

**RESPONSE TO ABET STATEMENT**

**FROM**

**The Electrical Engineering Study Program (EESP)**

**Universitas Hasanuddin at Makassar**

**INDONESIA**



In Conjunction to

**VISIT DATES: OCTOBER 23-25, 2019**

**ACCREDITATION CYCLE CRITERIA: 2019-2020**

**MARCH, 2020**

**FOREWORD**

The Engineering Accreditation Commission (EAC) of ABET has evaluated the Electrical Engineering (B.Eng) programs at Hasanuddin University for initial accreditation. The EESP would like to thank for the efforts made by ABET to evaluate the program.

The EESP has managed it responses to four ABET statements regarding the weakness of EESP. We have tried hard to response the statements by giving explanations, comments and some evidences.

Once again, we gratefully acknowledge in advance for the ABET effort to evaluate this responses. We are looking forward to hear further suggestions and positive response that our program could be accredited according to ABET criteria.

Best regards,

Task Force of the EESP’s for ABET Accreditation

The EESP Response to ABET Statement #1:

**1. Criterion 2:** **Program Educational Objectives**

This criterion requires the program to have published program educational objectives that are consistent with the mission of the institution, the needs of the program’s various constituencies, and the engineering accreditation criteria. It further requires that there be a documented, systematically utilized, and effective process, involving program constituents, for periodic review of these program educational objectives that ensures they remain consistent with the institutional mission, the program’s constituent’s needs, and the engineering accreditation criteria. The program lists its students, faculty members, industrial advisory board, major employers, and alumni as constituents. There was no evidence that any of these groups, aside from the faculty members, participated in the periodic review of program educational objectives. Without involvement of all constituencies in the process, the program educational objectives may not meet the needs of the program’s constituents. Thus, the strength of compliance with this criterion is lacking.

**The EESP Response:**

We have made meetings with all constituencies discussing about the reviews of the EESP program educational objectives and the review of the student outcome achievements. The first meeting was made in October 12, 2019, and the second meeting was organized in March 7, 2020. See **Appendix 1.1** for the example invitation letter, and **Appendix 1.2** for the list of attendances.

**The first meeting, October 12, 2019**

In the first meeting, the advisory boards, alumni and faculty members evaluate the EESP’s PEO. The constituents have observed the attainment of the PEO and given suggestion how to improve the attainments of the PEOs. Five of our Advisory Board members have given suggestions as follows. See also the **Appendix 1.3**.

1. From Mr. Abd. Salam, he has suggested to improve students skills on how to calculate basic production cost to improve company benefits. This is related to the improvement of Engineering Economic Course.
2. From Mr. Makkasau, he has given also important focus on entrepreneurship skills of the students and support students to do apprentice program in small-scale companies, which are based on manufacturing or productions.
3. From Mr. Muammar, he has given suggestion on project management skills of the students, and the implementation of their on-job trainings in their final projects.
4. From Mr. Haris, he has pointed out the importance of industry-academic gap analysis, such that EESP can analyze the problem and improve the student research & development (R&D) capability.
5. From Mrs. Rini, she has given suggestion to improve the student ability in interpreting data and evaluate the interpretation results.

In general as shown in the **Appendix 1.4**, the Advisory Board Member (Major Employer and Alumni) has reviewed the contents of the EESP PEO, and they concluded that the PEOs comply with the employer needs, and are in accordance with the missions of the university.

**The second meeting, March 7, 2020**

In the second meeting, we have received many inputs and suggestions from all constituencies (Students, Faculty Members, Alumni, Major Employers and Advisory Board Members). The main points of the meeting are as follows. Please see **Appendix 1.5** for the invitation letter from the head of EESP to all constituents (Advisory Board Member, Major Employers, Faculty Members, Alumni and Student Representatives), **Appendix 1.6** for the list of invited persons to attend the second meeting, **Appendix 1.7** for the minutes of the meeting, and **Appendix 1.8** for the list of attendances in the meeting on March 7, 2020.

**Review Program Educational Object (PEO)**

All constituents have reviewed the PEO designed by the Electrical Engineering Study Program of UNHAS have covered all the criteria needed by major employers, i.e. mastering basic science and mathematics relevant to competencies in the field of Electrical Engineering, ability to anticipate, formulate and solve problems, have an entrepreneurial skills, and the ability to do long-life learning. These things have become an important things for Electrical Engineering graduates to have, in order to survive in real life and meet the criteria of various companies engaged in various fields, especially in the field of Electrical Engineering.

