Fahad Bin Sultan University

College of Engineering

Department of Renewable Energy Engineering

Department Quality Manual

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Renewable Energy Engineering Department Quality Assurance Manual

Foreword

The Department of Renewable Energy Engineering (REE) at Fahad Bin Sultan University (FBSU) is steadfast in its commitment to academic excellence, innovation, and continuous improvement in renewable energy engineering education and research. This Quality Assurance Manual serves as a foundational document, guiding all REE Department stakeholders—faculty, staff, students, and external partners—in upholding the highest standards of quality across all operations.

This manual underscores the Department's dedication to fostering a robust quality culture, which is integral to the College of Engineering's and the University's overarching Quality Assurance System (QAS). The University's commitment to quality, reinforced by the direct involvement of its leadership, is systematically extended to the college and department levels. This cascading leadership commitment ensures that the broad quality aspirations of FBSU are translated into actionable, localized dedication within the REE Department. Such a structured approach cultivates a sense of ownership and responsibility among REE faculty and staff, which is paramount for the effective implementation and sustained success of quality assurance processes.

The REE Department's Quality Assurance System aligns rigorously with national and international accreditation standards, including those set by the National Quality Framework (NQF), the Education and Training Evaluation Commission (ETEC-NCAAA), and professional engineering bodies such as ABET. The Department welcomes feedback from all stakeholders, recognizing it as a vital component of its journey towards continuous enhancement.

Sincerely,

Dr. Abdullah Alali,
Acting Chairman,
Department of Renewable Energy Engineering

Introduction to the REE Quality Assurance Manual

This Quality Assurance Manual for the Department of Renewable Energy Engineering is a comprehensive and streamlined adaptation of the College of Engineering's Quality Assurance Manual, meticulously tailored to the unique context and operational specificities of renewable energy engineering education. It ensures that all relevant content particular to the REE Department is included and enhanced where necessary, providing a cohesive and polished guide for quality assurance within the Department.

The Department of Renewable Energy Engineering is deeply committed to developing a comprehensive system of academic quality management. This commitment aims to ensure high levels of performance and to continually elevate the quality and effectiveness of its educational programs and support services. The REE Department's Quality Management System (QMS) is firmly rooted in the ETEC-NCAAA standards at both institutional and program levels, and it is concurrently aligned with international higher education standards, with particular emphasis on criteria relevant to engineering accreditation, such as those stipulated by ABET.

This approach represents a strategic adaptation for specialization, where university-wide and college-wide principles and policies are distilled and then elaborated upon to suit the specific demands of renewable energy engineering education. This ensures that the manual is not merely a reduced version but a strategically adapted document that maintains full compliance while providing operational clarity for the REE Department.

The Department's QAS encompasses strategic planning, curriculum planning and implementation, data collection, evaluation, continuous improvement, and both internal and external review processes. This holistic view of quality management mirrors the College's and the University's comprehensive systems. This manual is structured into several main sections, providing a clear overview of the REE Department's QMS framework, the interrelation of its academic and administrative processes, and the operational arrangements that underpin its quality assurance standards.

SECTION I

RENEWABLE ENERGY ENGINEERING DEPARTMENT CONTEXT AND COMMITMENT TO QUALITY

About FBSU and CoE

Fahad Bin Sultan University (FBSU) is a private university in the city of Tabuk that was inaugurated by Prince Sultan Bin Abdul-Aziz in the year 2004 (1424 H). FBSU was established to meet the rapid increase in the Saudi population, the rising demand for higher education, and the enormous pressure on public institutions to educate the growing numbers of young men and women. FBSU was established with one college – the College of Computing. At the beginning of the academic year 1427–28 H, a branch for girls was added, followed by the addition of the two colleges of Engineering and Business and Management in 1428–29 H. The University is governed by a Board of Trustees chaired by His Royal Highness Prince Fahad Bin Sultan Bin Abdul Aziz. Today, FBSU consists of five colleges offering fourteen undergraduate programs and seven graduate programs.

1.1 Renewable Energy Engineering (REE) Department – Overview

The Department of Renewable Energy Engineering (REE) was established at Fahad Bin Sultan University in the academic year 2019/2020 as a vital component of the College of Engineering. The creation of the REE program was a direct and strategic response to the Kingdom of Saudi Arabia's Vision 2030, which emphasizes diversifying the nation's energy mix and developing sustainable resources. The department seeks to graduate highly qualified renewable energy engineers to support these national efforts and to provide graduates with the education needed to work in the neighboring countries or anywhere in the world.

The department's identity and mission are deeply intertwined with regional development, particularly through a strategic five-year partnership with the NEOM giga-project. This collaboration provides scholarships for students and establishes a direct pathway for graduates to be employed by NEOM and its subsidiary companies, such as ENOWA, which specializes in

sustainable energy and water systems. This symbiotic relationship creates a unique educational ecosystem where the curriculum, funding, and graduate employment are closely linked, ensuring the program's relevance and impact.

1.2 Program Offerings in the REE Department

The Department of Renewable Energy Engineering offers a Bachelor of Renewable Energy Engineering (BREE) program. The curriculum has evolved to meet the dynamic needs of the industry and accreditation standards. The initial program, established in 2019, consisted of a five-year study plan that included a foundation year followed by 140 credit hours of specialized coursework. In the academic year 2022-2023, based on feedback from program constituencies, the curriculum was updated to waive the separate foundation year, integrating its essential components into a revised 159-credit-hour plan.

1.3 Vision, Mission, & Values

1.3.1 REE Department VISION

To be a leading program in renewable energy engineering education and research, recognized for producing innovative engineers who drive the sustainable energy transition in the Kingdom of Saudi Arabia and beyond.

1.3.2 REE Department MISSION

The mission of the REE Program is to graduate competent renewable energy engineers who fulfill market needs and are equipped with sound knowledge and research and fundamental skills to:

- Be pioneers contributing to the comprehensive sustainable national development plans.
- Devote valuable engineering skills and knowledge toward the design, building, and running of renewable energy projects.
- Support the Kingdome's efforts to introduce renewable energy as part of its energy mix, aligning with the Saudi Vision 2030.
- Work in diverse environments, embrace lifelong learning, collaborate and lead in multidisciplinary teams.

1.3.3 REE Department Core Values

1. Academic excellence
2. Integrity and Ethics
3. Creativity and Innovation
4. Community Engagement and Service

5. Sustainability and Environmental Stewardship

1.4 Strategic Plan – REE Department

The REE Department's strategic direction is fully aligned with the College of Engineering's strategic plan, which is built upon five key themes. The department's specific activities and goals contribute directly to the achievement of these broader college objectives.

- **Theme 1: Enhance Academic Excellence:** The REE department contributes by developing and maintaining a rigorous curriculum (both 140 and 159 credit hour plans), recruiting highly qualified faculty with international experience, and ensuring program alignment with ABET and NCAAA standards.
- **Theme 2: Promote Quality Culture and Governance:** The department actively participates in the college's quality assurance framework, utilizing detailed assessment processes, stakeholder feedback, and continuous improvement cycles to enhance its educational offerings.
- **Theme 3: Strengthen Community Engagement:** The strategic partnership with NEOM is a prime example of the department's deep community and industry engagement, providing students with scholarships, training opportunities, and clear employment pathways.
- **Theme 4: Optimizing Resources and Facilities:** The department manages and utilizes state-of-the-art facilities, including the Renewable Energy and Robotics Laboratories Centre (RERC), to provide students with essential hands-on experience.
- **Theme 5: Building a Robust Research Infrastructure:** REE faculty are active in research in areas such as solar energy, wind energy, and hydrogen technologies, contributing to the college's research output and supporting the Kingdom's socioeconomic development goals.

1.5 Strategic Operational Objectives

The REE Department adopts the strategic operational objectives of the College of Engineering as the guiding framework for its own operational planning and execution. These objectives ensure that departmental activities are in sync with the college's broader goals for academic excellence, quality governance, community engagement, resource optimization, and research innovation.

1.6 Organizational Structure

The Department of Renewable Energy Engineering operates within the organizational framework of the College of Engineering, as depicted in Figure 1. The Department Chair reports to the Dean of the College and is responsible for the academic and administrative leadership of the department. The Chair is supported by faculty members who serve on various departmental and college-level committees to ensure the smooth functioning of the program and the implementation of quality assurance processes.

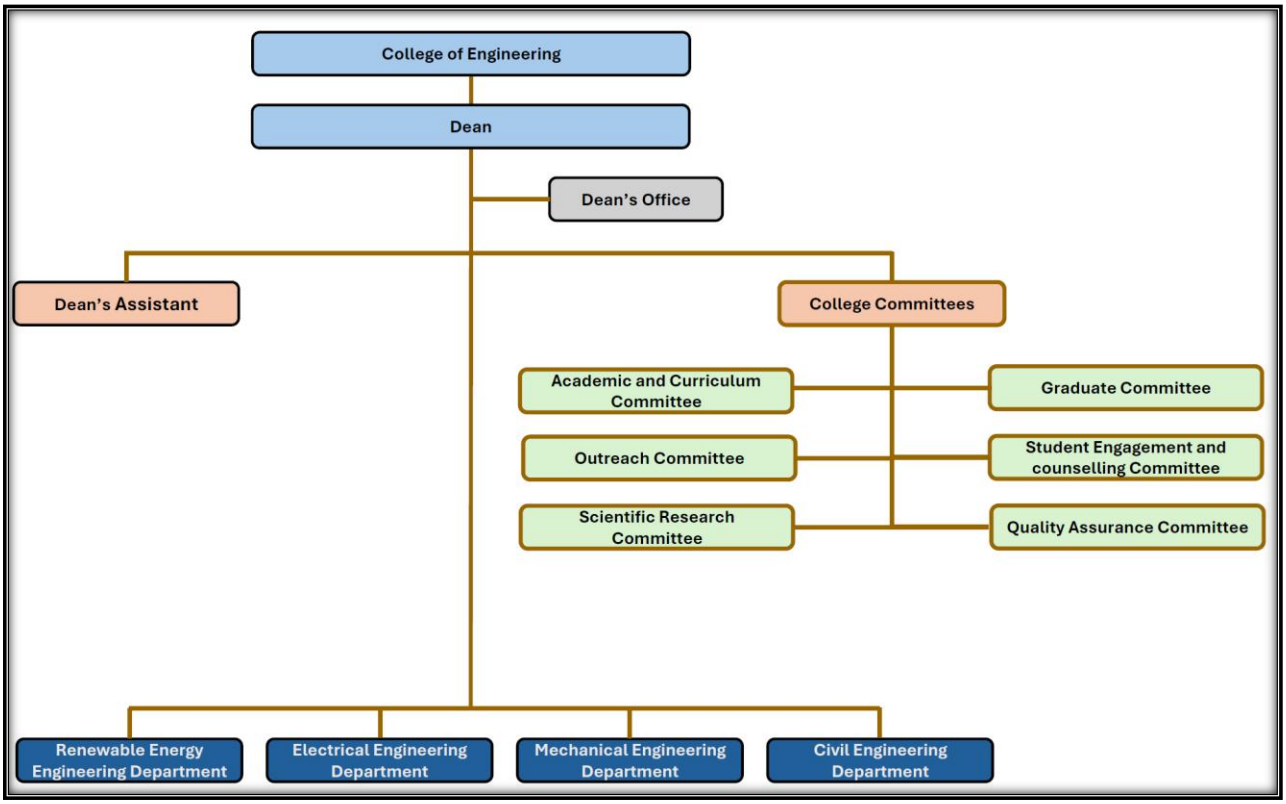

Figure 1 Organizational structure of CoE

Key departmental committees include the Scientific Research Committee, Accreditation and Quality/ABET Committee, Curriculum Committee, Laboratory and Safety Committee, and Engineering Training Committee. These committees are instrumental in course development, curriculum review, laboratory maintenance, and ensuring compliance with accreditation standards.

