ASIIN Seal

Accreditation Report

Bachelor's Degree Programs
Computer Engineering
Biomedical Engineering
Electrical Engineering

Master's Degree Program
Electrical Engineering

Provided by
Institut Teknologi Sepuluh Nopember

Version: 07 December 2021

Table of Content

A About the Accreditation Process

Name of the degree program (in original language)	(Official) English translation of the name	Labels applied for [1]	Previous accreditation (issuing agency, validity)	Involved Technical Committees (TC)[2]
Sarjana Teknik Komputer	Bachelor in Computer Engineering	ASIIN	/	04
Sarjana Teknik Biomedik	Bachelor in Biomedical Engineering	ASIIN	/	02
Sarjana Teknik Elektro	Bachelor in Electrical Engineering	ASIIN	/	02
Magister Teknik Elektro	Master in Electrical Engineering	ASIIN	/	02
Date of the contract: 01.07.2021 **Submission of the final version of the self-assessment report:** 31.08.2021 **Date of the onsite visit:** 29.09.-01.10.2021 **Online**				
Peer panel: Prof. Dr. Elmar Griese, University of Siegen Prof. Dr. Heribert Vollmer, University of Hannover Prof. Dr. Burkart Voß, University of Applied Sciences “Ernst Abbe” Jena Maximilian Dauer, Siemens AG				
Representative of the ASIIN headquarter: Sophie Schulz				
Responsible decision-making committee: Accreditation Commission				
Criteria used:				

[1] ASIIN Seal for degree programs

[2] TC: Technical Committee for the following subject areas: TC 02 - Electrical Engineering/Information Technology; TC 04 - Informatics/Computer Science

European Standards and Guidelines as of May 15, 2015 ASIIN General Criteria, as of December 10, 2015 Subject-Specific Criteria of Technical Committee 02 – Electrical Engineering/Information Technology as of December 9, 2011 Subject-Specific Criteria of Technical Committee 04 – Informatics/Computer Science as of March 29, 2018	

B Characteristics of the Degree Programs

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
Computer Engineering	Sarjana Teknik/ Bachelor of Engineering (B. Eng)	• Multimedia • Robotics • IoT	6	Full time	/	8 semesters	150 SKS equivalent to 240 ECTS	Annually June-August
Biomedical Engineering	Sarjana Teknik/ Bachelor of Engineering (B. Eng).	• Intelligent Biomedical Instrumentation • Assistive Technology and Rehabilitation Engineering • Medical Imaging and Image Processing • Medical Informatics	6	Full time	/	8 semesters	150 SKS equivalent to 240 ECTS	Annually June-August
Electrical Engineering	Sarjana Teknik/ Bachelor of Engineering (B. Eng)	• Power System Engineering • Electronics Engineering • Control System Engineering • Multimedia Telecommunication	6	Full time	/	8 semesters	150 SKS equivalent to 240 ECTS	Annually June-August
Electrical Engineering	Magister Teknik/ Master of Engineering	• Power System Engineering, • Electronics Engineering, • Multimedia Telecommunications, • Control System Engineering, • Multimedia Intelligent Network, • Telematics	7	Full time	/	4 semesters	75 SKS (equivalent to 120 ECTS)	Twice a year

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

C Peer Report for the ASIIN Seal[4]

1. The Degree Program: Concept, content & implementation

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

Evidence:

- Self-assessment report
- Study plan per program
- Module descriptions per program
- Objectives-module-matrix per program
- Websites
- Discussions during the online audit

Preliminary assessment and analysis of the peers:
The Institut Teknologi Sepuluh Nopember (ITS) has described and published program educational objectives (PEOs) and program learning outcomes (PLOs) for each of the four degree programs under review. While the PEOs are developed based on the vision and mission of the university as well as the respective faculty and are rather general and concise, the PLOs describe in greater detail the competences the students should acquire during their studies. By means of being published on the websites of the degree programs, the PEOs and PLOs are easily accessible for students as well as other stakeholders. Furthermore, there are regular revision processes in place that take into account feedback by external and internal stakeholders. A minor curriculum adjustment is done every year whereas a major revision including consultations of stakeholders takes place every four or five years.

The peers note that the relationship between PEOs and PLOs has been established in a comprehensible and logical manner. The development of PLOs of the study programs involves both internal and external stakeholders so that the curricula can be adapted and

modified according to the needs of the industry and the graduates on a regular basis. For example, ITS conducts surveys four times a year, through which the different stakeholders get the chance to assess the programs and their main objectives and adapt them if necessary. Internal stakeholders include all of ITS members (students, teaching staff, and non-academic employees), while the external stakeholders include the industry, alumni, the government, and society.

At the end of their studies, graduates of the bachelor's program Computer Engineering have acquired basic knowledge in natural sciences and engineering and advanced knowledge in computer engineering. They should be able to analyze the problems related to applications of computer engineering and to recommend solutions based on knowledge and understanding in this field. They know how to design and develop hardware and software and have gained extensive problem solving skills. Moreover, they have gained a solid understanding of project management methods and business practice.

Graduates of the bachelor's program Electrical Engineering have gained basic knowledge in natural sciences and mathematics and shall be able to apply this knowledge to solve electrical engineering problems. They know how to design and carry out laboratory and field experiments, how to analyze and interpret data, and how to design logical and realistic components, systems and processes. They must also be able to apply methods, ICT, and modern devices in solving problems in the field of electrical engineering.

The aim of the bachelor's program Biomedical Engineering is to produce graduates who have basic knowledge in natural sciences and mathematics and are able to apply this knowledge to solve biomedical engineering problems. Graduates of this program know how to find, understand, explain, formulate, and solve special problems in biomedical engineering, which includes in particular intelligent biomedical instrumentation, medical rehabilitation techniques, imaging and processing of medical images, and medical informatics.

Graduates of the master's program Electrical Engineering should be capable of mastering concepts, scientific principles, engineering principles, and factual knowledge about Information Technology to develop procedures and strategies needed in system analysis and design. They are able to formulate and solve problems and to produce system designs with new ideas in the field of electrical engineering. They know how to compile scientific conceptions and research maps and to study results accordingly and have the capacity to develop various products.

Next to the professional skills, the students of all four programs are supposed to acquire personal and social skills such as critical and creative thinking, communication skills, adaptability, the capacity to work in (international) teams, and leadership skills. In addition, they

should be able to solve engineering problems through research and the application of different concepts and methods.

In the peers' opinion, the objectives and learning outcomes of all degree programs are clear, plausible and cover all aspects that can be expected from a program in the respective field. They learn that the graduates of ITS in general, and those of the engineering programs in particular, are much sought after in the labor market. Moreover, many graduates of the master's degree program are employed as researchers/lecturers at various Indonesian universities. The representatives of industry emphasize the high quality of the graduates of all four programs under review and students as well as graduates are highly satisfied with and well aware of their very good job perspectives.

In summary, the peers confirm that the three bachelor's programs adequately reflect level 6 of the European Qualification Framework (EQF) while the master's program is adequate to EQF level 7. The program objectives and learning outcomes of all four programs are consistent with the respective ASIIN Subject-Specific Criteria of the Technical Committees of Electrical Engineering/Information Technology and Informatics/Computer Science. They aim at the acquisition of specific competences and are well-anchored, binding and easily accessible to all stakeholders.