**Review Student Outcome (SO) Achievements**

Almost all SO has been well fulfilled by the EESP graduates and some aspects need to be improved again. But there are still SOs that have shown low performance outcome and need to be improved by the Electrical Engineering Study Program by taking improvement steps as soon as possible. The problem is related with the ability to use a modern techniques and equipment that is on SO-6 (has the ability to develop and conduct appropriate experiments, analyze and interpret data to get the results of the assessment in order to draw a conclusions). Based on SO assessment and evaluation result, the SO-2 for Semester I 2019/2020 presents low performance. The EESP has conducted a meeting with faculty members on January 31, 2020 to evaluate the assessment and performance indicator results of the courses contributing low performance indicator values. Please see our response to ABET statement number 2 (Continuous Improvement).

**Related to Practical Work**

Minutes Submitted by PLN (Major Employer)

1. Substantially, PLN as the major employer is very open and embraces students for on-job training but the campus should be more active and initiative to find information about related matters and also determine the right candidates to carry out the on-job training at PLN.
2. PT. PLN offers on-job trainings for students in the field of renewable energy because The University position is in a strategic area for renewable energy
3. The necessity for student capability before carrying out on-job training.

Example: The use of applications/software related to electrical engineering field. Campus to hold at least 1 license and apply it in the new electro curriculum

1. For students in the concentration of Control and Telecommunications Engineering, they can do on-job training at PLN in the field of SCADA (related to Siemens devices) in the Sulawesi region
2. PLN Sulawesi has identified the problems of each unit, campus expected to be more initiative to see this as an opportunity
3. The need to improve the mechanism of on-job training: Students must have a clear timeline of their on-job training, and clear targeted achievements to obtain every week, using benchmarks and evaluations
4. BUMN has prepared things related to apprenticeship (apprenticeship program). There are guidelines from the beginning so that the trainees are more directed
5. Correspondence to various private companies or state-owned business entities, EESP should ask for related topics in their respective institutions to be the guideline of the EESP in providing or recommending locations or places of the On-Job Training for students
6. In regard to student outcome 7, in producing innovative products, PLN is ready to collaborate because every year PLN conducts innovative product activities
7. Introducing and teaching safety and health aspects to students based on the specifications of their respective fields
8. Creating alumni with an entrepreneurial spirits according to industry 4.0 era.

Advices from IATEL for Electrical Engineering Study Program

1. IATEL should facilitate graduates to find the appropriate vacancies (IATEL as facilitators for the job vacancy offers)
2. The alumni database should be improved, and encourage alumni to conduct research and development works, including to study further (MS and PhD programs)
3. The EESP should Introduce IATEL to the new students.

All constituent have reviewed the assessment result of the PEOs, and have given suggestions to improve continuously the program, where the suggestions have been given in the minutes of the meeting conducted on March 7, 2020, 10:00-15:00. All constituents agree to use the EESP PEO to evaluate the program’s graduates. There is no need to change the EESP PEO for the next periodical review schedule. Please see **Appendix 1.9**.

In the following attachments, there are:

1. Appendix 1.1. Example invitation letter from the head of EESP to an Advisory Board Member to attend the first meeting on October 12, 2019.
2. Appendix 1.2. The list of attendances (Advisory Board Members and Alumni) in the first meeting on October 12, 2020.
3. Appendix 1.3. The minutes of the first meeting on October 12, 2019.
4. Appendix 1.4. The review of the contents of the PEO, where the Advisory Boards agree to use the PEOs as the instrument to evaluate the student outcomes.
5. Appendix 1.5. The invitation letter from the head of EESP to all constituents (Advisory Board Member, Major Employers, Faculty Members, Alumni and Student Representatives) to attend the second meeting on March 7, 2020, with the agenda to review the PEOs.
6. Appendix 1.6. The list of invited persons to attend the second meeting on March 7, 2020.
7. Appendix 1.7. The minutes of the meeting on March 7, 2020.
8. Appendix 1.8. The list of attendances in the meeting on March 7, 2020.
9. Appendix 1.9. Signature of the constituents that review the program educational objectives (PEOs).