1.7 Graduate Attributes

FBSU aims to instill a set of desired qualities and competencies in all its graduates, including deep discipline knowledge, creative and critical thinking, digital capability, communication skills, moral and ethical awareness, self-directed learning, teamwork, leadership, and social responsibility. For a graduate of the REE program, these attributes are specifically contextualized:

- **Deep Discipline Knowledge:** Implies expertise in core renewable energy fields such as photovoltaics, wind energy systems, solar thermal design, and grid integration technologies.
- **Digital Capability:** Extends to proficiency in specialized engineering software like PVsyst for solar system design and MATLAB for power electronics simulation.
- **Creative and Critical Thinking:** Translates directly to the ability to design innovative and sustainable energy solutions, analyze complex energy systems, and solve multifaceted engineering problems.

The department's Program Learning Outcomes (PLOs) and Course Learning Outcomes (CLOs) are meticulously mapped to the university's Institutional Learning Outcomes (ILOs), ensuring a coherent and progressive development of these competencies.

1.8 Quality Assurance Management

Quality assurance is deeply embedded in the REE Department's operations, ensuring continuous improvement and adherence to national and international benchmarks. The system systematically monitors and evaluates the academic program, research initiatives, and administrative services.

The roles and responsibilities for quality assurance are adapted from the college level to the departmental context:

- **Department Chair:** Serves as the chief academic officer for the department, providing overall leadership in implementing quality assurance policies, promoting a quality culture, and ensuring program quality.
- **Department QA Coordinator:** A designated faculty member responsible for leading the quality assurance system within the department. Duties include ensuring compliance with NCAAA and ABET standards, coordinating quality-related activities, managing quality data, and preparing performance reports.

- **Faculty Members:** All faculty members are active participants in the quality assurance process. Responsibilities include developing and assessing course learning outcomes, participating in committee work, assisting in self-evaluation reports, and executing improvement plans.

This distribution of responsibilities ensures that quality is an embedded responsibility across all levels of the department, with the College QA Unit and the University's Deanship of Quality and Academic Accreditation (DQAA) providing the overarching framework and oversight.

Table 1: REE Department Committees and their Alignment with Quality Assurance

Committee Name	Mandate/Purpose (REE-specific)	Key Responsibilities in QA (REE-specific)	Alignment with CoE/University-level Committees	Relevant NCAAA/ABET Standard
Scientific Research Committee	Promotes and oversees research activities within the department, focusing on renewable energy technologies.	Ensures research quality and ethical conduct; monitors research output KPIs; supports faculty in securing grants and publications in solar, wind, and hydrogen fields.	Collaborates with CoE Scientific Research Committee and Deanship of Graduate Studies and Research (DGSR).	NCAAA Standard (Research), ABET Criterion (Student Outcomes - research skills)
Accreditation and Quality / ABET Committee	Leads and coordinates all quality assurance and accreditation activities within the department.	Prepares and distributes the REE Quality Manual; coordinates internal program reviews; monitors quality procedures and data; prepares performance reports for the Chair.	Reports directly to the Department Chair; collaborates closely with the College QA Unit and DQAA.	NCAAA Standard (Governance & Management), ABET Criterion (Continuous Improvement)

Committee Name	Mandate/Purpose (REE-specific)	Key Responsibilities in QA (REE-specific)	Alignment with CoE/University-level Committees	Relevant NCAAA/ABET Standard
Curriculum Committee	Oversees development, review, and approval of the REE academic program and curriculum.	Ensures the REE program meets NQF, NCAAA, and ABET standards; reviews course/program specifications; approves curriculum changes (e.g., 140 to 159 credit hours).	Collaborates with CoE Academic and Curriculum Committee and Institutional Curriculum Committee (ICC).	NCAAA Standard (Teaching & Learning), ABET Criterion (Curriculum)
Laboratory and Safety Committee	Manages the department's specialized labs (Solar, Wind, Renewable Energy) and ensures safe operating procedures.	Develops and enforces safety protocols; oversees equipment maintenance and upgrades; ensures lab activities support course learning outcomes.	Coordinates with CoE administration and university's Health, Environment, and Public Safety Dept. (HEAPS).	ABET Criterion (Facilities)
Engineering Training Committee	Manages the summer internship program (REE 400) for senior students.	Secures training placements with industry partners (e.g., NEOM); oversees student supervision and evaluation; gathers feedback from training supervisors.	Collaborates with CoE Outreach Committee and Deanship of Student Affairs (DAS).	ABET Criterion (Curriculum), NCAAA Standard (Community Partnership)

Table 2: REE Department Quality Assurance Roles and Responsibilities

Role	Primary Responsibilities (Key duties related to QA)	Reporting To	Key Collaborations
Department Chair	Overall leadership in QA; promotes quality culture; oversees academic advising and improvement plans; approves strategic plans; ensures program quality.	Dean of the College	College QA Unit, Department QA Coordinator, Faculty Members, College Council
Department QA Coordinator	Leads Department QA system; ensures NCAAA/ABET compliance; prepares/distributes REE QM; coordinates QA activities; monitors procedures; manages quality data; prepares reports.	Department Chair	College QA Unit, Faculty Members, Department Committees
Faculty Members	Assist QA Coordinator; support data collection; participate in committee meetings; assist in self-evaluation reports; help execute improvement plans; develop and assess CLOs.	Department Chair / QA Coordinator	Other Faculty Members, Department Committees

SECTION II

KPI FRAMEWORK IN THE REE DEPARTMENT

2. Key Performance Indicator Framework

The Key Performance Indicator (KPI) framework for the Department of Renewable Energy Engineering is in full alignment with the framework established by the College of Engineering, which adheres to the standards set by the National Center for Academic Accreditation and Evaluation (NCAAA). The department has adopted the 11 NCAAA KPIs for bachelor's level programs, which are measured annually to ensure the quality of the program. These indicators are essential for evaluating the extent to which the academic program's objectives are achieved and its strategies are efficient, providing clear metrics to stakeholders on the program's direction and performance.

2.1 KPI Framework Principles

The following principles, adopted from the College of Engineering, guide the use of KPIs within the REE Department:

- **Relevance and Alignment with Strategy:** Each KPI is aligned with the Fahad Bin Sultan University Strategic Plan, ensuring its relevance to institutional goals.
- **Clarity:** The KPI provides a clear and detailed explanation, defining the outcome and allowing for comparison with previous years' performance.
- **Driver to impact real change:** Target benchmarks are established and compared against actual performance to control and drive meaningful improvements.
- **Data Availability:** All selected KPIs are calculated based on available data. In cases of data unavailability, the indicator is noted as "aspirational," and actions are identified to source the required data in the future.
- **Mixture of Quantity and Quality Indicators:** The department follows a holistic approach by measuring its performance annually through both quantitative and qualitative KPIs.

2.2 Program KPI Terminology

For KPI analysis, the following terminology is used:

- **Benchmark/KPI:** The key performance indicators of the program.
- **Target Benchmark:** The anticipated or desired outcome for each KPI.
- **Actual Benchmark:** The actual outcome determined when the KPI is measured.
- **Internal Benchmarks:** Comparable benchmarks from within the program or department (e.g., data from previous years).
- **KPI Analysis:** A comparison of benchmarks to determine strengths and recommend improvements.
- **New Target Benchmark:** A new anticipated outcome for the KPI based on the analysis.

2.2.1 FBSU Data Related Policies

The REE Department adheres to all data-related policies established by the university to align departmental outcomes with the university's goals and vision. These policies include the KPI Policy, Benchmarking Policy, Proactive Data Collection & Management Policy, and Data Access Policy, which collectively ensure that performance is reviewed through evidence-based decision-making while maintaining data privacy and integrity.

2.3 Key Performance Indicators (KPIs)

The following table presents the KPIs applicable to the Bachelor of Renewable Energy Engineering program.

Table 3: KPIs for the Bachelor of Renewable Energy Engineering Program

KPI Code	KPI Description
KPI-P-01	Students' Evaluation of Quality of learning experience in the program.
KPI-P-02	Students' evaluation of the quality of the courses.
KPI-P-03	Completion rate.
KPI-P-04	First-year students' retention rate.
KPI-P-05	Students' performance in the professional and/or national examinations.

KPI-P-06	Graduates' employability and enrolment in postgraduate programs.
KPI-P-07	Employers' evaluation of the program graduates' proficiency.
KPI-P-08	Ratio of students to teaching staff.
KPI-P-09	Percentage of publications of faculty members.
KPI-P-10	Rate of published research per faculty member.
KPI-P-11	Citations rate in refereed journals per faculty member.

2.4 REE Department Surveys used for calculating Program level KPIs

The REE Department utilizes various surveys administered by the university to collect the data necessary for calculating its program-level KPIs. These instruments, shown in Figure 2, are crucial for gathering stakeholder feedback and measuring performance against established benchmarks. The surveys include:

- Students' evaluation of the quality of the programs
- Satisfaction of beneficiaries with learning resources
- Students' satisfaction with the offered services
- Satisfaction of beneficiaries with technical services
- Students' evaluation of the quality of the courses
- Employers survey
- Alumni survey

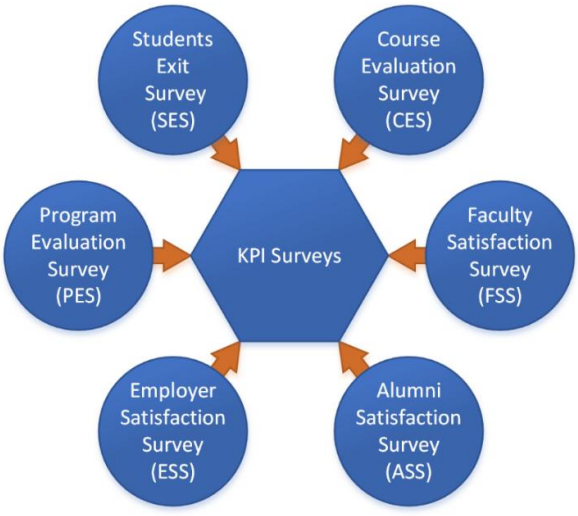

Figure 2: FBSU Surveys for calculating KPI results

SECTION III

STAKEHOLDERS ENGAGEMENT FORUM

3.1 Purpose

The stakeholder engagement forums for the Department of Renewable Energy Engineering aim to foster open, structured, and inclusive dialogue between the department and its key stakeholders. These stakeholders include students, faculty, staff, alumni, employers, industry partners like NEOM, and the broader community. The purpose is to gather direct feedback on strategic initiatives, academic programs, and research priorities, ensuring that the department's strategies and services remain aligned with stakeholder needs and emerging industry trends.