Criterion 1.2 Name of the degree program

Evidence:

- Self-assessment report

Preliminary assessment and analysis of the peers:
The titles of the degree programs follow the rules for naming study programs set by the Indonesian Ministry of Education. The expert panel considers the names of the study programs to be adequately reflecting the respective aims, learning outcomes, and curricula.

Criterion 1.3 Curriculum

Evidence:

- Study plan per program
- Module descriptions per program
- Objective-module-matrix per program
- Discussions during the online audit

Preliminary assessment and analysis of the peers:
The curricula of the four programs are designed to comply with the program objectives and learning outcomes and are subject to constant revision processes (cf. chapter 1.1). Regular

changes are made to ensure that the curricula are up to current requirements and adequately reflect the fast technological and scientific progress in the respective areas. In the self-assessment report and the curriculum for each program, ITS describes in detail how the PLOs of each program are to be achieved in the individual modules and thus explains the significance of each module for the program as a whole. The curricula are reviewed by the panel in order to identify whether the described learning objectives can be achieved by the available modules. Course descriptions as well as matrices matching the general learning objectives and the module contents were provided for a detailed analysis.

The bachelor's degree programs consist of eight semesters, each with a duration of 16 weeks. The first six semesters contain the fundamentals and program-specific courses, all of which are compulsory. Apart from these scientific courses, they also comprise courses in language (English and Bahasa Indonesia), and the Indonesian constitutional principles of Pancasila that are mandatory for all undergraduate programs in Indonesia. During the last two semesters, the students also have to take elective courses.

The Master's degree program comprises four semesters and focuses more strongly on scientific courses. It contains a significantly larger degree of elective courses than the bachelor's programs to give the students more room for specialization. It also includes some compulsory courses to teach the students additional skills in the core subject area.

All in all, the peers have a very good impression of the curricula of all four programs. By thoroughly analyzing the module descriptions and following the discussions during the online visit, the peers state that the four programs are coherent, well structured and cover the essential topics in the respective field, enabling also an individual profile building through various elective courses. With regards to the Computer Engineering program, the peers are surprised to see some rather unusual basic courses in the field of natural sciences that all students have to take in the beginning of their studies, such as physics or, in particular, chemistry. While teaching physics as a compulsory subject in a computer engineering program is considered outdated from the German perspective, the peers are well aware that this is still common in many other countries and understand that, in particular for the engineering component of the program, physics might still serve as a valuable foundational subject. However, regarding the compulsory chemistry course, the peers do not recognize any relevance for computer engineering. Although they understand that including these courses in any engineering program is a requirement from the government, they nevertheless encourage the university to evaluate in how far these basic modules in the first two semesters (especially chemistry) are relevant for the program. Concerning the Biomedical Engineering program, the peers learn that one objective of the program is to train graduates who will become clinical engineers afterwards. While they find out that many students actually specialize in this field, it is noticeable that the number of modules that focus on

clinical engineering topics is rather limited. Thus, they recommend including more modules in this field or covering the relevant topics in already existing modules. In particular, the topic of radiation protection should be included in the curriculum.

Criterion 1.4 Admission requirements

Evidence:

- Self-assessment report
- ITS and program websites
- Discussions during the online audit

Preliminary assessment and analysis of the peers:
There are three different paths of admission into the bachelor's degree programs:

1. National Selection of Higher Education or University (Seleksi Nasional Masuk Perguruan Tinggi Negeri, SNMPTN), a national admission system, which is based on the academic performance during high school.

2. Joint Selection of Higher Education or University (Seleksi Bersama Masuk Perguruan Tinggi Negeri, SBMPTN). This national selection is based on the results of a test (UTBK), which is held every year for university candidates. It is a nationwide written test (subjects: mathematics, Bahasa Indonesia, English, physics, chemistry, biology, economics, history, sociology, and geography).

3. Independent Selection (Seleksi Kemitraan Mandiri, SKM): Students are selected based on criteria determined by ITS itself. It mainly follows the results of UTBK, but also considers other criteria such as achievements and motivation of the students.

For each academic year, the university determines the ratio of students admitted through these three ways.

For the master's degree program, applicants need to have obtained a bachelor's degree with a minimum GPA of 3.0 from a program accredited A or B by the national Indonesian accreditation agency, pass the entrance exam, submit two letters of recommendation as well as a TOEFL certificate with a minimum score of 450 or comparable certificates (e.g. IELTS).

According to the general admission criteria, to be admitted into any of the four programs under review, an applicant needs to have full color-vision. While the admission criteria generally appear clear and understandable to the peers, they wonder about this need for color-vision and get the impression that there is no clear explanation for this requirement. As

there is no convincing reason for this rule, the peers consider it needlessly restrictive and ask ITS to drop it.

The admission website informs potential students in great detail about the requirements and the necessary steps to apply for admission into the programs. Since the rules are based on decrees by the ministry of education and on the university's written regulations, the peers deem them binding and transparent.

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

Admission

In its statement, ITS clarifies that full color vision is an admission criterion only for the bachelor's program Biomedical Engineering and explains that professional engineers have certain requirements, one of which is color blindness in certain fields, especially as industrial engineers and clinical engineers who must identify color directly in their working place. One of the reasons behind this criterion is to make (potential) students aware of the fact that there are specific professional fields that require full color-vison. At ITS, color blind screening is done after students pass the admission test. If the result of the student screening shows color blindness, the student is given an explanation why this requirement must be fulfilled, i.e. regarding employment opportunities after graduation. After that, the final decision rests within the student whether he or she will continue the admission process or opt for another study program that does not require full color vision.

The peers thank ITS for the additional explanation. However, they do not understand the illustrated reasons for this regulation and therefore ask ITS to ensure that colorblind applicants are not excluded from admission.

Curriculum Biomedical Engineering

The ITS representatives explain in their statement that they are planning to introduce radiation safety topics in the next semester. The peers welcome these plans and suggest maintaining their initial recommendation until its practical implementation.

The peers consider this criterion to be mostly fulfilled.

2. The degree program: structures, methods and implementation

Criterion 2.1 Structure and modules

Evidence:

- Self-assessment report
- Study plan per program
- Module descriptions per program
- Objective-module-matrix per program
- Discussions during the online audit

Preliminary assessment and analysis of the peers:

The bachelor's programs are designed for four years and the students need to achieve 150 Indonesian Credit Points (SKS, which is roughly equivalent to 240 ECTS; cf. chapter 2.2 for more details). Roughly 90% of these credit points are awarded for compulsory, around 10 % for elective courses. The master's program encompasses 75 SKS (around 120 ECTS) within two years. Each semester is equivalent to 16 weeks, including 14 weeks of learning activities and two weeks of examination (midterm and final exams).

After analyzing the module descriptions and the study plans, the peers confirm that all degree programs under review are divided into modules and that each module is a sum of coherent teaching and learning units. All programs allow the students to define individual focuses through broad ranges of electives (see chapter 1.3 for more details). The students confirm that the structure of the program allows them to reach the learning outcomes within the regular duration. This is corroborated by data provided by ITS, which demonstrates that the average study time is very close to the allocated eight and four semesters for bachelor's and master's degree programs, respectively.