The EESP Response to ABET Statement #2:

**2. Criterion 4. Continuous Improvement**

This criterion requires that the program must regularly use appropriate, documented processes for assessing and evaluating the extent to which the student outcomes are being attained. The results of these evaluations must be systematically utilized as input for the continuous improvement of the program. In fall 2018, the institution implemented a university-wide outcome-based assessment process. The program presented an assessment plan in which the seven student outcomes were mapped to courses in the curriculum, but the course instructional materials and student work did not always support the student outcomes identified to be assessed in the course. In addition, documentation of the materials and student work, used to assess the level to which student outcomes were attained, was incomplete. The assessment results were submitted to the university quality assurance office, but the use of the results as input to the continuous improvement of the program was not documented. Thus, the strength of compliance with this criterion is lacking.

**The EESP Response:**

**Regarding the first comment**: “the course instructional materials and student work did not always support the student outcomes identified to be assessed in the course. In addition, documentation of the materials and student work, used to assess the level to which student outcomes were attained, was incomplete”.

Regarding the comment, the EESP has provided the documentation of the materials and student works, used to assess the level to which student outcomes were attained. All faculty members have already provided instructional materials in various forms, such as handouts, textbooks, lecturer notes, etc, and to archive the student works. In this response, we can only show a few randomly selected example materials as shown in **Appendix 2.1A**. Photographs in **Appendix 2.1B** present cabinets in our department, in which the instructional materials and student works are archived or documented in every semester.

In order to assess the student outcomes, each team teaching for a certain courses defines “student learning outcomes” or “course objectives” that reflect the student outcomes of the program. The team teaching have provided some assignments and final exam, where the content of the tasks in the assignment and the final exam must enable us to achieve the extent to which the course objectives are fulfilled. Example materials presented in this response are some final exams of 4 randomly selected course as shown in **Appendix 2.1C**.

The ability of each student to answer all the tasks is totally scored in range of 0-100. Then each student gets grade mark A, A-, B+, B, B-, C+, C-, D and E. Grade A is the largest and grade E means that a student fails. The grade mark of student is converted to grade point having the range between 0.00 and 4.00. The detail explanation of this grade is given in our self-study report. The grade point average of all students registered in the courses are then obtained and assigned as the performance indicator value of the considered course.

**Regarding the second comment**: “The assessment results were submitted to the university quality assurance office, but the use of the results as input to the continuous improvement of the program was not documented”.

In every semester, we organized a meeting to review and evaluate the assessment results of each student outcome. After the completion of the final examinations of all courses, the faculty members have organized meetings to discuss the assessment results. The last organized meeting was on January 31, 2020. The invitation letter, the minute of the meeting and the list of attendances are shown in **Appendix 2.2** and **Appendix 2.3**. The program evaluates the extent to which the student outcomes are attained. As shown in **Appendix 2.4**, performance indicator values of each course are measured quantitatively to give the SO values. In the appendix, eight courses indicate lower performance indication (PI) values. Three of them contribute to the SO values of the SO-2. All team teachings evaluate their courses regarding the PI value of the course. However in this response to ABET statement number 2, we have selected only 8 samples of team teaching meeting of the 8 selected courses having lower performance indicators. The micro meeting notes the analysis of the problems and the action required to improve the performance indicator values of the considered course as shown in **Appendix 2.5**.

The head of EESP and the university quality assurance representative summarized the meeting results as shown in **Appendix 2.6**. The translation of the evaluation result is shown below.

The further action is to submit the program evaluation result to the Dean that has given a disposition to the University Quality Assurance Office as shown in **Appendix 2.7**. The submission is made to inform the dean about some requirements to improve the program that need institutional action involvement such as facilities or resources requirement.

**TRANSLATION of THE EVALUATION RESULT**

**NOTE ON MEETING EVALUATION OF STUDENT LEARNING OUTCOMES**

This meeting evaluates student learning outcomes in the first semester 2019-2020 with the following results:

1. All Lecturers have made micro meeting and evaluated their considered course
2. There are eight courses that have low performance indicators (PI≤2.5 or approach the limit), namely:
3. Electric Circuit I
4. Logic Circuits
5. Engineering Mathematics I
6. Basic Electronics
7. Probability and Statistics
8. Electrical Measurement
9. Analysis of the Electric Power System
10. Antennas and Propagation
11. The whole team of lecturers are asked to analyze any existing problem and further provide actions to improve performance indicator values using any of the following actions: improving teaching materials, teaching methods, improving/upgrading the quality of assignment/evaluation questions and if necessary, to open tutorial classes that can help students better understand their lecture subject.