3.2 Scope

The stakeholder forums cover a broad range of strategic, academic, and operational topics relevant to the REE Department, including but not limited to:

- Strategic priorities and departmental development.
- Academic program quality and curriculum relevance.
- Research and innovation initiatives in renewable energy.
- Student services and campus life.
- Community outreach and industry partnerships.
- Employer expectations and labor market trends in the energy sector.

3.3 Objectives

The objectives of the stakeholder forums are to:

- Engage stakeholders in the department's decision-making and continuous improvement processes.
- Gather diverse perspectives on key strategic and operational issues.
- Identify the needs, challenges, and opportunities from the viewpoint of various stakeholder groups.

- Strengthen transparency and trust between the department and its stakeholders.
- Enhance the relevance and impact of the academic program based on external input.
- Support evidence-based planning through systematic stakeholder feedback.

3.4 Surveys and Feedback

The REE Department implements a structured approach to collecting stakeholder feedback through periodic internal and external surveys. The feedback from these surveys is analyzed, and action plans are implemented to address concerns and incorporate suggestions for improvement. The Department's Quality Coordinator is responsible for compiling program KPIs and collecting the data needed for program enhancement.

The main stakeholders for the REE Department are:

1. **Students:** Current REE students, especially those nearing graduation, provide immediate feedback through student councils, exit surveys, and interviews.
2. **Alumni:** As the first cohort of the REE program graduated in May 2025, the department is establishing strong engagement channels to gather feedback on program relevance and job preparedness. Their input is crucial for assessing the achievement of long-term program objectives.
3. **Faculty:** REE faculty provide input through regular Department Council meetings, Curriculum Committee meetings, and course reports.
4. **Employers/Industry Partners:** This is a significant constituency for the REE program, primarily including organizations in the public and private sectors. ENOWA, the energy and water subsidiary of the NEOM project, is a key employer of REE graduates. Their input is obtained through employer surveys and the Industrial Advisory Board (IAB).
5. **REE Industrial Advisory Board (IAB):** The IAB has been a key stakeholder since the program's inception, providing critical feedback that helps shape the program's policies and objectives. The board comprises members from NEOM's energy sector (ENOWA) and industry, such as the Masdar solar panel factory.
6. **Student Training Supervisors:** Experienced engineers from organizations where senior REE students conduct their summer internships provide valuable feedback on student performance and preparedness for the professional environment.
7. **Professional and Accreditation Bodies:** Organizations like ETEC-NCAAA and ABET play an important role in specifying learning outcomes and assessment strategies.

3.5 Councils and Committees

The REE Department is keen to have all stakeholders participate in the decision-making process and strictly follows the university's guidelines for forming and operating councils and

committees. The department engages students and the business community through these platforms. The REE Industrial Advisory Board, in particular, facilitates a dynamic exchange of ideas, ensuring the program remains attuned to industry expectations. This collaboration guides strategic improvements and helps adapt the program to emerging industry needs.

SECTION – IV

MANAGEMENT OF THE RENEWABLE ENERGY ENGINEERING DEPARTMENT

4.1 Renewable Energy Engineering Department Mission, Program Educational Objectives (PEOs) & Program Learning Outcomes (PLOs)

4.1.1 Program Mission

The mission of the REE Program is to graduate competent renewable energy engineers who fulfill market needs and are equipped with sound knowledge and research and fundamental skills to:

- Be pioneers contributing to the comprehensive sustainable national development plans.
- Devote valuable engineering skills and knowledge toward the design, building, and running of renewable energy projects.
- Support the Kingdome's efforts to introduce renewable energy as part of its energy mix, aligning with the Saudi Vision 2030.
- Work in diverse environments, embrace lifelong learning, collaborate and lead in multidisciplinary teams.

4.1.2 Program Educational Objectives (PEOs)

The REE program is designed to achieve the following PEOs, which describe the expected accomplishments of graduates during the first few years after graduation:

- **PEO1. Apply Engineering Fundamentals:** Equip students to solve renewable energy engineering problems using principles of mathematics, basic sciences, and engineering analysis, aligned with industry and societal needs.
- **PEO2. Design Sustainable Solutions:** Develop skills to design systems and processes that prioritize safety, sustainability, and ethical considerations in diverse socio-economic and environmental contexts.
- **PEO3. Promote Professional Competence:** Cultivate effective communication, teamwork,

leadership, and ethical judgment to address global challenges and uphold professional responsibilities in engineering practice.

- **PEO4. Advance Lifelong Learning:** Prepare graduates to adapt to emerging technologies, conduct experiments, interpret data, and pursue continuous learning for research or professional growth.

4.1.3 Program Learning Outcomes (PLOs)

For the purposes of this manual and to ensure alignment with international accreditation standards such as ABET, the REE program's seven Student Outcomes (SOs) serve as its official Program Learning Outcomes (PLOs). These outcomes describe what students are expected to know and be able to do by the time of graduation. The program's adoption of specific, measurable Performance Indicators (PIs) for each PLO represents a mature and sophisticated approach to outcome-based education. This granular structure makes the assessment and continuous improvement processes more precise and data-driven. It allows instructors to target and assess specific sub-skills within a broader competency, generating more actionable data for program enhancement. This demonstrates a proactive commitment to quality that is strategically aligned with the demanding standards of international engineering accreditation.

Table 4: Renewable Energy Engineering Program Learning Outcomes (PLOs) and Performance Indicators (PIs)

PLO (Student Outcome)	Performance Indicators (PIs)
1) An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.	1a) Demonstrate the ability to identify and understand the principles of engineering, science, and mathematics. 1b) Formulate complex engineering problems by applying the principles of engineering, science, and mathematics. 1c) Apply engineering, science, and mathematics principles to develop solutions for complex engineering problems.
2) An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.	2a) Produce a clear needs statement for a design project, identify constraints, and establish criteria for acceptable and desirable solutions. 2b) Evaluate and analyze the economic aspects of engineering solutions, and use appropriate techniques to assess and manage risks in product or process design.

PLO (Student Outcome)	Performance Indicators (PIs)
3) An ability to communicate effectively with a range of audiences.	3) Communicate effectively with diverse audiences, tailoring the message to the audience's level of understanding and context.
4) An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.	4a) Recognize and uphold ethical and professional responsibilities in engineering situations. 4b) Identify alternative engineering solutions, considering economic, environmental, and societal impacts, and address design conflicts.
5) An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives.	5a) Identify and fulfill roles within a team to ensure success, integrate inputs from all team members, and make decisions based on objective criteria. 5b) Monitor team progress and provide constructive feedback to enhance team performance.
6) An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.	6a) Demonstrate good laboratory practices and instrumentation skills to measure specific quantities and collect required data. 6b) Use appropriate tools to analyze data, verify and validate experimental results, and account for experimental errors.
7) An ability to acquire and apply new knowledge as needed, using appropriate learning strategies.	7) Show awareness of the importance of continuous learning and research after graduation, and independently find information relevant to problem-solving.

Table 5: Mapping of REE Program Educational Objectives (PEOs) to Program Learning Outcomes (PLOs/SOs)

	PLO 1 (Problem Solving)	**PLO 2** (Design)	**PLO 3** (Communication)	**PLO 4** (Ethics)	**PLO 5** (Teamwork)	**PLO 6** (Experimentation)	**PLO 7** (Lifelong Learning)
PEO1:	✓					✓	✓

	PLO 1 (Problem Solving)	**PLO 2** (Design)	**PLO 3** (Communication)	**PLO 4** (Ethics)	**PLO 5** (Teamwork)	**PLO 6** (Experimentation)	**PLO 7** (Lifelong Learning)
Apply Engineering Fundamentals							
PEO2: Design Sustainable Solutions		✓		✓			
PEO3: Promote Professional Competence			✓	✓	✓		
PEO4: Advance Lifelong Learning	✓				✓	✓	✓

This mapping demonstrates the logical coherence of the program's educational design. It shows that the short-term learning outcomes achieved by graduation (PLOs/SOs) are intentionally designed to build toward the long-term career and professional objectives (PEOs), validating that the curriculum is a cohesive whole.

4.2 Program Development, Approval and Review Process

The process of developing a new program at the REE Department follows the policy of new program design offered by FBSU. The process for developing a new program is illustrated in Figure 3. The department adheres to the established university-wide procedures for proposing, approving, and reviewing academic programs to ensure quality and alignment with institutional goals.

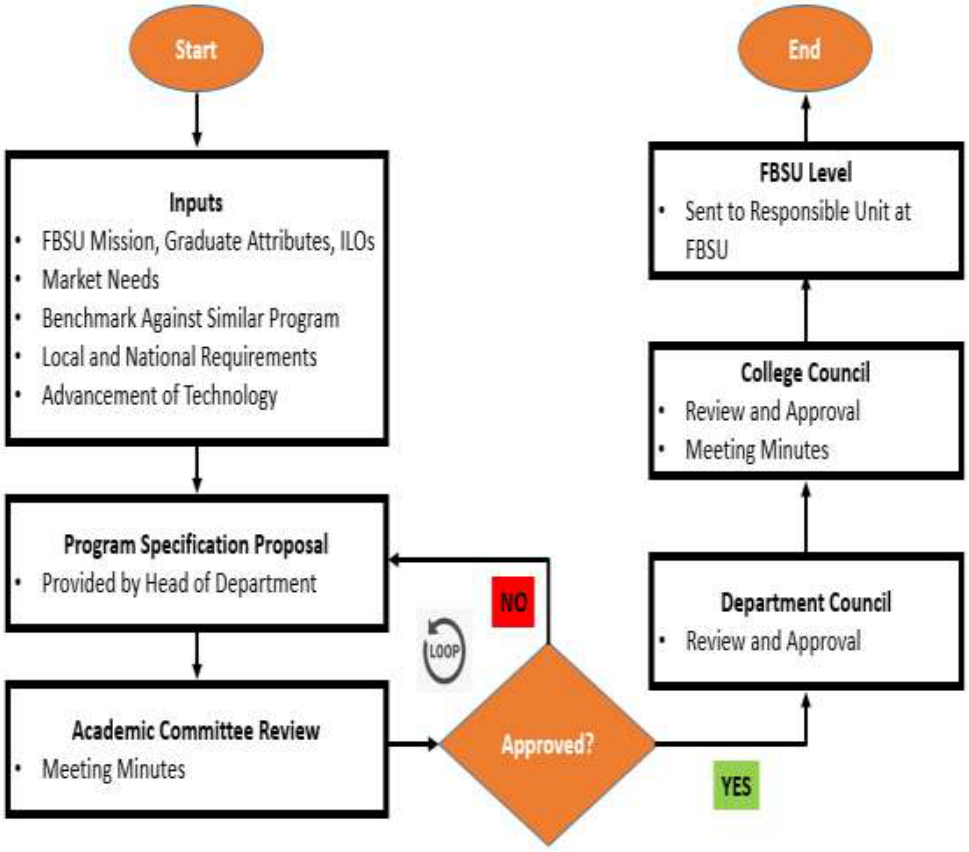

Figure 3: Flowchart of Developing a New Program at CoE.

