 2008. Students give their feedback on the courses through online questionnaires at the end of each semester. Giving feedback on the classes is compulsory for the students; otherwise, they cannot access their account on the ITB digital platform. Additionally, students' feedback is collected by distributing a mid-semester questionnaire. The students' feedback from mid-semester questionnaires is normally addressed directly by the lecturer by discussing it with the students. This feedback gives the chance to lecturers to improve their teaching practice.

Furthermore, ITB regularly conducts an alumni study. By taking part at this survey, alumni can reflect on their educational experiences at ITB and their professional career. This tracer study is organised by ITB's alumni organization and the results are annually published

Finally, each year there is an undergraduate exit survey regarding their study experiences in ITB. The exit survey focuses on three main areas: quality of academic atmosphere, contribution of ITB education on learning and development on certain skills, and students' satisfaction with services and facilities.

The curriculum evaluations are held during the final exam week. A compilation of the students' feedback is sent to the respective lecturers. As the students point out during the discussion with the peers, there is also the possibility to give a direct and informal feedback to the teacher.

During the audit, the peers learn that if there is negative feedback, the Dean or the head of the research group talks to the respective teacher, analyses the problem, and offers guidance. The auditors gain the impression that students' feedback is taken seriously by the faculties and changes are made if there is negative feedback. Additionally the peers notice that the results of the questionnaires are discussed with the students directly.

As the peers consider the further development of the degree programmes to be very important, they appreciate the existing culture of quality assurance. In summary, the peer group confirms that the quality management system is suitable to identify weaknesses and to improve the degree programmes. All stakeholders are involved in the process.

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

As the university do not comment the criterion, the peers confirm their preliminary assessment. They find the criterion completely fulfilled.

D Additional Documents

Before preparing their final assessment, the panel ask that the following missing or unclear information be provided together with the comment of the Higher Education Institution on the previous chapters of this report:

- Course descriptions for all religion courses

E Comment of the Higher Education Institution

The institution submits the missing module descriptions.

F Summary: Peer recommendations

Taking into account the additional information and the comments given by university the peers summarize their analysis and **final assessment** for the award of the seals as follows:

Degree Programme	ASIIN-seal	Subject-specific label	Maximum duration of accreditaiton
Ba Geophysical Engineering	Without requirements	EUR-ACE	30.09.2027
Ma Geophysical Engineering	Without requirements	EUR-ACE	30.09.2027

Recommendations

For both programmes

E 1. (ASIIN 1.3) It is recommended to include aspects of drilling technics more intensively in the programme.

E 2. (ASIIN 1.3) It is recommended to offer more opportunities for the students to improve their economic knowledge, their communication skills and their teamwork abilities.

E 3. (ASIIN 2.1) It is recommended to improve the support of the student's academic mobility.

E 4. (ASIIN 4.3) It is recommended to improve the number of work places for the self-studies of the students.

E 5. (ASIIN 5.1) It is recommended to make the content and the teaching methods more transparent in some of the module descriptions.

G Comment of the Technical Committees 11- Geosciences

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

The Technical Committee 11 – Geosciences recommends the award of the seals as follows:

Degree Programme	ASIIN-seal	Subject-specific label	Maximum duration of accreditaiton
Ba Geophysical Engineering	Without requirements	EUR-ACE	30.09.2027
Ma Geophysical Engineering	Without requirements	EUR-ACE	30.09.2027

Recommendations

For both programmes

E 1. (ASIIN 1.3) It is recommended to include aspects of drilling technics more intensively in the programme.

E 2. (ASIIN 1.3) It is recommended to offer more opportunities for the students to improve their economic knowledge, their communication skills and their teamwork abilities.

E 3. (ASIIN 2.1) It is recommended to improve the support of the student's academic mobility.

E 4. (ASIIN 4.3) It is recommended to improve the number of work places for the self-studies of the students.

E 5. (ASIIN 5.1) It is recommended to make the content and the teaching methods more transparent in some of the module descriptions.