The peers notice that there are a number of quite small modules with only 2-3 credit points. They learn that this is due to some regulation by ITS and the government and that it is common in Indonesia to have overall smaller modules compared to the German (or European) standard. Overall, the peers regard the module structure to be adequate, also because all students confirm that they are used to having smaller modules and that this does not have negative implications on the overall workload (cf. chapter 2.2).

The peers also discuss the practical experience of the students, as all three bachelor's degree programs contain an internship (also called work experience). It is mandatory for all students to do a one-month internship, which may be extended up to six months. During the internship, the students are guided by two supervisors which are in close contact: one field supervisor in the company and one from the respective ITS department. The students highlight that the university is very supportive in finding placements for the internship and

that they are always encouraged to gain as much practical experience as possible. However, the peers notice that there is broad consensus that a one-month internship is too short and thus often worthless, which is why most students extend it anyway. They therefore recommend extending the mandatory part of the internship to a minimum of three months in order to increase the utility of the internship for students as well as employers. Besides this internship anchored in the programs, there is a university-wide program to recognize internships done by the students as extra-curricular activities and to award 2 to 20 credit points for them. The peers appreciate this opportunity, although they wonder why the relationship between the duration of the internship and the awarded credit points is not proportional.

International Mobility

The self-assessment report as well as the discussions make it very clear that international recognition is one of ITS's primary goals for the next years. The peers point out that international mobility, with regard to lecturers as well as students, is a key factor in these efforts.

The peers learn that the university already provides various mobility opportunities for students. These include semesters abroad, short programs, internships, and international conferences. To foster these, there are cooperation agreements with 653 partner institutions worldwide, with a certain focus on Asia, but also including many institutions in Europe and North America. Partly due to the COVID-19 pandemic, the number of students participating in mobility programs in 2020 and 2021 was relatively low, but is expected to markedly increase again after the pandemic. An international office has been established in order to coordinate ITS's efforts and to support the students in the planning and administration of international mobility. Moreover, the university provides scholarships for international mobility programs.

Qualifications obtained at other universities in Indonesia or abroad are recognized in line with the courses at ITS. Before a stay abroad, the university concludes a learning agreement with the respective student to ensure that the courses taken are relevant to the study program and can thus be recognized. As the students confirm, there are no problems with credit transfer or the organization of student mobility. They emphasize that the international office as well as their academic advisors are eager to support them and to find adequate study programs and courses.

The peers appreciate the efforts undertaken by the university to foster student mobility and they are very satisfied with the structures and support mechanisms for international mobility.

Criterion 2.2 Workload and credits

Evidence:

- Self-assessment report
- Study plan per program
- Module descriptions per program
- Discussions during the online audit

Preliminary assessment and analysis of the peers:
Based on the National Standards for Higher Education of Indonesia (SNPT), all four programs under review use a credit point system called SKS. According to the legal requirements, an undergraduate program in Indonesia can have between 144 and 160 SKS and a graduate program has to include at least 36 SKS. The bachelor's programs under review both encompass 150 SKS, while the master's program has 75 SKS.

1 SKS of academic load is equivalent to 170 minutes per semester week. For lectures, tutorials and similar classes, this means 50 minutes of face-to-face activity, 60 minutes of structured tasks and 60 minutes of independent learning per semester week, whereas for laboratory work and internships, 1 SKS equals 170 minutes of the respective activity per semester week. Regarding the conversion from SKS to ECTS, ITS explains that 1 SKS equals 45.3 hours and thus 1.6 ECTS, based on 28.3 hours per ECTS. The peers acknowledge that a credit point system based on the students' workload is in place.

In all programs, the workload is spread relatively evenly over the semesters. Moreover, the effective number of SKS the students can take depends on their achievements in the previous semester. In the bachelor's programs, if their GPA is less than 2.5, they can take up to 18, between 2.5 and 3.0 up to 20, between 3.0 and 3.5 up to 22 and above 3.5 up to 24 SKS in one semester. In the master's program, they can take up to 12 SKS if their GPA is less than 3 and up to 15 SKS otherwise. This mechanism is supposed to ensure that the students can really handle the workload. It also means that students can finish their studies in less than 8 semesters, although this is relatively rare due to the high workload in general.

The peers confirm that the workload in hours is indicated in the module descriptions and the distinction between classroom work and self-studies is made transparent and is in line with the credits awarded. At the end of each semester, the students' workload for every course is monitored and evaluated.

During the discussions with the students, the peers learn that they deem the workload as well as the number of exams to be adequate and that they still find time to develop their individual interests and skills outside of the university by working or taking extracurricular

classes.

The peers believe the overall workload to be manageable, especially since nearly all students graduate on time.

Criterion 2.3 Teaching methodology

Evidence:

- Self-assessment report
- Module descriptions per program
- Discussions during the online audit

Preliminary assessment and analysis of the peers:
As ITS explains in the self-assessment report, various student-centered learning methods are utilized in the degree programs under review. Through the Indonesian regulations on credit points (see chapter 2.2), an adequate balance between face-to-face activities and independent learning is already ensured for all courses. Besides the regular lectures, methods such as group discussions, project- and problem-based learning, role-plays, simulations etc. are used. The students confirm that these methods are actually in use and that they are highly satisfied with the variety of teaching methods, which support them in achieving the learning outcomes. The classes are sufficiently small (no more than 25 students for electives and 50 for compulsory courses) to allow the effective use of interactive methods.

Teaching and learning is supported by a broad range of media, both traditional (books, papers) and online (videos, presentations etc.). The university's online learning management system supports teachers and students in communicating and disseminating learning material. In the course of the Covid-19 pandemic, the university has swiftly switched to online learning with videoconferences, recorded videos and other media.

The peers consider the teaching methodology employed in the degree programs to be diverse, interactive and to show a healthy mixture between traditional and modern/alternative methods. They are well adapted to the aims and conditions of the individual courses and suitable to support the students in achieving the intended learning outcomes.

Criterion 2.4 Support and assistance

Evidence:

- Self-assessment report
- Discussions during the online audit

Preliminary assessment and analysis of the peers:
In order to support students in completing their studies on time with good achievements, the university and the faculty provide academic and personal support and assistance through various means. The main contact person for every student is their academic advisor, who is assigned to them in their first semester. An academic advisor shall help them develop an adequate schedule for their studies, choose electives according to their skills and interests and support them in case of academic and non-academic problems. Each student meets his or her academic advisor on a regular basis (at least twice per semester), who is also responsible for monitoring the study progress. The academic advisor also has to approve the student's study plan for the semester. As the peers learn and highly appreciate, the study progress is not only monitored by the academic advisor on an individual basis, but the faculty is automatically alerted when students fall below a certain number of credit points per semester and are thus threatened with dropping out. In these cases, additional advice can be provided.

Furthermore, there is supporting staff in the international office (cf. chapter 2.1), the career center, the scholarship sector and the general academic administration. The career center regularly organizes job fairs, seminars with potential employers, trainings for writing applications etc. in order to support the students in their career planning.

During the discussions, it remains unclear to the peers how students with disabilities are supported. Therefore, they ask ITS for additional information on this point.