4.3 Curriculum Mapping (CLOs to PLOs to NQF Domains)

The REE Department Chair is required to develop PLOs according to the policy provided by FBSU. Each instructor is required to provide course specifications and develop Course Learning Outcomes (CLOs) that align with the PLOs, following the standard policy offered by FBSU. At the end of each semester, a course report must be provided for each course by the instructor. Both instructors and the department chair must use the standard format provided by NCAAA to develop course specifications, course reports, and program specifications. This hierarchical mapping, illustrated in Figure 4, ensures that course-level activities directly contribute to achieving departmental and institutional learning outcomes.

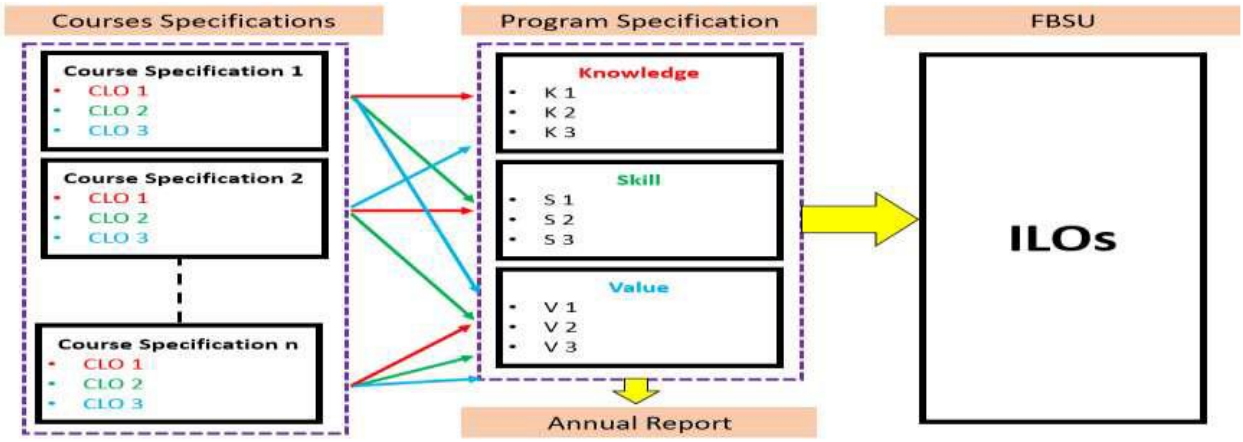

Figure 4: Mapping CLOs to PLOs to ILOs.

4.4 Benchmarking and Program Comparability

Benchmarking is the continuous process of comparing the department's strategy, curriculum, and processes with other best-in-class institutions to learn how they achieved excellence and then set out to match and even surpass it. The REE department engages in this process to ensure its curriculum remains current, relevant, and competitive.

4.4.1 Basic Benchmarking Methodology

The department follows a four-stage methodology:

1. **Plan:** Identify what to benchmark and who to benchmark against (internal units, other universities, best-in-class).
2. **Implement:** Collect comparative qualitative and quantitative data.
3. **Analyze:** Analyze the data to identify performance gaps and new practices for adoption.
4. **Act:** Implement an action plan for change and measure the results for effectiveness.

The College of Engineering has established benchmarking partnerships with UBT College and Prince Muqrin University, and the REE Department leverages these relationships for its own comparability studies. An example of this benchmarking process is shown in Figure 5.

UBT
عضو الاتحاد الدولي للجامعات
عضو اتحاد الجامعات العربية

قياس مؤشرات الأداء الرئيسية للبرامج الأكاديمية

الصادرة عن هيئة تقويم التعليم والتدريب/ المركز الوطني للتقويم والاعتماد الأكاديمي للسنة:

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ص.ب 33335 جدة 21448 المملكة العربية السعودية ، هاتف 920000490 فاكس 966122159010+ ، البريد الإلكتروني info@ubt.edu.sa

Figure 5 Sample Benchmarking with UBT College

4.5 Survey Analysis Report on Course Evaluation

4.5.1 Formal Feedback Analysis Procedure

The REE Department follows the college's formal procedure for analyzing feedback from course evaluation surveys, which is outlined in the flowchart in Figure 6. Survey results are compiled and analyzed statistically and thematically. A Departmental Teaching Evaluation Report is generated each semester, identifying strengths, weaknesses, and common student concerns or suggestions. Based on this analysis, the Department Council holds a Teaching Review Meeting to identify courses needing improvement and recommend specific actions. Faculty members create Course Action Plans for courses that score below target benchmarks or receive significant negative feedback.

Structured Feedback Collection and Analysis

Figure 6 : Feedback Analysis Flow Chart

4.5.2 Documenting Changes and Improvements

A "Feedback-to-Action" summary sheet is completed for each course at the end of the semester as part of the Course Report. This document lists key feedback points, the actions taken or planned, the responsible faculty members, and the timeline for implementation. This documentation is stored in the department's Annual Quality File and submitted to the College QA Unit for central monitoring.

SECTION - V

TEACHING AND LEARNING

5.1 Teaching and Learning Policies

The Department of Renewable Energy Engineering adheres to the comprehensive suite of teaching and learning policies established by Fahad Bin Sultan University and the College of Engineering. These policies provide a framework for ensuring quality, consistency, and continuous improvement in all aspects of course design, delivery, and assessment. Key policies include:

- New Faculty Orientation Policy
- Course Design Policy
- Course Syllabus Policy
- Course Specifications Policy
- Course Learning Outcomes Development Policy
- Program Amendment Policy
- Program Specifications Policy
- Learning Outcomes Assessment Policy
- Professional Development Policy
- Classroom Observation Policy
- Program Assessment Policy
- Curriculum Development and Review Policy
- Student Assessment Policy
- E-Learning Management System (E-LMS) Policy
- Teaching and Learning Quality Framework Policy
- Academic Advising Policy
- Student Special Needs Policy
- Academic and Intellectual Freedom Policy and Academic Misconduct Policy
- Faculty Code of Conduct Policy

5.2 Teaching Effectiveness Evaluation

Evaluating teaching effectiveness is a critical component of the REE Department's Quality Assurance framework. It ensures that instructional practices align with institutional learning outcomes, foster student engagement, and continuously improve based on evidence and feedback. The evaluation process is structured, data-informed, and aligned with national and international academic standards.

5.3 Evaluation Methods

The following tools and mechanisms are used to evaluate teaching effectiveness within the REE Department:

5.3.1 Student Course Evaluations

Anonymous surveys are conducted at the end of each semester for every course using a standardized instrument. Students rate their instructor’s teaching strategies, communication clarity, subject knowledge, and responsiveness. The results are aggregated and reported to faculty and academic leadership for reflection and improvement. The university's evaluation system is illustrated in Figures 7, 8, and 9.

Figure 7 Course Evaluation Systems

Figure 8 : Course Evaluation Surveys.

Spring 2023-2024

Course	Fundamental of Power Electronics	Instructor	عمار القحطاني	Section	30	Course Code	REE 310
الكلية	Engineering	Department	Renewable Energy Engineering	Response	100.00%	Average Program	4.15
The start of the course							
The course outline (including the knowledge and skills the course was designed to develop) was made clear to me.							4.45
The things I had to do to succeed in the course, including assessment tasks and criteria for assessment, were made clear to me.							4.18
Sources of help for me during the course including faculty office hours and reference material, were made clear to me.							4.27
What happened during the course							
The conduct of the course and the things I was asked to do were consistent with the course outline.							4.09
My instructor(s) were fully committed to the delivery of the course. (Eg. classes started on time, instructor always present, material well prepared, etc).							4.36
My instructor(s) had thorough knowledge of the content of the course.							4.64
My instructor(s) were available during office hours to help me.							4.45
My instructor(s) were enthusiastic about what they were teaching.							4.73
My instructor(s) cared about my progress and were helpful to me.							4.68
Course materials were of up to date and useful. (texts, handouts, references etc.)							4.23
The resources I needed in this course (textbooks, library, computers etc.) were available when I needed them.							4.18
In this course effective use was made of technology to support my learning.							4.50
In this course I was encouraged to ask questions and develop my own ideas.							4.27
In this course I was inspired to do my best work.							4.36
The things I had to do in this course (class activities, assignments, laboratories etc) were helpful for developing the knowledge and skills the course was intended to teach.							4.36
The amount of work I had to do in this course was reasonable for the credit hours allocated.							4.59
Marks for assignments and tests in this course were given to me within reasonable time.							3.95
Grading of my tests and assignments in this course was fair and reasonable.							4.59
The links between this course and other courses in my total program were made clear to me.							4.59

Figure 9 : Sample Instructor's Course Evaluation

5.3.2 Peer Review of Teaching

Peer evaluations are conducted for faculty members to ensure adherence to effective teaching standards. Senior faculty members from the department conduct the evaluations using a standardized observation rubric that assesses instructional clarity, content delivery, classroom interaction, and learning environment management. The template for this rubric is shown in Figure 10. A consolidated report is submitted to the Dean through the quality chair.

Fahad Bin Sultan University

Peer Review Report Form

College:	Department:
Instructor's Name:	Course:
Term:	Academic Year:
Review Date:	Review Time:

Reviewer(s) evaluation of each of the following Criterion:

5: Extremely Effective;	*4: Highly Effective;*	*3: Somewhat Effective;*
2: Least Effective;	*1: Not Effective;*	*NA: Not Applicable*

Criteria	5	4	3	2	1	NA	Comments
Mastery of the subject matter							
Effective use of delivery tools (PPT, multimedia, whiteboard, etc.)							
Class time management							
Teaching style inspire students							
Use of tone of voice							
Communicate with students							
Use of collaborative work							
Encourage students to ask questions and provide instant feedback							
Response to students' questions							
Use of relevant case studies							
Work relevant examples							
Relate material to current issues							
Quick review of previous lecture							
State objectives of current lecture							
Summarized what was covered							
Required textbook							
Took attendance							
Gave handouts							
Assigned homework							

Fahad Bin Sultan University

Reviewers' summary
Best teaching practice:
Worst teaching practice:
Additional insights:
Overall assessment and comments:
Specific recommendations to the instructor: 1) 2) 3) 4)