H Decision of the Accreditation Commission

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

The Accreditation Commission decides to award the following seals:

Degree Programme	ASIIN-seal	Subject-specific label	Maximum duration of accreditaiton
Ba Geophysical Engineering	Without requirements	EUR-ACE	30.09.2027
Ma Geophysical Engineering	Without requirements	EUR-ACE	30.09.2027

Recommendations

For both programmes

E 1. (ASIIN 1.3) It is recommended to include aspects of drilling technics more intensively in the programme.

E 6. (ASIIN 1.3) It is recommended to offer more opportunities for the students to improve their economic knowledge, their communication skills and their teamwork abilities.

E 7. (ASIIN 2.1) It is recommended to improve the support of the student's academic mobility.

E 8. (ASIIN 4.3) It is recommended to improve the number of work places for the self-studies of the students.

E 9. (ASIIN 5.1) It is recommended to make the content and the teaching methods more transparent in some of the module descriptions.

Appendix: Programme Learning Outcomes and Curricula

According to [….] the following **objectives** and **learning outcomes (intended qualifications profile)** shall be achieved by the Bachelor degree programme […]:

Learning outcomes for the Undergraduate Programme in Geophysical Engineering (UPGE) are defined and described in the study guide which is accessible on the FPME-ITB web site to all students, staff members, and all the other stakeholders. Professors, lecturers, researchers, alumni, geophysicist and engineer communities, stakeholders and collaborators, as well as students have participated in the definition process of the learning outcomes. The process of acquiring input from them usually occurs during the evaluation and renewal/update of curriculum. In ITB, this activity takes place every five years. Within a year of the implementation of new curriculum, evaluation is usually conducted regularly by Unit of Internal Inspection/ *Satuan Pengawas Internal (SPI-ITB)* and Unit of Quality Assurance/*Satuan Penjaminan Mutu (SPM-ITB)* in ITB. The evaluation of curriculum is a long program that runs no less than 3 years before a renewal/update of curriculum is proposed and decided. Labor market demands are acquired through interactions with related institutions, companies, graduates' suggestions (questionnaire), and related science communities.

On those bases, UPGE sets the Programme Learning Outcomes (PLO) for the graduates as follows:

1. They understand basic knowledge such as mathematics, physics and chemistry which form the basis for geophysical observation and measurement.
2. They understand basic geological knowledge such as physical geology, earth structure and composition, earth tectonics, and earth evolution process.
3. They are able to identify the physical processes governing the behavior of common geophysical systems in the natural system.
4. They are able to quantitatively describe the behavior of natural systems and the principles of geophysical data acquisition, processing, and interpretation with physics-based mathematical models.
5. They are able to explain and apply the principles of geophysical methods for natural resource explorations, natural hazards, engineering and environmental matters.

6. They are able to investigate mathematical models by solving the governing equations with a combination of analytical and computational methods in order to achieve better sub-surface interpretation.
7. They are able to effectively communicate their scientific knowledge through written and oral presentations, able to interpret and evaluate the pub published literature and oral and poster presentations at scientific seminars.
8. They are able to demonstrate a good teamwork, leadership, positive attitude, responsibility, work ethics, entrepreneurship skill, and other personal qualities & interpersonal capabilities.

Those outcomes and the objectives of the Undergraduate Programme in Geophysical Engineering are accessible to stakeholders through http://www.gf.itb.ac.id. Fehler! Verweisquelle konnte nicht gefunden werden. below shows the correlation between the programme learning outcomes (PLO) and the objectives of the programme.

The following **curriculum** is presented:

Table 0.1 Regulation of completing the Undergraduate Programme in Geophysical Engineering.

Programme	Stage	Total CU Pass				Minimum GPA	Length of Study	Maximum allowed duration of Study
		Compulsory	Elective	Free	Total			
Undergraduate	TPB	36	0	0	36	2.00[1]	1 year	2 years
	Sarjana	83	15	10	108	2.00[2]	3 years	6 years*

[1] Minimum grade: D; [2] Minimum grade: C. *as from entering ITB

Table 0.2 Curriculum structure of Undergraduate Programme in Geophysical Engineering