Apart from that, the peers conclude that there are enough resources available to provide individual assistance, advice, and support for all students. They notice the close and trustful relationship between the students and the teaching staff. The support systems help the students to achieve the intended learning outcomes to complete their studies successfully and without delay.

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

Internships

In its statement, ITS points out once more that students always have the chance to prolong their internships. This is based on a nation-wide program that has been launched in 2020 by the Minister of Education and Culture. The peers take of this, but highlight once again that all programs should extent the mandatory internship to a duration of at least three months.

Support for students with disabilities

ITS explains that most facilities are barrier-free and that the university provides counseling for students with disabilities in the Student Advisory Center.

The peers consider this criterion to be completely fulfilled.

3. Exams: System, concept and organization

Criterion 3 Exams: System, concept and organization

Evidence:

- Self-assessment report
- Module descriptions per program
- ITS academic regulations
- Sample written exams and final theses

Preliminary assessment and analysis of the peers:
For the examination of the students' achievement, each course determines course objectives to support the achievement of the program learning outcomes of the respective program. Accordingly, each course must assess whether all defined learning outcomes stated in the module description have been achieved. For this purpose, ITS utilizes various types of examination.

In each course, at least two assignments/quizzes, a mid-term and a final examination are employed. There are different assessment methods in the programs, such as written tests, quizzes, assignments, reports, presentations, and oral examinations. In most courses, mid-term and final exam consist of written tests and additional quizzes or assignments are used. However, the other assessment methods are also used to a certain degree.

The final course grade is calculated based on the score of these individual assessments, whereby the lecturer determines the ratio between them in accordance with the Academic Guidelines. At the first meeting of a course, the students are informed about what exactly is required to pass the module and about how the final grade is determined through the teaching and learning plan. ITS uses a grading system with the grades A, AB, B, BC, C, D and E, where a D (equivalent to a Grade Point of 1) is necessary to pass a module.

The mid-term exams are carried out in the 8th and the final exams in the 16th week of the semester, whereas the smaller quizzes and assignments take place in the other weeks. The students confirm that they are normally well distributed, so that there are no more than a few in any given week. However, the students desire more time for exam preparation in

the very week before the exam. Precisely, they would much prefer to not have any classes during that week. Although the university ensures that no classes are scheduled during exam week, the students report that sometimes teachers give assignments or project works right at the end of the semester, i.e. in the last week before the exam, which sometimes leads to a pea in the last week before the exams.

The students confirm that a variety of assessment methods is used, including traditional methods such as written or oral exams, but also presentations or project reports are utilized. Next to the mid-term and the final exams, students also have some quizzes and projects throughout the semester that all count towards the final module grade. Although this means that the total number of tests taken during a semester is comparatively high, the students do not complain at all about this workload and instead confirm that taking several exams for one course allows for a continuous learning process.

According to ITS regulations, students who cannot participate in the regular exams due to illness or other legitimate reasons have the right to be offered a follow-up exam in the same semester. There do not appear to be any specific rules regarding compensation measures for students with disabilities. The peers ask ITS to clarify whether this is actually the case and if not, they ask the university to draft such regulations so that the students' rights are clearly laid down and they can rely on them.

Shortly before the online visit, the peers were provided with a selection of exams and final projects to check. They confirm that these represent an adequate level of knowledge as required by the EQF level 6 for the three bachelor's programs and EQF level 7 for the master's program. The forms of exams are oriented toward the envisaged learning outcomes of the respective courses, and the workload is distributed in an acceptable way.

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

According to its statement, ITS is planning to set a deadline for submitting assignments at least one week before the start of final exam week in the near future. The peers welcome this idea and suggest maintaining their initial recommendation until its practical implementation.

The peers consider this criterion to be partially fulfilled.

4. Resources

Criterion 4.1 Staff

Evidence:

- Self-assessment report
- Staff handbook per program
- Discussions during the online audit

Preliminary assessment and analysis of the peers:

At ITS, the staff members have different academic positions. There are professors and lecturers. The academic position of each staff member is based on research activities, publications, academic education, supervision of students, and other supporting activities. For example, there are lecturers who hold a Master's degree and lecturers who hold a PhD degree. The latter may become professors once they have earned a certain amount of credits with regard to their academic work. In addition, the responsibilities and tasks of a staff member with respect to teaching, research, and supervision depend on the academic position.

In the four programs under review, there is a lecturer-student ratio of 1:17. This ratio is classified as ideal according to government regulations for degree programs in the field of technology. The four programs are implemented by 137 teaching staff members in total, out of which 20 are full professors, 85 hold a doctorate and 32 a master's degree. Those with a master's degree only teach in the three bachelor's programs. The academic staff is supported by a considerable number of administrative and technical employees at department, faculty, and university level.

The academic staff is actively involved in research projects funded by grants from the Indonesian government, the university itself or other research funds, which results in a reasonable number of publications per year. ITS positions itself as a university with a strong research focus, which the peers appreciate. They also learn that students can be involved in research project, for instance through undergraduate theses.

The peers highlight the very well qualified and engaged staff members and confirm that the composition and scientific orientation of the teaching staff are suitable for successfully implementing and sustaining the degree programs. The auditors are impressed by the excellent and open-minded atmosphere among the students and the staff members. Both confirm that in case of questions or problems, there is always an academic advisor available to solve the issues together with the student.

Criterion 4.2 Staff development

Evidence:

- Self-assessment report
- Discussions during the online audit

Preliminary assessment and analysis of the peers:
According to the self-assessment report and the discussions during the online audit, ITS encourages the continuing professional development of its staff. For this purpose, various opportunities are provided. There is a mandatory didactic training for new academic staff that encompasses curriculum design, teaching material, and innovative teaching and learning methods. Moreover, workshops are held to refresh and to deepen various didactic competences in each semester. The lecturers can also regularly participate in external didactical trainings offered and funded by the government.

The teaching staff is encouraged to study abroad or to participate in international research projects and conferences in order to enhance their knowledge, increase their English proficiency and to build international networks. For this purpose, the university informs about possible scholarships to support academic mobility. Particularly for junior lecturers with a master's degree, ITS offers systematic training to prepare them for acquiring a PhD abroad, for instance through English courses, information on foreign education systems, administrative support, and supporting (international) research collaborations.

The peers learn from the teaching staff that there are many different options to apply for funding for research projects, not only from ITS but also from the government and big companies the university collaborates with. The lecturers further highlight the fact that the university provides very good incentives for all teaching staff members. For example, an annual prize is awarded for the largest number of articles published in international journals and successfully raised project funds. This is why the teachers are highly motivated to perform well in their research activities, which the peers appreciate very much.

In summary, the peers appreciate the university's efforts in the further development of its employees and consider the support mechanisms for the continuing professional development of the teaching staff adequate and sufficient.

Criterion 4.3 Funds and equipment

Evidence:

- Self-assessment report
- Video material
- Discussions during the online audit

Preliminary assessment and analysis of the peers:
The university and the faculty are mainly funded by the Indonesian government and the community, through tuition fees and through grants for research projects in collaboration with industry. The figures presented by the university show that the faculty's income is stable and the funding of the degree programs is secured. The academic staff emphasize that from their point of view, all four programs under review receive sufficient funding for teaching and learning activities as well as research, which results in well-equipped facilities and very good access to current literature, databases and modern software. The students confirm this positive impression and state their satisfaction with the available resources.