Reviewer's Name	**Signature**	**Date**

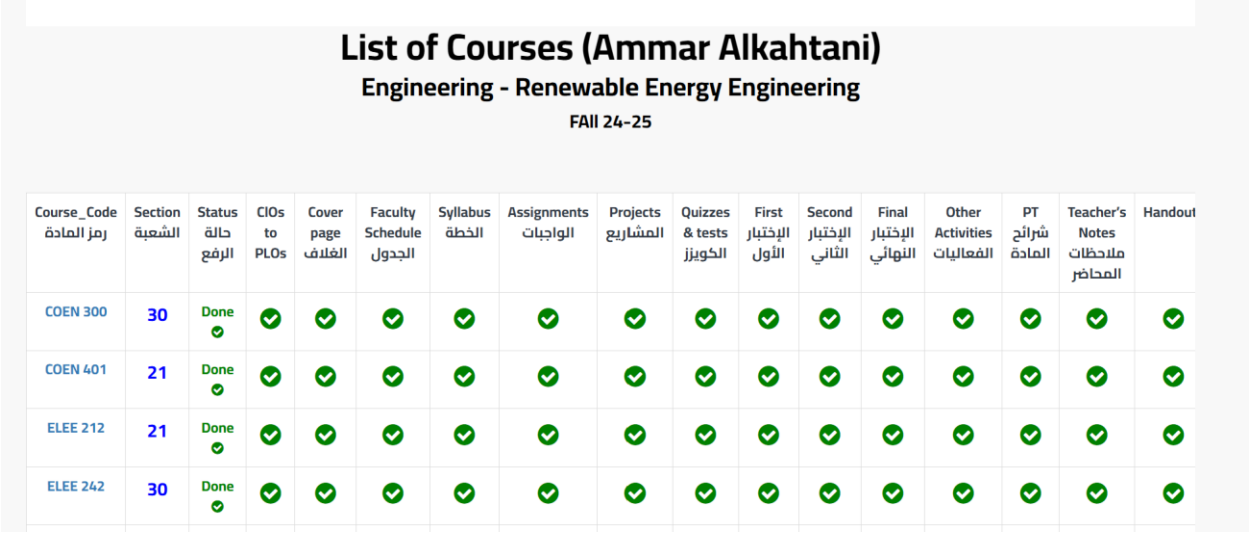
Instructor's Signature:	**Date:**

Figure 10 Peer Review Template

5.3.3 Course File and Portfolio Review

Course portfolios are submitted at the end of each semester and reviewed by the Department's Quality Assurance Committee. Each file is checked for the alignment of course learning outcomes (CLOs) with instructional methods and assessment tools. A checklist is maintained, and feedback

is provided to each individual faculty member in case of any discrepancies. A sample view of an instructor's portfolio is provided in Figure 11.



List of Courses (Ammar Alkahtani)

Engineering - Renewable Energy Engineering

FAll 24-25

Course_Code رمز المادة	Section الشعبة	Status حالة الرفع	CIOs to PLOs	Cover page الغلاف	Faculty Schedule الجدول	Syllabus الخطة	Assignments الواجبات	Projects المشاريع	Quizzes & tests الكويزز	First الإختبار الأول	Second الإختبار الثاني	Final الإختبار النهائي	Other Activities الفعاليات	PT شرائح المادة	Teacher's Notes ملاحظات المحاضر	Handout
COEN 300	30	Done	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
COEN 401	21	Done	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
ELEE 212	21	Done	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
ELEE 242	30	Done	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

Figure 11 : Sample Instructor Portfolio View

5.3.4 Review Course Portfolio Process

The review of the course portfolio reflects the output of the quality assurance process, including assessment approaches, syllabus, and up-to-date teaching materials. The process, illustrated in Figure 12, involves a detailed review of all components of the course portfolio for all courses and instructors each semester, with evaluations and comments documented.

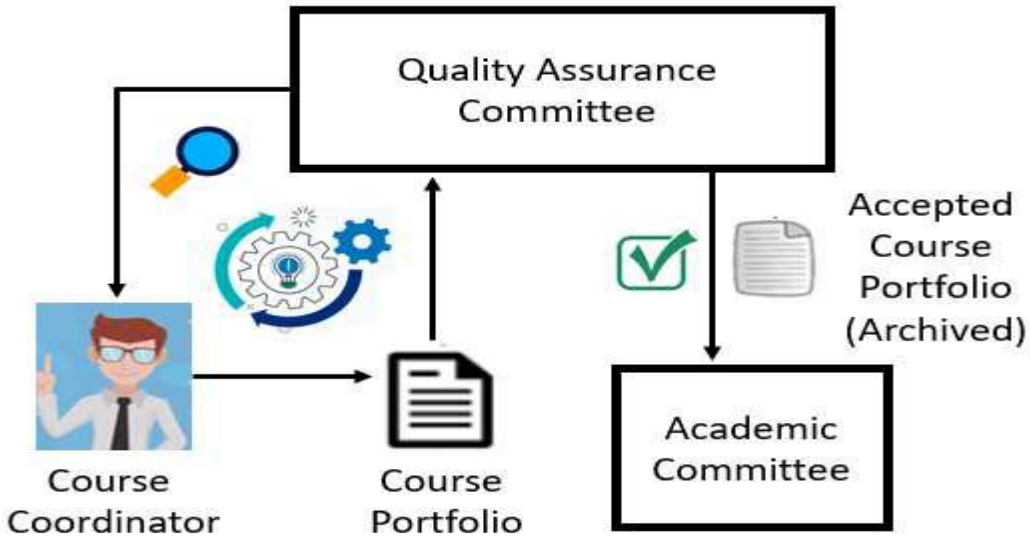


Figure 12 : Review Course Portfolio Process

5.4 Moderation of Assessments

The Department Chair is responsible for defining moderators for courses at the beginning of each semester. Pre- and post-moderation of exams and assignments are conducted to ensure content validity, fairness, and alignment with CLOs. The pre- and post-moderation forms are shown in Figure 13 and Figure 14, respectively. Feedback from moderators is shared with instructors for instructional refinement.

PRE-ASSESSMENT MODERATION FORM

College:	**College of Engineering**	**Department:**	**Electrical Engineering**
Program:	**Bachelor of Electrical Engineering**		
Academic Year:	**24-25**	**Semester:**	**Fall**
Dean:	**Khaldoon Bani Hani**	**Dept. Chair:**	**Ali Ramadan**
Course Code:	**ELEE 390**	**Course Title:**	**Electromagnetic**
Type of Assessment:	**Direct (Midterm Exam)**	**Date of Assessment:**	**October 22, 2024**
Name of Moderator:	**Ali Al-Shetwi**		

Name of Moderator:

		Yes	No	Comments
1	**Is the assessment consistent with the course learning outcomes and their relative weights?**	×		**a) Each problem is aligned with its corresponding course learning outcome as per the course syllabus. b) The ratio of the problems' assigned grades is consistent with CLO2:CLO3=30%:20% weights.**
2	**Does the assessment enable students to provide evidence corresponding to the stated learning outcomes?**	×		**The CLOs targeted in this assessment are problem-solving based. This assessment indeed reflects each student's ability in performing transmission line calculations (CLO2) and employing vector calculus in solving electromagnetics-based problems (CLO3).**
3	**Is the assessment appropriate to the course level?**	×		**This assessment is appropriate to the course level.**
4	**Are all assessment instructions and marking schedule details, available to students, clear for all students to understand?**	×		**The grade of each problem and its mapped CLO are clearly outlined on the exam's cover page.**
5	**Is the marking schedule clear for markers to understand?**	×		**The exam's key solution is neat in terms of grade distribution (per problem) and marking procedure.**
6	**Does the marking schedule indicate the range of evidence and Judgment required to ensure consistency in assessment?**	×		**The marking schedule is designed to ensure consistency in assessment.**
7	**List any changes you recommend before the assessment and marking schedule is used**		×	**N/A**
8	**Any other comments you have arising from this pre-assessment Moderation?**		×	**N/A**

Figure 13: Pre-Moderation Form

POST- ASSESSMENT MODERATION FORM

College:	**College of Engineering**	**Department:**	**Electrical Engineering**
Program:	**Bachelor of Electrical Engineering**		
Academic Year:	**24-25**	**Semester:**	**Fall**
Dean:	**Khaldoon Bani Hani**	**Dept. Chair:**	**Ali Ramadan**
Course Code:	**ELEE 390**	**Course Title:**	**Electromagnetic**
Type of Assessment:	**Direct (Midterm Exam)**	**Date of Assessment:**	**October 22, 2024**
Course Instructor:	**Ali Ramadan**		
Name of Moderator:	**Ali Al-Shetwi**		

No.	Student Name	ID	Selection Criteria	Mark Awarded	Moderator's Comments
1	Rayan Abdullah S Alghamdi	202111199	Highest grade	22	verified
2	Maram Saleh S Alatawi	202115131	Above Average	15.5	verified
3	Saud Abdulaziz I Alsharari	202111168	Above Average	13.75	verified
4	Hadi Ali S Aldhawi	202312058	Around Average	10.5	verified
5	Mohammed Saleem M Alhawiti	202312092	Around Average	10	verified
6	Thamer Abdullah H Alzahrani	202212039	Below Average	6.5	verified
7	Saud Mari S ALqarni	202312145	Below Average	5	verified
8					

Moderator's General Comments

		Yes	No
1	**Documentation seen:** ✓ **Full list of marks awarded to all students for this assessment** ✓ **Course assessment scheme** ✓ **Brief and assessment criteria** ✓ **Marking scheme** ✓ **Grade descriptors** ✓ **Feedback**	×	
2	**Does the moderation sample reflect the full range of marks and markers?**	×	
3	**Does the marking conform to the marking scheme?**	×	
4	**Does the marking conform to the verified assessment criteria?**	×	
5	**Are the marking decisions consistent?**	×	
6	**Are there any recurring themes, patterns, discrepancies?**		×
7	**Have any concerns been resolved with the marker(s)? (if Yes, what actions have been taken?)**		×

I have checked the marking of the items in this sample and confirm that the verified assessment and marking criteria have been accurately, consistently and fairly applied.

I do confirm the marks for all students who have taken this assessment.

Moderator's Signature:	**Ali Al-Shetwi**	**Date:**	**November 5, 2024**

Figure 14 Post-Moderation Form

5.5 Use of Blended/Online Learning Standards

The REE Department is committed to delivering high-quality blended and online learning experiences that uphold academic rigor and align with the standards set by the National eLearning

Center (NELC) in Saudi Arabia. The Learning Management System (LMS), Moodle, is the primary platform used to deliver, manage, and monitor online instruction.

5.6 Strategic Implementation

Blended and online delivery is adopted strategically across select courses to enhance accessibility, flexibility, and student-centered learning. Courses delivered in these formats are identified in course specifications and approved by the department and college councils.

5.7 Standards and Compliance

All online and blended courses are designed and delivered in compliance with NELC standards, ensuring quality in content, interaction, assessment, and student support.

5.8 Course Design and Delivery

Online materials are structured with clearly defined learning objectives, multimedia content, interactive elements, and formative assessments. Teaching methods incorporate videos, recorded lectures, online quizzes, discussion forums, and project-based learning. Learning analytics tools are used to monitor student progress and engagement.

5.9 Quality Assurance Administrative Calendar

The REE Department follows the DQAA calendar prepared by the College of Engineering at the start of each academic year. This calendar tracks the submission of essential documents and enhances the monitoring and review processes for continuous quality improvement. The calendar is divided into three phases: the beginning of the semester, during the semester, and the concluding weeks after exams, ensuring that all necessary documentation is completed and submitted promptly. The structure of this calendar is shown in Figure 15, with a detailed example provided in Figure 16.