Semester I					Semester II				
No	Code	Course Name	CU/ECTS	Hours*	No	Code	Course Name	CU/ECTS	Ho
1	MA1101	Mathematics IA	4/5.56	192	1	MA1201	Mathematics IIA	4/5.56	1
2	FI1101	Basic Physics IA	4/5.56	192	2	FI1201	Basic Physics IIA	4/5.56	1
3	KI1101	Basic Chemistry IA	3/4.17	144	3	KI1201	Basic Chemistry IIA	3/4.17	1
4	KU1164	Introduction to Mineral and Energy Resources	2/2.78	96	4	KU1011	Indonesian Language: Scientific Writing	2/2.78	
5	KU1102	Introduction to Computation	3/4.17	144	5	KU1001	Sports	2/2.78	
6	KU1024	English	2/2.78	96	6	KU1202	Introduction to Engineering and Design	3/4.17	1
Total			18/25.02	864	Total			18/25.02	8
Semester III					Semester IV				

No	Code	Course Name	CU/ECTS	Hours*	No	Code	Course Name	CU/ECTS	Ho
1	GL2111	Physical Geology	3/4.17	144	1	GD2001	Introduction to Surveying	2/2.78	
2	KU2071	Pancasila and Civic Education	2/2.78	96	2	GL2043	Introduction to Mineralogy and Petrology	3/4.17	1
3	TG2101	Geomathematics I	3/4.17	144	3	KU206X	Religion and Ethics	2/2.78	
4	TG2102	Wave in Geophysics	3/4.17	144	4	TG2203	Geomathematics II	3/4.17	1
5	TG2103	Basic Geophysical	2/2.78	96	5	TG2204	Potential Theory	2/2.78	
6	TG2104	Geophysical Instrumentation	3/4.17	144	6	TG2201	Geostatistics I	2/2.78	1
7	TG2105	Computing in Geophysics	3/4.17	144	7	TG2231	Seismology	3/4.17	1
Total			**19/26.39**	912	**Total**			**17/23.61**	8
Semester V					**Semester VI**				
No	**Code**	**Course Name**	**CU/ECTS**	**Hours***	**No**	**Code**	**Course Name**	**CU/ECTS**	**Ho**
1	GL2012	Structural Geology	3/4.17	144	1	TG3201	Geophysical Thermodynamics & Fluid Dynamics	3/4.17	1
2	GL3053	Sedimentology and Stratigraphy	2/2.78	96	2	TG3261	Seismic Data Acquisition & Processing	3/4.17	1
3	TG3110	Geophysical Signal Analysis	3/4.17	144	3	TG3241	Geo-electromagnetisms	3/4.17	1
4	TG3102	Geostatistics II	2/2.78	96	4	TG3263	Gravity & Geomagnetics	3/4.17	1
5	TG3109	Refraction Seismic	3/4.17	144	5	TG3222	Geodynamics	2/2.78	
6	TG3132	Earth Crust Mechanics	2/2.78	96	6	TG3290	Fieldwork	3/4.17	1
Total			**15/20.83**	720	**Total**			**17/23.61**	8
Semester VII					**Semester VIII**				
No	**Code**	**Course Name**	**CU/ECTS**	**Hours***	**No**	**Code**	**Course Name**	**CU/ECTS**	**Ho**
1	TG4001	Communication in Geophysics	2/2.78	96	1	TG4091	Final Project II	3/4.17	1
2	TG4092	Final Project I	2/2.78	96	2	XXMANJ	Management Compulsory Course	2/2.78	
3	TG4162	Seismic Interpretation	3/4.17	144	3	TG4243	Volcanology and Geothermal Exploration	3/4.17	1
4	TG4141	Geophysical Inversion	3/4.17	144					
Total			**10/13.89**	480	**Total**			**8/11.11**	3

**Total workload per semester, **Compulsory Courses: 75 CU*

Table 0.3 ITB compulsory courses.

No	Code	Course Name	CU/ECTS	Hours*
1	KU206X	Religion & Ethics	2/2.78	96
2	KU2071	Civic Education	2/2.78	96
3		Management Courses**	2/2.78	96
4		Environmental Courses***	2/2.78	96
Total			8/11.11	384

**Total workload per semester, **ITB Compulsory Courses: 8 CU*

***They are alternative courses on management courses set up by ITB. Students may take any one of them; ***For the environment course, students are obligated to take the environment course (TG-4142) that is provided by the Undergraduate Programme in Geophysical Engineering.*

Table 0.4 Elective Course in the Undergraduate Programme in Geophysical Engineering.