In the self-assessment report, ITS gives an extensive overview of the available learning spaces and libraries (university library and department library). Moreover, they list detailed information of all laboratories available per study program. Due to the ongoing COVID-19 pandemic, it is not possible for the peer panel to travel to Indonesia and visit ITS in person. Therefore, the university has provided the peers with professional videos showing its campus with some central facilities, relevant research and teaching facilities and, in particular, all the different laboratories available for the four study programs. The peers are impressed by the range of learning tools and resources available to the students. They consider the university's facilities and available equipment in the labs to be of highest standards and are convinced that the laboratories adhere to the international safety standards. The relatively newly constructed premises are spacious and offer ample opportunities for the professional and individual development of students and teachers. The students confirm that they are provided with all relevant software and are given easy access to all necessary rooms and equipment. The lecturers present from the electrical engineering department note that some of the department's labs should be modernized or renewed soon. Although the peers do not see this need based on the videos provided, they fully support the lecturers in this endeavor.

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

The peers consider this criterion to be completely fulfilled.

5. Transparency and documentation

Criterion 5.1 Module descriptions

Evidence:

- Module descriptions per program

Preliminary assessment and analysis of the peers:
The module descriptions for all four programs are published on the university's website in both Bahasa Indonesia and English, so that students and stakeholders can access them at any time.

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 credit points awarded, the intended learning outcomes, the applicability, the admission and examination requirements, and the forms of assessment as well as details explaining how the final grade is calculated.

Criterion 5.2 Diploma and Diploma Supplement

Evidence:

- Sample diploma per program
- Sample transcript of records per program
- Sample diploma supplement per program

Preliminary assessment and analysis of the peers:
With the successful completion of their studies, the students receive a diploma, an academic transcript, and a diploma supplement. The diploma supplements are bilingual (Bahasa Indonesia and English) and contain all relevant information on the student's qualifications profile and individual performance as well as the classification of the degree program with regard to its applicable education system.

Criterion 5.3 Relevant rules

Evidence:

- All relevant rules on the studies, examination, admission and quality assurance were provided and are published on the university's website
- Self-assessment report
- Discussions during the online audit

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

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

The peers consider this criterion to be completely fulfilled.

6. Quality management: quality assessment and development

Criterion 6 Quality management: quality assessment and development

Evidence:

- Self-assessment report
- ITS guidebook on internal quality assurance
- Discussions during the online audit

Preliminary assessment and analysis of the peers:
The peers learn that there is an institutional system of quality management aiming at continuously improving the degree programs. This system relies on internal (SPMI) as well as external (SPME) quality assurance.

SPME focuses on both national and international accreditations. Every degree program and every Higher Education Institution in Indonesia has to be accredited by the national Accreditation Agency (BAN-PT). ITS as an institution as well as all four degree programs under review have received the highest accreditation status (A) from BAN-PT.

SMPI encompasses all activities focused on implementing measures for improving the teaching and learning quality at the university. ITS has a Quality Assurance Office (KPM), which conducts regular scans of academic and non-academic quality criteria within the institution. Apart from this office, there are different quality assurance units in place, such as the Faculty Quality Team (TMF), Department Quality Team (TMD), and Degree program Quality Team (TMP). Different measures are taken to gather information about a variety of qualitative aspects of the institution.

On the institutional level, ITS annually carries out an SPMI evaluation of ten standards concerning management, resources, strategic development and quality assurance procedures. The performance of the departments is continuously checked through an information system called SIPMONEV. As has already been mentioned, there is a major curriculum revision process for each program every four years and a minor one every year (cf. chapter 1). The graduates are followed by ITS through a regular tracer study conducted by the career center. Internal and external stakeholders give input through these processes in various ways.

Lastly, at the end of each semester, the students are asked to fill out an evaluation survey on each course that they took. It contains several items regarding the quality of the teaching, the learning media, the adequacy of assessment methods and similar issues. Based on the results, a Lecturer Achievement Index (IPD) is calculated for each lecturer, which is used for questions of staff development.

The peers acknowledge that ITS has established a comprehensive quality assurance system that is generally suitable to identify weaknesses and to improve the degree programs. However, they also identify some weak points. During the meetings with students and teaching staff, the peers learn that participating in the course evaluation is obligatory. Otherwise, the students will not be able to access their grades, for example. The peers are worried that this may lead to a lack of validity of the results, as some students may not take enough time for the survey and thus not fill it out with sufficient attention. Thus, they encourage ITS to reconsider this and highly recommend making evaluations optional. An even more serious issue appears is the fact that the students' feedback is not anonymous since it is directly linked to their student ID. The peers emphasize the importance of anonymity and confidentiality during the evaluation processes and ask the university to guarantee these. Thus, ITS has to ensure that the evaluation surveys are carried out anonymously. In this regard, it must also be clearly communicated to the students that the evaluations take place in an anonymous way.

The peers expressly welcome that the students are deeply involved in the quality assurance processes in various ways, such as the surveys, but also through discussions with student representatives and direct bilateral exchange with the lecturers and, in this regard, laud the active engagement of the teachers aimed at receiving comprehensive and continuous student feedback. The peers also inquire in which way the students are informed about the results of the course evaluations and the actions taken based on these results. They learn and highly appreciate that these are regularly published on the "myITS" platform where the students and lecturers can access them.

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

In its statement, ITS points out that the motivation behind the survey scheme is the fact that the students will most likely not participate in the surveys anymore if they are not mandatory. In light of this input from the peers, the university is planning to raise the issue in the next curriculum evaluation on the institutional level.

The peers consider this criterion to be partially fulfilled.

D Additional Documents

Not required.

E Comment of the Higher Education Institution (15.11.2021)

The institution provided a short statement on the report.

F Summary: Peer recommendations (16.11.2021)

Taking into account the university's statement on the report, the peers summarize their analysis and **final assessment** for the award of the seals as follows:

Degree Program	ASIIN-seal	Subject-specific label	Maximum duration of accreditaiton
Ba Computer Engineering	With requirements for one year	/	30.09.2027
Ba Biomedical Engineering	With requirements for one year	/	30.09.2027
Ba Electrical Engineering	With requirements for one year	/	30.09.2027
Ma Electrical Engineering	With requirements for one year	/	30.09.2027

Requirements and recommendations for the applied labels

Requirements

A 1. (ASIIN 1.4) ITS must not exclude students from admission on the grounds of color-blindness

A 2. (ASIIN 3) Compensation measures for exams for students with disabilities have to be established.

A 3. (ASIIN 6) Ensure that course evaluations are carried out anonymously.

Recommendations

For the bachelor's degree programs

E 1. (ASIIN 1.3) It is recommended to integrate a mandatory internship of at least three months into the curricula.

For the bachelor's degree program Computer Engineering

E 2. (ASIIN 1.3) It should be evaluated in how far the general modules in the first two semesters (especially chemistry) are relevant for the competence profile of the program.

For the bachelor's degree program Biomedical Engineering

E 3. (ASIIN 1.3) It is recommended to include more modules in the field of clinical engineering, in particular radiation safety.