Faculty Member Administrative Calendar

No	Name of the Document	Timeline	Status
Beginning of the Semester (Week 1 to 2)			
1	Submission of Course Specifications to the chairs	End of Week 1 of the term	
2	Upload Course Outlines to Moodle System	End of Week 1 of the term	
3	Updating the assessment schedule on Moodle System	End of Week 2 of the term	
4	Door Class schedules with office hours	End of Week 2 of the term	
5	FBSU Academic Integrity & Syllabus Acknowledgement Form	End of Week 2 of the term	
During the Semester (Week 3 to 16)			
6	Submission of 20% midterm grades	Before the last day for dropping the course with W	
7	A compiled report on Low GPA students	End of Week 8 of the term	
8	Academic Advising Logbook	Throughout the semester	

No	Name of the Document	Timeline	Status
9	Maintaining Grade book on Moodle	Throughout the semester	
10	DN forms (Progress Report, Attendance, and midterm grades till date)	End of Week 12 of the term	
11	Submission of 60% of midterm grades on Moodle System	End of semester (before end of week 15)	
12	Faculty Satisfaction Survey	Week 10-12 of the 2nd academic semester or before the annual faculty evaluation	
13	Update Faculty portal	This should be updated throughout the semester and submitted during week 12.	
14	Submit annual faculty Evaluation evidence	Week 10-12 of the 2nd academic semester	
15	Sign annual faculty evaluation	Week 10-12 of the 2nd academic semester	
16	Submission of the final grades	Final exams will be during weeks 16-18	
17	Submission of the Final Exam Student answers	Week 16-18 of the term	

During the Semester (Week 17 to 18)			
18	Prepare section and combined Course Report	After the semester exam	
19	Submit e-course portfolio	After the semester exam	

Figure 15 Quality Assurance Administrative Calendar

No	Name of the Document	Timeline
1	Annual Action Plan for the next academic year	End of the academic year
2	Program Specification Note: The Program Specification should be changed in case any curriculum changes have been made in the program, otherwise old copy can be submitted)	End of Week 5 of the 1st term
3	Submission of NCAAA KPIs at program or department level for the previous year	End of Week 7 of the 1st term
4	Annual Program Report of the previous academic year	End of Week 7 of the 1st term
5	Updates on the Academic Advising List	End of Week 2 of each term
6	Compiled report of low GPA students	End of Week 5 of each term
7	Receiving 20% midterm grades from the faculty	Before the course withdrawaldate
8	Teaching Load (First draft)	As asked by the highermanagement
9	Recruitment Requirements	As asked by the highermanagement
10	Annual Budget	As asked by the highermanagement
11	List of Textbooks for the next academic semester	Week 6-7 of each term
12	Chairperson or Peer review of Classes	Week 4 onwards of the term or as arranged in the individual department but prior to week 15.
13	Faculty Annual Evaluation	End of each year. Results signed evaluations, etc.to be submitted to the President's Assistant for Academic Affairs.
14	Annual Strategic Plan Progress Report of the Program	End of each year. To be submitted to the Officer of Strategic Planning and Development Office
15	Department meeting minutes and closing the loop on the topics discussed in the meeting	Week 14 of each term
16	NCAAA Template -B	Week 5 of 2nd term
17	Help CSI in preparing Alumni Database	End of Week 8 of each term
Extra-Curricular Activities for the Department in collaboration with the various Administrative Units		
18	A report on the professional development activities w.r.t teaching and learning Concerned office: Teaching and Learning Center	End of the academic year
19	A report on the research activities Concerned office: Dean of Graduate Studies & Research	End of the academic year
20	Community Service Report from the Community Service Office along with the results of the relevant NCAAA KPI Concerned office: Consultative Center for Studies Community Service	End of the academic year
21	A report on the extra-curricular activities (workshops, field trips, student club activities, Academic Advising)	End of the academic year

Figure 16: COE DQAA Calendar

SECTION - VI

STUDENT ASSESSMENT METHODS AND LEARNING OUTCOMES

6.1 ASSESSMENT POLICIES AND PLANS

The Department of Renewable Energy Engineering implements a robust assessment policy to ensure that student learning is measured accurately, fairly, and consistently. This policy is aligned with the university's overarching exams and assessments policy, NCAAA standards, and ABET accreditation criteria.

6.2 Assessment Policy – Principles

The assessment policy is guided by the following principles:

- **Alignment with Learning Outcomes:** All assessments are directly mapped to Course Learning Outcomes (CLOs), which are themselves aligned with Program Learning Outcomes (PLOs) and national qualification frameworks.
- **Variety and Balance:** A variety of assessment methods are employed to address different learning styles and outcome domains, including a balanced mix of formative and summative assessments.
- **Transparency and Fairness:** Assessment criteria, rubrics, and grade weightings are communicated clearly to students at the beginning of each course.
- **Continuous Improvement:** Assessment results are analyzed regularly to inform teaching practices, course adjustments, and program-level improvements.

The department employs a wide range of assessment activities, including internal and external exams, assignments, projects, presentations, quizzes, lab reports, internship evaluations, and capstone projects.

6.3 Learning Outcomes

Learning outcomes are specific statements of what students will be able to do upon completing a learning experience. They are structured at three levels, as shown in Figure 17:

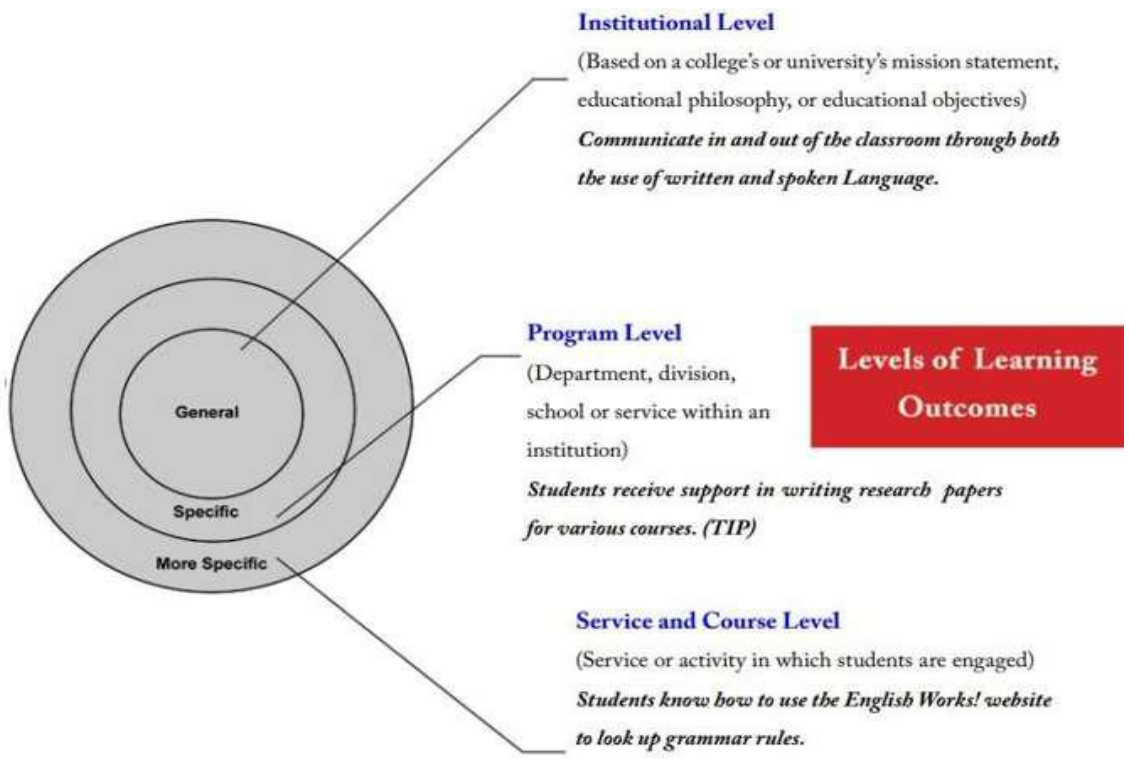


Figure 17: Levels of Learning Outcomes

- **Institutional Learning Outcomes (ILOs):** Broad competencies expected of all university graduates.
- **Program Learning Outcomes (PLOs):** Knowledge, skills, and behaviors students should exhibit upon completing the REE program. As detailed in Section IV, the department uses the seven ABET-aligned Student Outcomes (SOs) as its official PLOs.
- **Course Learning Outcomes (CLOs):** Specific and measurable statements defining the knowledge, skills, and attitudes learners will demonstrate by the completion of a single course.

6.3.1 Benefits of LOs Assessment

The systematic assessment of learning outcomes provides clear benefits for students (clarified expectations), faculty (informed teaching improvements), and employers/society (ensuring graduate preparedness).

6.3.2 Role of Stakeholders in LOs Assessment

The assessment process involves multiple stakeholders, including students, faculty, department leadership, employers, industry partners (like NEOM), accreditation bodies, and alumni, each providing valuable perspectives for continuous improvement.

6.3.3 Targets in LOs Assessment

Targets define the expected level of aggregated student performance. For the REE program, the satisfactory attainment level from direct assessments is set at not less than 65%, while the target for indirect assessment is 70% to account for the subjective nature of survey data.

6.4 Hierarchical Relationships Among Goals, Objectives, and Outcomes

The department's educational design follows a clear hierarchy, as illustrated in Figure 18, where specific CLOs build towards the achievement of broader PLOs, which in turn align with the program's long-term PEOs and the institution's mission. The process of designing and delivering these outcomes is shown in Figure 19.

Figure 18 Designing and Delivering Learning Outcomes

6.5 Using Bloom's Taxonomy in Writing CLOs

The REE department faculty use Bloom's Taxonomy as a framework for developing CLOs that represent different levels of cognitive engagement, from basic recall to higher-order skills like analysis, evaluation, and creation. Figure 20 illustrates the cognitive processes of Bloom's Taxonomy.

Figure 19 Bloom's Taxonomy Cognitive Process

6.6 Alignment of CLOs with Student Outcomes

A critical aspect of the department's quality assurance is ensuring that CLOs are explicitly aligned with the program's PLOs (Student Outcomes). This alignment is documented in each course syllabus and forms the basis for program-level assessment.

6.7 COE Learning Outcomes (LO's) Alignment with NCAAA and COE Mission

The REE Department's assessment procedures adhere to the standards set by the NCAAA and are designed to be in full compliance with the National Qualifications Framework (NQF), ensuring that educational strategies meet the demands of the job market. The alignment of the quality assurance framework with the Saudi NQF is depicted in Figure 21.