No	Code	Course Name	CU/ECTS	Hours*	IE/RE	No	Code	Course Name	CU/ECTS	Hours*
1	TG3001	Advanced Geophysical Instrumentation	3/4.17	144	IE	10	TG4223	Numerical Simulation of The Earthquake	3/4.17	144
2	TG4029	Capita of Selecta in Geophysics	2/2.78	96	IE	11	TG4225	Applied Seismology	2/2.78	96
3	TG4047	Design in Geophysical Engineering	2/2.78	96	IE	12	TG4226	Physics of the Earth's Interior	2/2.78	96
4	TG4063	Special Topic in Geophysics	2/2.78	96	IE	13	TG4234	Earthquake & Fault Mechanics	2/2.78	96
5	TG4067	Job Training	2/2.78	96	IE	14	TG4264	Seismic Inversion for Reservoir	3/4.17	144
6	TG4128	Geotomography	3/4.17	144	IE	15	TG4265	Seismic Attributes for Reservoir Characterization	2/2.78	96
7	TG4142	Engineering & Environmental Geophysics	3/4.17	144	IE	16	TG4269	Economical Geophysics and Management	2/2.78	96
8	TG4166	Rock Physics	2/2.78	96	IE	17	TG4168	Introduction to Seismic Stratigraphy	2/2.78	96
9	TG4168	Seismic Stratigraphy	2/2.78	96	IE					

**Total workload per semester , **IE -Internal Elective Courses, RE -Recommended External Elective Courses*

According to [….] the following **objectives** and **learning outcomes (intended qualifications profile)** shall be achieved by the Master degree programme […]:

Learning outcomes for the Master Programme in Geophysical Engineering (MPGE) are defined and described in the study guide which is accessible on the FPME-ITB web site to all students, staff members, and all the other stakeholders. Professors, lecturers, researchers, alumni, geophysicist and engineer communities, stakeholders and collaborators, as well as students have participated in the definition process of the learning outcomes. The process of acquiring input from them usually occurs during the evaluation and renewal/update of curriculum. In ITB, this activity takes place every five years. Within a year of the implementation of new curriculum, evaluation is usually conducted regularly by Unit of Internal Inspection/*Satuan Pengawas Internal (SPI-ITB)* and Unit of Quality Assurance/*Satuan Penjaminan Mutu (SPM-ITB)* in ITB. The evaluation of curriculum is a long program that runs no less than 3 years before arenewal/update of curriculum is proposed and decided. Labor

market demands are acquired through interactions with related institutions, companies, graduates' suggestions (questionnaire), and related science communities.

On those bases, MPGE sets the Programme Learning Outcomes (PLO) for the graduates as follows:

6. They have capabilities in the application and development of comprehensive geophysical science and technology which includes data acquisition and processing as well as modeling and interpretation within the framework of earth resource exploration, geotechnical, environmental or earth disaster mitigation.
7. They have creativity, are able to carry out analysis and synthesis and draw in-depth conclusions from an application of geophysical science and technology.
8. They have the ability to work independently or in a team and can effectively communicate the results of geophysical data interpretation into geological and engineering languages.
9. They have the ability to participate in further education programs (doctoral programs) both at home and abroad.
10. They have a pioneering spirit and leadership in improvement efforts in their community.

Those outcomes and the objectives of the Master Programme in Geophysical Engineering are accessible to stakeholders through http://www.gf.itb.ac.id. Fehler! Verweisquelle konnte nicht gefunden werden. below shows the correlation between the programme learning outcomes (PLO) and the objectives of the programme.

The following **curriculum** is presented:

Table 0.5 Curriculum Structure of Earthquake and Volcano Geophysics.