**SUMMAR OF PROGRAM EVALUATION RESULTS OF ELECTRICAL ENGINEERING STUDY PROGRAM – EESP FOR SEMESTER I 2019-2020**

| **No** | **Evaluation Items** | **Assessment Results** | **Problem Analysis** | **Improvement Steps** |
| --- | --- | --- | --- | --- |
| 1 | Evaluation of the learning outcomes of the **Electric Circuit I** course | *Performance Indicator =* 2.50 (approaching the threshold value) | * Lack of student participation in teaching and learning process * Lack of practice questions | * Lecturer learning methods need to be improved so that students are more involved * Hold a tutorial class |
| 2 | Evaluation of the learning outcomes of the **Logic Circuit** course | *Performance Indicator* = 2.59 (approaching the threshold value) | * Students still lack of understanding about sequential circuit subject (flip-flops) | * Improve material/ teaching subject so that students are understood more on the course * Hold a tutorial class |
| 3 | Evaluation of learning outcomes in **Mathematics Engineering I** courses | *Performance Indicator* = 2.36 | * Lack of student participation in teaching and learning process * Lack of practice questions | * Lecturer learning methods need to be improved so that students are more involved * Hold a tutorial class |
| 4 | Evaluation of learning outcomes in the **Basic Electronics** course | *Performance Indicator* = 1.93 | * Students' analytical skills are still low | * Conduct a tutorial class |
| 5 | Evaluation of the learning outcomes of **Probability and Statistics** courses | *Performance Indicator* = 1.89 | * The ability of students in applying probability equations in solving problems is lacking * The absence of software that able to support the teaching and learning process | * Conduct a tutorial class * Provide SPSS software * Conduct training in the use of SPSS software |
| 6 | Evaluation of the learning outcomes of the **Electrical Measurement** course | *Performance Indicator* = 2.40 | * The absence of software that able to support the teaching and learning process * The number of equipment in the laboratory that is not proportionate with the number of students * The room is not conducive | * Provide Digsilent software * Provide Matlab *Simulink* software * Provide *osiloskop* and * Provide *air conditioner* |
| 7 | Evaluate the learning outcomes of the **Electric Power System Analysis** course | *Performance Indicator* = 1.73 | * Learning material is not up to date * The absence of software that able to support the teaching and learning process specifically in making comparisons between theory and simulation | * Provide supporting software tools: Digsilent software * Provide supporting software tools: SPSS software |
| 8 | Evaluation of the learning outcomes of **Antennas and Propagation + Laboratory** courses | *Performance Indicator* = 2.50 (threshold value) | * Lack of student participation in teaching and learning process * Lack of practice questions | * Lecturer learning methods need to be improved so that students are more involved * Conduct a tutorial class |
| 9 | Evaluate other courses that have a performance indicator value above a specified threshold | *Performance Indicator* > 2.50 | In general students do not have significant problems in attending lectures | Learning methods are maintained and if necessary improved |
| 10 | Evaluation of SO-2 achievements is quite low | *Achievement SO-2 <* 2.5 (2,32) | Contribution of PI course values related to SO-2 achievement is very low, the courses are **Probability and Statistics**, **Electrical Measurement**, **Antenna and Propagation** | Learning related methods must be improved, especially student assignments |

The results of the problem analysis on the low SO achievements in several courses, may indicate a significant correlation to the lack of equipment and software facilities owned by the Department of Electrical Engineering. Therefore, regarding this problem, we request further action from the University Quality Assurance and the University Institution to meet the requirement to fulfill better learning process quality and continuous improvement.

In the following attachment, there are:

1. Appendix 2.1. The invitation letter to attend the program student outcome evaluation meeting for Semester I 2019/2020 on January 31, 2020 and the list of invited attendances (faculty members).
2. Appendix 2.2. The minutes of the SO evaluation meeting and the list of attendances.
3. Appendix 2.3. The Assessment results that has been used to evaluate the extent to which the SO has been attained.
4. Appendix 2.4. The selected samples of 8 team teachings of selected courses having lower performance indicators, the analysis of the problems and the action required to improve the performance indicator values of the considered courses.
5. Appendix 2.5. The summary of the program evaluation for Semester I 2019/2020, which is submitted to University Quality Assurance Representative.
6. Appendix 2.6. The letter of Program Evaluation to the Dean, especially the required actions to improve the program related to the program facilities, equipment and software tools.
7. Appendix 2.7. The photograph of cabinets documenting the course materials and student works in the EESP office.