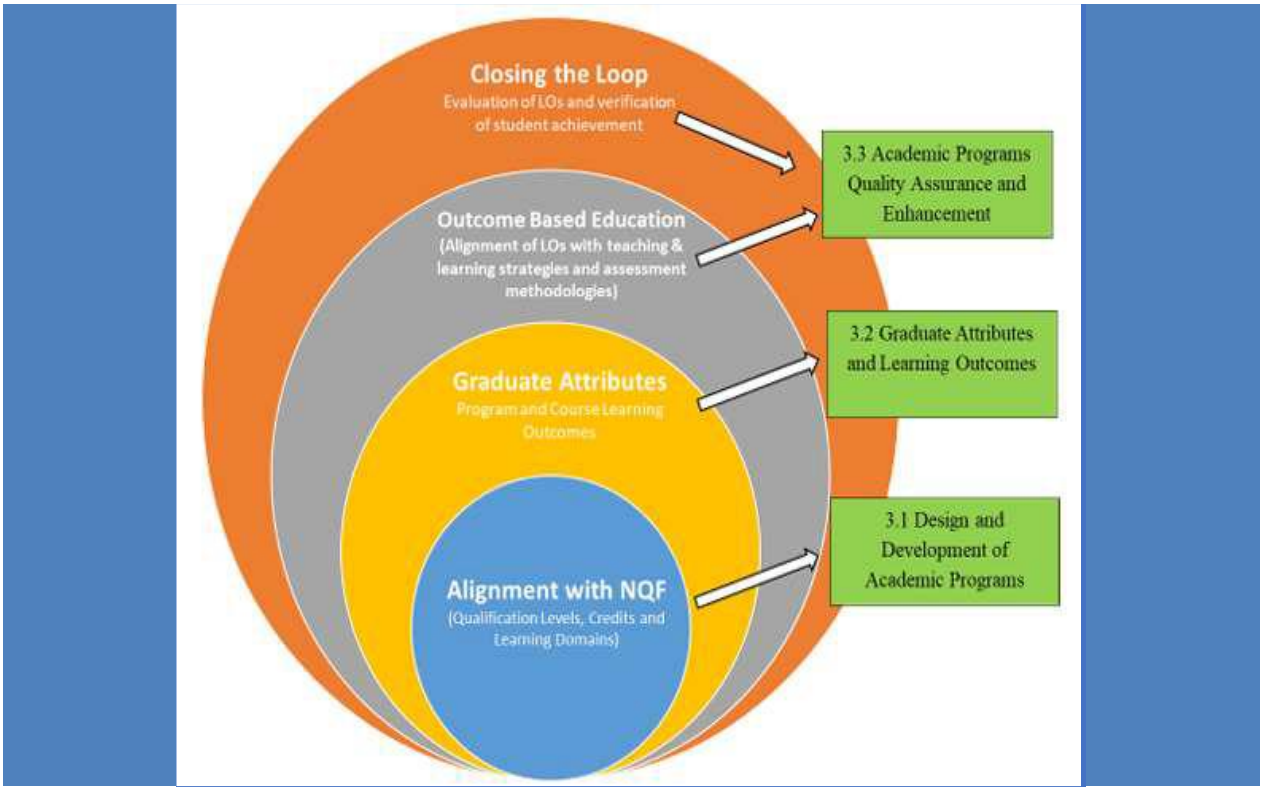


Figure 20 : Compliance of Quality Assurance Framework to the Saudi NQF

6.8 Exam Development and Approval

The department follows the college's strict standards for the design, administration, and grading of examinations. This includes exam blueprinting, pre-moderation review, and post-moderation of graded papers to ensure fairness, consistency, and alignment with intended learning outcomes. A key component of the REE program's summative assessment is the mandatory Exit Exam administered as part of the final year capstone project (REE 499), which assesses students' overall knowledge and skills development.

6.9 Quality Cycle of the Learning Outcome

The assessment of learning outcomes at the course and program levels follows a continuous annual cycle based on the **PIMRU Model (Plan → Implement → Monitor → Review → Update)**. This structured framework, shown in Figure 22, ensures that assessment is systematic, data-driven, and leads to tangible improvements in student learning.

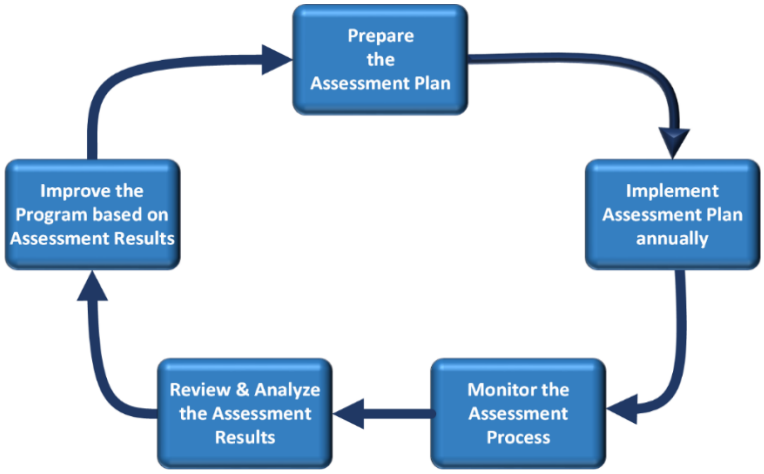


Figure 21: PIMRU Model

Table 6: REE Program Assessment Plan and Cycle

Assessment Tool	**Items Assessed**	**Administered by**	**Responsible for Analysis & Report**	**Frequency**
Course Assessment by Faculty (Direct)	PLOs/SOs	Course Instructor	Instructor, Focus Group	Every Semester
Course Assessment by Student (Indirect)	PLOs/SOs	Course Instructor	Instructor, Focus Group	Every Semester
Alumni Survey	PLOs/SOs, PEOs	Department QAC	Department QAC, Chair	Annually
Employer Survey	PLOs/SOs, PEOs	Department QAC	Department QAC, Chair	Annually

Exit Exam (Direct)	PLOs/SOs	Department Faculty	Department QAC, Chair	Every Semester
Student Exit Survey (Indirect)	PLOs/SOs, PEOs	Department Chair	Department QAC, Chair	Every Semester
Industrial Advisory Board (Indirect)	PEOs, PLOs/SOs	Department QAC	Department QAC, Chair	Annually

This plan operationalizes the assessment strategy, providing a clear, multi-year roadmap for data collection that ensures the process is systematic and sustainable.

6.10 Quality Assurance for Courses with Multiple Sections

The department applies a standardized procedure for courses with multiple sections to ensure coordination and consistency. This involves a unified course specification, syllabus, and textbook; regular meetings between instructors; and collaborative development of major exams.

6.11 Electronic Maintenance of Course Portfolio

A well-organized electronic course portfolio is maintained for each course, documenting the planning, process, and outcomes. The portfolio includes the syllabus, teaching materials, assessments, samples of student work, grade sheets, and learning outcome assessment results.

SECTION - VII

STUDENT ASSESSMENT AND EVALUATION PROCESS OF LEARNING OUTCOMES

7.1 Assessment Process in the REE Department

The Department of Renewable Energy Engineering employs a comprehensive and systematic process for assessing student learning outcomes, which is crucial for meeting NCAAA and ABET accreditation criteria. This process relies on a triangulation of data from multiple sources to provide a valid and reliable picture of program effectiveness. By combining direct evidence from student work with indirect perceptual data from various stakeholders, the department can make nuanced, evidence-based decisions for continuous improvement.

7.1.1 Direct Assessment Methods

Direct assessment methods involve the examination of actual student work to provide tangible evidence of learning. The REE department uses several direct methods:

- **Embedded Course Assessments:** Specific assignments, exam questions, or projects within core REE courses are mapped to specific PLOs and PIs. Faculty use standardized rubrics (on a 0-4 scale) to evaluate student performance on these embedded items.
- **Capstone Projects (REE 498 & REE 499):** This two-semester culminating experience is a primary tool for direct assessment. Student performance is evaluated on multiple components, including technical reports and oral presentations, against rubrics that are explicitly linked to multiple PLOs.
- **Laboratory Reports and Practical Assessments:** Labs such as the Solar Energy Lab (supporting REE 420L) and Wind Energy Lab (supporting REE 460L) provide direct evidence of students' ability to conduct experiments, analyze data, and draw conclusions (PLO 6).
- **Exit Exam:** A mandatory, computer-based exit exam is integrated into the final year project (REE 499). This summative assessment covers a broad range of REE topics and provides a direct measure of the overall knowledge and skills attained by graduating students.

7.1.2 Indirect Assessment Methods

Indirect methods gather information about student perceptions of their learning and the overall program, providing valuable context for interpreting direct assessment results.

- **Surveys:** The department utilizes a suite of surveys to gather feedback from different constituencies:
  - **Course Evaluation Surveys:** Administered at the end of every course.
  - **Program Exit Surveys:** Collected from all graduating students to assess their perception of how well the program helped them achieve the PLOs and PEOs.
  - **Alumni Surveys:** Sent to graduates to gather feedback on their career progression and the relevance of their education.
  - **Employer Surveys:** Sent to employers of REE graduates (such as NEOM) to evaluate graduate competencies and alignment with industry needs.
- **Industrial Advisory Board (IAB) Feedback:** The IAB, comprising industry experts, provides regular feedback on the relevance of the program's PEOs and PLOs, ensuring the curriculum remains aligned with professional practice.

7.1.3 Assessment Cycle and Data Management

The department follows the university's PIMRU (Plan → Implement → Monitor → Review → Update) model for its assessment cycle.

- **Planning:** The department develops an annual assessment plan, selecting a subset of PLOs for focused assessment each year within a systematic two- to four-year cycle.
- **Implementing:** Faculty collect assessment data using the specified direct and indirect methods.
- **Monitoring:** The Department QA Committee tracks the implementation of the assessment plan.
- **Reviewing:** Faculty and the QA Committee analyze the collected data to determine the extent to which learning outcomes are being achieved, identifying strengths and weaknesses.
- **Updating (Closing the Loop):** Based on the analysis, improvements are implemented. This can include curriculum modifications, changes in teaching strategies, or investments in new lab equipment. The effectiveness of these changes is then evaluated in the subsequent assessment cycle.

All assessment data is securely managed and retained for a minimum of six years to support longitudinal analysis and accreditation reviews.

7.2 Target Benchmark Level of Learning Outcomes

The department has established clear benchmarks for student achievement. The target is that for each PLO, at least 65% of students will achieve a satisfactory level on direct assessment measures, and at least 70% on indirect measures.

7.3 Evaluation Process of Course Learning Outcomes

At the end of every semester, Course Coordinators collect and analyze the CLO assessment results (both direct and indirect). Improvement actions related to learning outcomes, curriculum, and course management are discussed with the course instructors and then submitted to the department's Curriculum Committee for approval. These approved actions are then included in the decision-making process for the continuous enhancement of the program.

7.4 Process of Updating the Learning Outcomes

7.4.1 Course Learning Outcomes

A change in a course's learning outcomes is considered a major curriculum change. The course coordinator can submit a change request form to the Curriculum Committee, stating the reason for the change along with the revised CLO-PLO mapping. The committee validates the request and then seeks the approval of the Department Council.

7.4.2 Program Learning Outcomes

A change in the Program Learning Outcomes is also considered a major curriculum change. The Curriculum Committee Chair can submit a change request form to the Department Council at the end of an assessment cycle, stating the valid reason for changing the PLO. The Department Council validates the request and seeks approval from the College Council.