For all degree programs

E 4. (ASIIN 3) It is recommended not to schedule additional assignments or project works during the last week before the exam in order to ensure that the students have sufficient time for exam preparation.

E 5. (ASIIN 6) Consideration should be given to conducting evaluations on a voluntary basis in the future.

G Comment of the Technical Committees

Technical Committee 02 – Electrical Engineering/Information Technology (22.11.2021)

Assessment and analysis for the award of the ASIIN seal:

The Technical Committee discusses the procedure and in particular the requirement A 1. Some of the committee members can well understand the university's justification that there are several professional fields in the biomedical engineering sector that require full color vision. However, the Technical Committee agrees with the peer group in saying that colorblind applicants may not generally be excluded from admission to the program and therefore recommends maintaining the requirement as suggested.

The Technical Committee 02 – Electrical Engineering/Information Technology recommends the award of the seals as follows:

Degree Program	ASIIN-seal	Subject-specific label	Maximum duration of accreditaiton
Ba Biomedical Engineering	With requirements for one year	/	30.09.2027
Ba Computer Engineering	With requirements for one year	/	30.09.2027
Ba Electrical Engineering	With requirements for one year	/	30.09.2027
Ma Electrical Engineering	With requirements for one year	/	30.09.2027

Requirements

A 1. (ASIIN 1.4) ITS must not exclude students from admission on the grounds of color-blindness

A 2. (ASIIN 3) Compensation measures for exams for students with disabilities have to be established.

A 3. (ASIIN 6) Ensure that course evaluations are carried out anonymously.

Recommendations

For the bachelor's degree programs

E 1. (ASIIN 1.3) It is recommended to integrate a mandatory internship of at least three months into the curricula.

For the bachelor's degree program Computer Engineering

E 2. (ASIIN 1.3) It should be evaluated in how far the general modules in the first two semesters (especially chemistry) are relevant for the competence profile of the program.

For the bachelor's degree program Biomedical Engineering

E 3. (ASIIN 1.3) It is recommended to include more modules in the field of clinical engineering, in particular radiation safety.

For all degree programs

E 4. (ASIIN 3) It is recommended not to schedule additional assignments or project works during the last week before the exam in order to ensure that the students have sufficient time for exam preparation.

E 5. (ASIIN 6) Consideration should be given to conducting evaluations on a voluntary basis in the future.

Technical Committee 04 – Informatics/Computer Science (26.11.2021)

Assessment and analysis for the award of the ASIIN seal:

The Technical Committee discusses the procedure and in particular the recommendation E1. According to the committee, it is not common to integrate an extensive internship in a Computer Engineering program. Therefore, they are hesitant to recommend an extension of the existing internship. Instead, they suggest a more general wording that points to the general restructuring of the internship.

The Technical Committee 04 – Informatics/Computer Science recommends the award of the seals as follows:

Degree Program	ASIIN-seal	Subject-specific label	Maximum duration of accreditaiton
Ba Computer Engineering	With requirements for one year	/	30.09.2027

Requirements

A 1. (ASIIN 1.4) ITS must not exclude students from admission on the grounds of color-blindness

A 2. (ASIIN 3) Compensation measures for exams for students with disabilities have to be established.

A 3. (ASIIN 6) Ensure that course evaluations are carried out anonymously.

Recommendations

For the bachelor's degree programs

E 1. (ASIIN 1.3) It is recommended to consider improving the structure and organization of the internship.

For the bachelor's degree program Computer Engineering

E 2. (ASIIN 1.3) It should be evaluated in how far the general modules in the first two semesters (especially chemistry) are relevant for the competence profile of the program.

For the bachelor's degree program Biomedical Engineering

E 3. (ASIIN 1.3) It is recommended to include more modules in the field of clinical engineering, in particular radiation safety.

For all degree programs

E 4. (ASIIN 3) It is recommended not to schedule additional assignments or project works during the last week before the exam in order to ensure that the students have sufficient time for exam preparation.

E 5. (ASIIN 6) Consideration should be given to conducting evaluations on a voluntary basis in the future.

H Decision of the Accreditation Commission (07.12.2021)

Assessment and analysis for the award of the subject-specific ASIIN seal:

The Accreditation Commission discusses the procedure and follows the decision of the peer group and the Technical Committees. With regards to the recommendation E 1, it follows the suggestion of the Technical Committee 04.

The Accreditation Commission decides to award the following seals:

Degree Program	ASIIN-seal	Subject-specific label	Maximum duration of accreditaiton
Ba Computer Engineering	With requirements for one year	/	30.09.2027
Ba Biomedical Engineering	With requirements for one year	/	30.09.2027
Ba Electrical Engineering	With requirements for one year	/	30.09.2027
Ma Electrical Engineering	With requirements for one year	/	30.09.2027

Requirements and recommendations for the applied labels

Requirements

A 4. (ASIIN 1.4) ITS must not exclude students from admission on the grounds of color-blindness

A 5. (ASIIN 3) Compensation measures for exams for students with disabilities have to be established.

A 6. (ASIIN 6) Ensure that course evaluations are carried out anonymously.

Recommendations

For the bachelor's degree programs

E 1. (ASIIN 1.3) It is recommended to consider improving the structure and organization of the internship.

For the bachelor's degree program Computer Engineering

E 2. (ASIIN 1.3) It should be evaluated in how far the general modules in the first two semesters (especially chemistry) are relevant for the competence profile of the program.

For the bachelor's degree program Biomedical Engineering

E 3. (ASIIN 1.3) It is recommended to include more modules in the field of clinical engineering, in particular radiation safety.

For all degree programs

E 4. (ASIIN 3) It is recommended not to schedule additional assignments or project works during the last week before the exam in order to ensure that the students have sufficient time for exam preparation.

E 5. (ASIIN 6) Consideration should be given to conducting evaluations on a voluntary basis in the future.

Appendix: Programme Learning Outcomes and Curricula

According to the website, the following **objectives** and **learning outcomes (intended qualifications profile)** shall be achieved by the Bachelor's degree programme Computer Engineering:

No.	Program Educational Objectives	Program Learning Outcomes
1.	PEO1: Computer Engineering graduates show constructive and contributive character for themselves and the people of the nation with the basis of The One Almighty God.	PLO1: Demonstrate religious attitudes and tolerance for differences in religion, ethnicity, and culture
		PLO2: Demonstrate an attitude of responsibility independently and jointly contribute to law enforcement, ethics, norms for community life and environmental sustainability.
2.	PEO2: Computer Engineering graduates have the knowledge and understanding in the field of natural science and engineering for the field of Computer Engineering.	PLO3: Having extensive and good knowledge in the fields of mathematics, natural sciences, and engineering, which enables them to understand certain fields related to computer engineering such as circuits and electronics, digital design, embedded systems, computer architecture and organization, computer networks, signal processing , computer algorithms and information security.
		PLO4: Having knowledge of the latest and most recent technological developments in the field of computer systems and networks that include hardware and software applied to embedded systems, digital signal processing, communication systems, multimedia computing and information security and knowledge of the latest principles and issues related to economic factors, occupational health and safety, social and ecology in general.
3.	PEO3: Computer Engineering graduates can analyze the problems related to applications of the field of computer engineering and be able to recommend a solution based on knowledge and understanding in the field of computer engineering.	PLO5: Able to choose and apply modeling, calculation and testing methods through experiments and computer simulations, able to explain the results in the fields of cloud computing, wireless sensor networks, internet of things (IoT), wearable devices, embedded systems and robotics.