The EESP Response to ABET Statement #3:

**3. Criterion 5. Curriculum**

This criterion requires that the program must include a culminating major engineering design experience that incorporates appropriate engineering standards and multiple constraints. The program has a capstone experience that is distributed over several courses. Appropriate engineering standards and multiple constraints were addressed indirectly in some senior design projects, but most project reports did not include evidence of the incorporation of engineering standards and constraints. Without adequate experience in the application of design constraints and engineering standards, students in the program may not be adequately prepared for engineering practice. Thus, the strength of compliance with this criterion is lacking.

**The EESP Response:**

The EESP has implemented principally or implicitly capstone design courses in the final project of each final year student. In the final project, students have incorporated engineering standards and constraints. Documents in **Appendix 3.1** presents some selected final projects of the EESP final-year students. Some students have designed a hardware prototype following given design specifications and constraints. The ability of the students to design the prototype is the reflection of its engineering and technical skills, which are accumulated from some courses that they are taken from previous years/semesters.

The EESP has revised and reorganized its curriculum, where capstone design course I and II are proposed in the first and second semester for each academic year. The courses are proposed for the final-year students (senior students). Please see **Appendix 3.2** and **Appendix** **3.3** for the invitation letter and the list of faculty members. Although in the meeting, only the faculty members are invited, the draft of the curriculum has been discussed with all constituents. In line with our response for ABET STATEMENT#1, we have also made a meeting with all constituents (Students, Alumni, Faculty Member, Major Employers and Advisory Board Members) on March 7, 2020, where one of the agenda beside the PEO periodical review is also to discuss the draft of the curriculum. Principally, all constituents support the curriculum revision and the introduction of the capstone design course I and capstone design course II.

As shown in **Appendix 3.4**, we name the capstone design course as Electrotechnical Design I, conducted in the first semester and Electrotechnical Design II, conducted in the second semester. Each year, we organize a seminar and expo/exhibition, where the students present and expose/exhibit their hardware/software prototype as the outcomes of their capstone design courses.

In the following attachment, there are:

1. Appendix 3.1. Examples of student final project that represents (implicitly) capstone design project.
2. Appendix 3.2. Invitation from the Head of EESP for the EESP faculty members to revise the EESP curriculum.
3. Appendix 3.3. The list of the invited faculty members.
4. Appendix 3.4. The list courses in the draft of the revised curriculum.
5. Appendix 3.5. The meeting minutes attended by faculty members where a project seminar and exhibition are organized each year, where last year students present their software/hardware prototypes in the seminar and exhibition event.

The EESP Response to ABET Statement #4:

**4. Criterion 7. Facilities**

This criterion requires that classrooms, offices, laboratories, and associated equipment must be adequate to support attainment of the student outcomes and to provide an atmosphere conducive to learning. Modern tools, equipment, computing resources, and laboratories appropriate to the program must be available, accessible, and systematically maintained and upgraded to enable students to attain the student outcomes and to support program needs. The program has facilities to support attainment of student outcomes, but in some cases the number of students using the facility was large, such that each student may not receive the full benefit of the experience. In addition, the limited functionality of student versions of software for electrical circuit simulation, numerical computation and general office functions impeded the ability of students to fully attain the student outcomes. Without sufficient and appropriate equipment and software, student learning through hands- on laboratory experience may be inadequate. Thus, strength of compliance with this criterion is lacking.

**The EESP Response:**

We are now under the process to improve the facilities of our department. The procurements of a professional edition of a numerical simulation program such as Matlab and full version of an electric and electronic circuit simulator such as PSpice as well as backup units of the lab equipment are still ongoing. We need several months until the facilities are completely installed in our department.

In the following attachment, there are:

1. Appendix 4.1. A letter from the head of EESP to the engineering faculty dean for the lab equipment and software procurement
2. Appendix 4.2. The document of the list of equipment under procurement process
3. Appendix 4.3. The letter from Rector of the University of Hasanuddin to response the equipment/software procurement