Semester I					Semester II				
No	**Code**	**Courses**	**CU/ECTS**	**Hours***	**No**	**Code**	**Courses**	**CU/ECTS**	**Hours**
1	TG5111	Advanced Mathematics in Geophysics	2/5.26	160	1	TG5024	Research Methodology	3/7.89	240
2	TG5112	Advance Wave and Field in Geophysics	3/7.89	240	2	TG6232	Fieldwork	2/5.26	160

3	TG5114	Advance Signal Geophysical Analysis	2/5.26	160	3	TG6031	Geodynamics and Seismotectonics	3/7.89	240
4	TG5031	Earthquake Seismology	3/7.89	240	4	TG6032	Geohazard and Volcano Physics	3/7.89	240
5		Elective Courses	2/5.26	160	5		Elective Courses	4/10.53	320
Total			**12/31.58**	**960**	**Total**			**15/39.47**	1200
Semester III					Semester IV				
No	**Code**	**Courses**	**CU/ECTS**	**Hours***	**No**	**Code**	**Courses**	**CU/ECTS**	**Hours***
1	TG6091	Thesis I	4/10.53	320	1	TG6092	Thesis II	4/10.53	320
2	TG5032	Computational Seismology	3/7.89	240					
Total			**7/18.42**	560	**Total**			**4/10.53**	320

Table 0.6 Curriculum Structure of Petroleum Geophysics.

Semester I					Semester II				
No	**Code**	**Courses**	**CU/ECTS**	**Hours***	**No**	**Code**	**Courses**	**CU/ECTS**	**Hours**
1	TG5111	Advanced Mathematics in Geophysics	2/5.26	160	1	TG5024	Research Methodology	3/7.89	240
2	TG5112	Advance Wave and Field in Geophysics	3/7.89	240	2	TG6232	Fieldwork	2/5.26	160
3	TG5114	Advance Signal Geophysical Analysis	2/5.26	160	3	TG5225	Advanced Rock Physics	2/5.26	160
4	GL5032	Petroleum System	2/5.26	160	4	TG5024	Advanced Seismic Interpretation	3/7.89	240
5	TG5122	Advanced Acquisition and Processing of Seismic Data	2/5.26	160	5		Elective Courses	4/10.53	320
Total			**11/28.95**	880	**Total**			**14/36.84**	1120
Semester III					Semester IV				
No	**Code**	**Courses**	**CU/ECTS**	**Hours***	**No**	**Code**	**Courses**	**CU/ECTS**	**Hours**
1	TG6091	Thesis I	4/10.53	320	1	TG6092	Thesis II	4/10.53	320
2	TG6041	Reservoir Geophysics	3/7.89	240					
3		Elective Courses	2/5.26	160					
Total			**9/23.68**	720	**Total**			**4/10.53**	320

**Total workload per semester*

Table 0.7 Curriculum Structure of Applied Geophysics Options.

Semester I					Semester II				
No	**Code**	**Courses**	**CU/ECTS**	**Hours***	**No**	**Code**	**Courses**	**CU/ECTS**	**Hours***
1	TG5111	Advanced Mathematics in Geophysics	2/5.26	160	1	TG5024	Research Methodology	3/7.89	240
2	TG5112	Advance Wave and Field in Geophysics	3/7.89	240	2	TG6232	Fieldwork	2/5.26	160
3	TG5114	Advance Signal Geophysical Analysis	2/5.26	160	3	TG5042	Minning Exploration	2/5.26	240
4	TG5161	Advanced Gravity and Magnetic Method	3/7.89	240	4	TG5043	Geothermal Exploration	2/5.26	160
5	TG5122	Advanced Geoelectrical Method	3/7.89	240	5	TG6044	Advanced Engineering and Environmental Geophysics	2/5.26	160
Total			**13/34.21**	1040	**Total**			**15/39.47**	**960**
Semester III					Semester IV				
No	**Code**	**Courses**	**CU/ECTS**	**Hours***	**No**	**Code**	**Courses**	**CU/ECTS**	**Hours***
1	TG6091	Thesis I	4/10.53	320	1	TG6092	Thesis II	4/10.53	320
2		Elective Courses	2/5.26	160					
Total			**6/15.79**	480	**Total**			**4/10.53**	320

**Total workload per semester*