4.	PEO4: Computer Engineering graduates can develop hardware and/or software design that fulfills the need for global markets evaluated by the aspects of maintainability, sustainability, and manufacturability.	PLO6: Able to develop hardware and/or software (integrated) design implemented in embedded systems, signal processing, communication systems, multimedia computing, and information security; and able to evaluate aspects of maintainability, sustainability, and manufacturability.
		PLO7: Able to design products for the global market in the field of cloud computing, wireless sensor networks, internet of things (IoT), wireless sensor networks, internet of things, wearable devices, embedded systems and robotics.
5.	PEO5: Computer Engineering graduates can demonstrate their expertise in problem-solving by considering the aspect of health, security, and law including economical and environmental requirements.	PLO8: Able to apply their knowledge and understanding to gain practical skills, to solve problems, for research tasks and design of systems and procedures including awareness of health, safety, legal aspects, taking into account technical, economic, and environmental needs.
6.	PEO6: Graduate of Computer Engineering have the ability to demonstrate an awareness of project management and business practices through effective communication strategies, interdisciplinary teamwork, professional and ethical responsibilities, and being able to engage in lifelong independent learning.	PLO9: Able to demonstrate awareness of project management and business practices through effective communication strategies, interdisciplinary teamwork, professional and ethical responsibilities, and being able to engage in lifelong independent learning.

The following **curriculum** is presented:

	Semester I			Semester II	
Course Number	Course	Credits	Course Number	Course	Credits
KM184101	Mathematics 1	3	KM184201	Mathematics II	3
SF184101	Physics 1	4	SF184202	Physics II	3
UG18490X	Religion	2	UG184913	Civics	2
UG184911	Pancasila	2	UG184912	Indonesian	2
UG184914	English	2	SK184101	Chemistry	3
EW184001	Introduction to Electrical Technology	2	EW184003	Electric Circuits	2
EW184002*	Basic Computer Programming	3	EC184201	Advanced Programming	3
Total		18	Total		18
	Semester III			**Semester IV**	
Course Number	Course	Credits	Course Number	Course	Credits
EC184301	Linear Algebra and Discrete Mathematics	4	EC184401	Systems Design and Engineering	2
EC184302	Telecommunication Systems	2	EC184402	Differential Equations and Series for Engineering	3
EC184303	Electronic Circuits	3	EC184403	Database Management System	3
EC184304	Data Structure and Algorithm Analysis	3	EC184404	Digital Signal Processing	3
EW184004	Numerical Methods	3	EC184405	Digital Circuits and Lab	4
EC184305	Operating Systems	3	EC184406	Probability and Statistics	3
Total		18	Total		18

	Semester V			Semester VI	
Course Number	Course	Credits	Course Number	Course	Credits
EC184501	Computer Networks and Laboratory	4	EC184601	Practical Work	2
EC184502	Computer System Architecture and Organization	3	EC184602	Network and System Programming	3
EC184503	Machine Learning	3	EC184603	Embedded Systems and Lab	4
EC184504	Digital Image and Video Processing	3	EC184604	Computer Vision	3
EC184505	Microprocessor Systems and Microcontrollers	3	EC1849XX	Elective Courses 2	3
EC1849XX	Elective Courses 1	3	EC1849XX	Elective Courses 3	3
			UG184915	Technopreneur	2
Total		19	Total		20
	Semester VII			Semester VIII	
Course Number	Course	Credits	Course Number	Course	Credits
EC184701	Pre Final Project	2	EC184801	Final Project	6
EC184702	Projects of Telematics	3	XXXXXXXX	Enrichment courses	3
EC184703	Wireless Sensor Network and IoT	4	EC184802	Electrical Technology Competence	3
EC184704	Computer Security System	3	UG184916	Technology Insights and Applications	3
EC1849XX	Elective Courses 4	3			
EC1849XX	Elective Courses 5	3			
Total		18	Total		15

	Elective Courses			Religion	
Course Number	Course	Credits	Course Number	Course	Credits
EC184911	Game Design	3	UG18490X	Islams	2
EC184912	Game Programming	3	UG18490X	Catholics	2
EC184913	Computational Intelligence for Game	3	UG18490X	Hinduism	2
EC184921	Programmable Devices	3	UG18490X	Budhist	2
EC184922	Real-Time Concurence Systems	3	UG18490X	Khonghucu	2
EC184923	Mobile Robot Programming	3			
EC184924	Robotics Probabilistics	3			
EC184931	Advanced Computer Networks	3			
EC184932	Distributed Computing	3			
EC184933	Grid and Cloud Computing Systems	3			
EC184934	Intelligent Web and Big Data	3			
EC184941	Mobile Programming	3			
EC184942	Ubiquitos-Computational	3			
EC184943	Digital Forensics	3			
EC184944	Medical Informatics	3			
EC184945	Computer Graphics	3			
EC184946	Soft Computing and Deep Learning	3			
EC184947	Human Computer Interaction	3			
EC184904	Cluster and Multiprocessor Computing	3			

According to the website, the following **learning outcomes (intended qualifications profile)** shall be achieved by the Bachelor's degree programme Biomedical Engineering:

Category	No.	Program Learning Outcomes
Knowledge and understanding	PLO-01	Able to apply Natural Sciences and Mathematics in the field of Biomedical Engineering
	PLO-02	Able to find, understand, explain, formulate, and solve general problems in the field of Engineering and special problems in the field of Biomedical Engineering which includes intelligent biomedical instrumentation, medical rehabilitation techniques, imaging and processing of medical images, and medical informatics
Engineering analysis	PLO-03	Able to design and implement laboratory experiment and / or field experiments, analyze and interpret data, and use objective assessments to draw conclusions
	PLO-04	Have good skills in oral and writing communications
Engineering design	PLO-05	Able to design components, systems, and processes in the field of Biomedical Engineering that are systematic, logical, and realistic appropriate with specified specifications by considering aspects of safety, social, cultural, environmental, and economic by recognizing / utilizing local and national resources with global insight
Engineering practice and product development	PLO-06	Able to apply the latest knowledge, skills and methods in solving problems in the field of Biomedical Engineering
	PLO-07	Able to plan, complete, and evaluate tasks within existing boundaries
	PLO-08	Able to work in interdisciplinary and intercultural teams and be responsible to the community and comply with legal and professional ethics in solving Biomedical Engineering problems
Transferable skills	PLO-09	Able to know / follow the latest developments in the field of science and technology and to react objectively by promoting the values of universal truth
	PLO-10	Able to apply the principles of technology and managerial ability to be able to work in the field of Biomedical Engineering as well as in community life in the national and international level
	PLO-11	Able to understand the need for lifelong learning
	PLO-12	Able to behave and act religiously, nationally, respectfully, independently, and persistently

The following **curriculum** is presented:

Semester I				Semester II			
Course Number	Course Name	Credits	ECTS	Course Number	Course Name	Credits	ECTS
EB184101	Anatomy and Physiology	3	4,8	EW184003	Electric Circuits	2	3,2
EW184001	Introduction to Electrical Technology	2	3,2	KM184201	Mathematics 2	3	4,8
EW184002	Basic Programming	3	4,8	SF184202	Physics 2	3	4,8
KM184101	Mathematics 1	3	4,8	SK184101	Chemistry 1	3	4,8
SF184101	Physics 1	4	6,4	UG18490x	Religion Studies	2	3,2
UG184911	Pancasila	2	3,2	UG184912	National Language	2	3,2
UG184914	English	2	3,2	UG184913	Civics	2	3,2
Total		19	30,4	Total		17	27,2

Semester III				Semester IV			
Course Number	Course Name	Credits	ECTS	Course Number	Course Name	Credits	ECTS
EB184301	Fundamentals of Bioelectrochemistry	3	4,8	EB184401	Fundamentals of Signal Processing	4	6,4
EB184302	Probability and Statistics	2	3,2	EB184402	Fundamentals of Control Systems and Laboratory	4	6,4
EB184303	Basic Electronics and Laboratory	4	6,4	EB184403	Fundamentals of Biomechanics	3	4,8
EB184304	Engineering Mathematics	3	4,8	EB184404	Electric System in Biomedical Application	2	3,2
EB184305	Basics Communication System and Laboratory	3	4,8	EB184405	Digital Techniques and Laboratory	4	6,4
EB184306	Advanced Electric Circuits and Laboratory	3	4,8	EW184004	Numerical Methods	3	4,8
Total		18	28,8	Total		20	32

Semester V				Semester VI			
Course Number	Course Name	Credits	ECTS	Course Number	Course Name	Credits	ECTS
EB184501	Fundamentals of Microcontroller and Microprocessor	3	4,8	EB184601	Biomagnetic Engineering	3	4,8
EB184502	Biomedical Sensors and Transducers	3	4,8	EB184602	Project Design	4	6,4
EB184503	Biomedical Instrumentations and Laboratory	3	4,8	EB184603	Fundamentals of Intelligent Systems	3	4,8
EB184504	Biomedical Signal Processing and Laboratory	3	4,8	EB184604	Microelectronic System in Biomedical Applications	3	4,8
EB184505	Biomaterials	3	4,8	EB184605	Biomedical Imaging	3	4,8
EB184506	Biomodelling	3	4,8	UG184915	Technopreneurship	2	3,2
Total		18	28,8	Total		18	28,8

Semester VII				Semester VIII			
Course Number	Course Name	Credits	ECTS	Course Number	Course Name	Credits	ECTS
EB184701	Biocybernetics	3	4,8	EB184801	Human-Machine Interaction	3	4,8
EB184702	Preliminary of Final Project	2	3,2	EB184802	Non-stationary Signal Analysis	3	4,8
EB184703	On Job Training	2	3,2	EB184803	Final Project	4	6,4
UG184916	Concept of Technology	3	4,8	EB184804	Clinical Engineering	2	3,2
EB1849xx	Elective Course	3	4,8	EB1849xx	Elective Course	3	4,8
EB1849xx	Elective Course	3	4,8	__18xxxx	Enrichment Course	3	4,8
Total		16	25,6	Total		18	28,8

Elective Courses

A. Intelligent Biomedical Instrumentation

Course Number	Course Name	Credits	ECTS
EB184901	Design of Intelligent Biomedical Instrumentation Systems	3	4,8
EB184902	Telemedicine Systems	3	4,8
EB184903	Decision Support Based Diagnosis Systems	3	4,8

B. Assistive Technology and Rehabilitation Engineering

Course Number	Course Name	Credits	ECTS
EB184904	Assistive and Walfare Technologies	3	4,8
EB184905	Medical Robotics	3	4,8
EB184906	Rehabilitation Engineering	3	4,8

C. Medical Imaging and Medical Image Processing

Course Number	Course Name	Credits	ECTS
EB184907	Medical Ultrasonic Imaging	3	4,8
EB184908	Medical Image Processing	3	4,8
EB184909	Multimodal Biomedical Image Analysis	3	4,8

D. Medical Informatics

Course Number	Course Name	Credits	ECTS
EB184910	Medical Infromation Management	3	4,8
EB184911	Medical Database and Optimization	3	4,8
EB184912	Genomic Computation	3	4,8

According to the website, the following **learning outcomes (intended qualifications profile)** shall be achieved by the Bachelor's degree programme Electrical Engineering:

Learning Outcomes

PLO-1 Able to apply knowledge of natural sciences and mathematics to solve electrical engineering problem
PLO-2 Able to design and carry out laboratory and / or field experiments, analyze and interpret data, and use objective judgments to draw conclusions
PLO-3 Able to design logical and realistic components, systems and processes in accordance with specified specifications by considering safety, social, cultural, environmental and economic aspects
PLO-4 Able to work effectively in groups of members across disciplines and cultures by showing leadership traits, and being able to define goals, work plans, and achievements
PLO-5 Able to identify, formulate and solve problems in the field of electrical engineering
PLO-6 Able to comply with applicable laws and regulations, professional ethics and be responsible for the field of work taking into account the global, economic, environmental and social context.
PLO-7 Able to communicate effectively both in written and oral form
PLO-8 Able to apply the principles of technology-based entrepreneurship and establish networks both at national and international levels
PLO-9 Able to learn independently to foster lifelong learning abilities
PLO-10 Able to know and respond to the latest developments in science and technology by promoting universal values
PLO-11 Able to apply methods, ICT, and modern devices in solving problems in the field of electrical engineering
PLO-12 Able to show religious, nationalist, and mutual respect characters

The **curricula per specialization** can be found on the program's website:

https://www.its.ac.id/telektro/academics/bachelor-degree/curriculum/

According to the website, the following **learning outcomes (intended qualifications profile)** shall be achieved by the Master's degree programme Electrical Engineering:

Program Learning Outcomes

1. Graduates are able in mastering concepts, scientific principles comprehensively, engineering principles, and factual knowledge about Information Technology to develop procedures and strategies needed in system analysis and design related to the field of Electrical Engineering (PLO-1)
2. Graduates are able to formulate problems, arrange engineering problem solving, and produce system designs with new ideas in the field of electrical engineering (PLO-2)
3. Graduates are able to implement solutions to engineering problems that take into account economic, public health and safety, cultural, social, and environmental factors (PLO-3)
4. Graduates are able to compile scientific conceptions and study results based on rules, procedures, scientific ethics and document them (PLO-4)
5. Graduates are able to compile a research map developed through an interdisciplinary or multidisciplinary approach (PLO-5)
6. Graduates are able to develop themselves and compete at the national and international levels (PLO-6)
7. Graduates are able to make decisions in the context of solving problems in the development of science and technology that pay attention to and apply the value of the humanities-based on analytical or experimental studies of information and data (PLO-7)
8. Graduates are able to systematically reflect the non-technical implications of engineering work and to integrate results in a responsible and professional manner (PLO-8)
9. Graduates are able to develop products that can improve the quality of life of the community either independently or collectively (PLO-9)

The **curricula per specialization** can be found on the program's website:

https://www.its.ac.id/telektro/academics/master-degree/curriculum/#1554092565376-99c270ba-1c0c487b-e70f