SECTION - VIII

FACULTY AND STAFF MANAGEMENT

8.1. Recruitment policy of Faculty Members

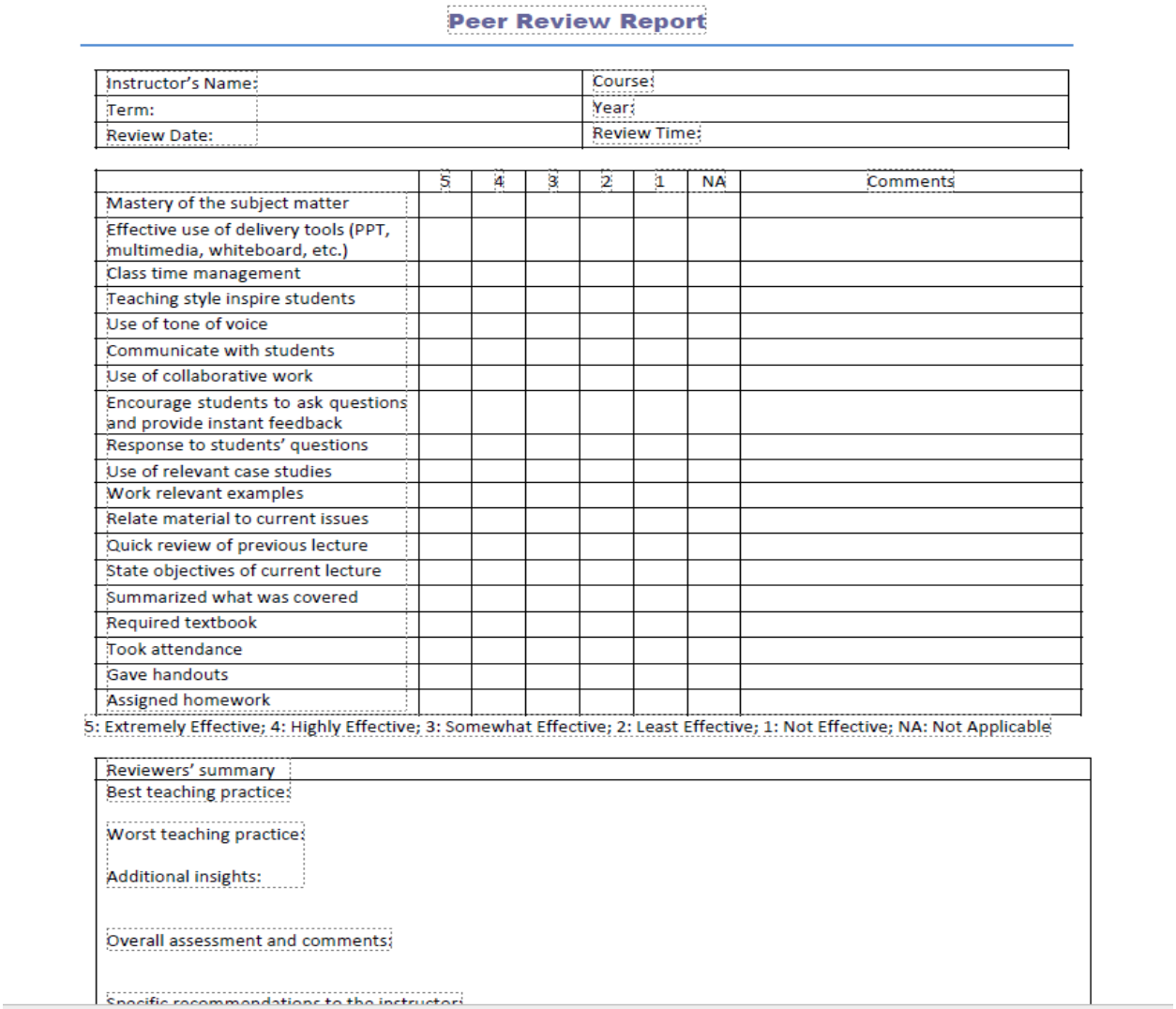
The process of faculty recruitment for the Department of Renewable Energy Engineering adheres to the official recruitment policy of Fahad Bin Sultan University. The department, through the College of Engineering, follows a structured and competitive procedure to ensure the selection of highly qualified candidates who possess the necessary expertise in specialized areas of renewable energy.

8.2. Orientation of New Faculty Members

All new faculty members joining the REE Department undergo a comprehensive orientation based on the policy provided by FBSU. This orientation is designed to familiarize them with the university's academic system, policies, facilities, and the specific quality assurance procedures of the department and college.

8.3 Peer Review of Faculty Members

The evaluation of REE faculty members is driven by the Faculty Evaluation Policy of FBSU. All faculty members undergo thorough evaluations by students, the Department Chair, and peers. This process is a key component of monitoring the quality of teaching and providing constructive feedback for professional development. A template of the peer review form is shown in Figure 23.



Peer Review Report

Instructor's Name:	Course:
Term:	Year:
Review Date:	Review Time:

	5	4	3	2	1	NA	Comments
Mastery of the subject matter							
Effective use of delivery tools (PPT, multimedia, whiteboard, etc.)							
Class time management							
Teaching style inspire students							
Use of tone of voice							
Communicate with students							
Use of collaborative work							
Encourage students to ask questions and provide instant feedback							
Response to students' questions							
Use of relevant case studies							
Work relevant examples							
Relate material to current issues							
Quick review of previous lecture							
State objectives of current lecture							
Summarized what was covered							
Required textbook							
Took attendance							
Gave handouts							
Assigned homework							

5: Extremely Effective; 4: Highly Effective; 3: Somewhat Effective; 2: Least Effective; 1: Not Effective; NA: Not Applicable

Reviewers' summary
Best teaching practice: Worst teaching practice: Additional insights: Overall assessment and comments: Specific recommendations to the instructor:

Figure 22: Peer Review Form Template

8.4 Student Evaluation of Faculty Members

Formal student evaluations of faculty are conducted for every course at the end of each semester via the university's SIS system. These evaluations cover teaching delivery, feedback quality, professionalism, and communication. The data is analyzed to mitigate bias and is shared with the faculty member, the Department Chair, and the College Dean to inform teaching improvement efforts. A sample of the student feedback form is provided in Figure 24.

Spring 2023-2024

Course	Fundamental of Power Electronics	Instructor	عمار القحطاني	Section	30	Course Code	REE 310
الكلية	Engineering	Department	Renewable Energy Engineering	Response	100.00%	Average Program	4.15
The start of the course							
The course outline (including the knowledge and skills the course was designed to develop) was made clear to me.							4.45
The things I had to do to succeed in the course, including assessment tasks and criteria for assessment, were made clear to me.							4.18
Sources of help for me during the course including faculty office hours and reference material, were made clear to me.							4.27
What happened during the course							
The conduct of the course and the things I was asked to do were consistent with the course outline.							4.09
My instructor(s) were fully committed to the delivery of the course. (Eg. classes started on time, instructor always present, material well prepared, etc).							4.36
My instructor(s) had thorough knowledge of the content of the course.							4.64
My instructor(s) were available during office hours to help me.							4.45
My instructor(s) were enthusiastic about what they were teaching.							4.73
My instructor(s) cared about my progress and were helpful to me.							4.68
Course materials were of up to date and useful. (texts, handouts, references etc.)							4.23
The resources I needed in this course (textbooks, library, computers etc.) were available when I needed them.							4.18
In this course effective use was made of technology to support my learning.							4.50
In this course I was encouraged to ask questions and develop my own ideas.							4.27
In this course I was inspired to do my best work.							4.36
The things I had to do in this course (class activities, assignments, laboratories etc) were helpful for developing the knowledge and skills the course was intended to teach.							4.36
The amount of work I had to do in this course was reasonable for the credit hours allocated.							4.59
Marks for assignments and tests in this course were given to me within reasonable time.							3.95
Grading of my tests and assignments in this course was fair and reasonable.							4.59
The links between this course and other courses in my total program were made clear to me.							4.59

Figure 23: Sample Course Evaluation Student feedback form

8.5 Faculty Members Annual Appraisal Form

All faculty members in the REE Department are evaluated annually using the official appraisal form provided by FBSU. The appraisal measures performance across three main areas with corresponding weights:

1. Teaching Performance (Weight: 50%)
2. Research Performance (Weight: 30%)
3. Service and Community Engagement (Weight: 20%)

The first section of this form is illustrated in Figure 25.

The REE department is supported by faculty with doctoral degrees from a variety of respected international universities. Their expertise covers key curricular areas, including solar and wind energy, hydrogen technologies, thermal power, and power systems. This diverse expertise ensures the quality of the degree program and provides sufficient coverage for all core and elective topics.

جامعة فهد بن سلطان
FAHAD BIN SULTAN UNIVERSITY

Faculty Member Annual Appraisal Form

Department/College: _____

Academic Year _____

Faculty Member Name: _____

Rank: _____

Section 1: Teaching Performance (Weight: 50%)

Criterion	Excellent (4)	Good (3)	Satisfactory (2)	Needs Improvement (1)
Course Delivery	Mastery of subject; clear, engaging delivery	Clear delivery; minor improvements needed	Basic clarity; delivery sometimes ineffective	Poor delivery; lacks clarity and engagement
Student Feedback (Survey Results)	Avg. ≥ 4.5/5	Avg. 4.0–4.49/5	Avg. 3.5–3.99/5	Avg. < 3.5/5
Course Materials and Organization	Innovative, well- structured, updated materials	Well-organized, mostly updated materials	Some outdated or disorganized materials	Poor or missing course organization
Assessment and Feedback to Students	Timely, clear, fair assessments; rich feedback	Timely and mostly clear assessments	Some delays or unclear feedback	Late, unclear, or unfair assessments
Student Support and Advising	Actively supports and advises students	Provides student support when requested	Limited student advising	Rarely available or supportive

Figure 24 Section 1- Faculty Annual Appraisal Form.

SECTION - IX

LEARNING RESOURCES AND INFRASTRUCTURE

9.1 The Library

The FBSU library functions as a central resource center supporting the academic programs of the REE Department. It provides quality collections, including print, electronic, and A/V materials, and offers access to resources both on and off campus. The library's mission is to provide and continually enhance critical information resources, engaging spaces, innovative technologies, and valuable services to support research and learning.

9.1.1 Hierarchical Structure of Library

The library is organized in a hierarchy with a Director who reports to the Assistant to the President for Academic Affairs, ensuring that its operations are aligned with the university's academic mission. The library's structure is shown in Figure 26.

Figure 25: FBSU Library.

9.2 Quality Cycle adopted by Library

The library has implemented the PDCA (Plan-Do-Check-Act) quality assurance method to ensure the quality of its services. This cycle involves aligning with NCAAA standards, managing risks, developing policies, creating strategic and action plans, acquiring resources based on faculty and student recommendations, and using KPIs to measure user satisfaction. The college also complies with an official 'Infrastructure Quality Assurance (QA) Checklist,' as shown in Figure 27.

Infrastructure Quality Assurance (QA) Checklist

(To be filled by departments/facilities managers annually)

General Information

- ☐ Building/Facility Name: _____
- ☐ Department/College: _____
- ☐ Date of Review: _____
- ☐ Reviewer Name: _____

Classrooms

Item	Yes	No	Comments/Issues
Adequate seating and desks available for expected capacity?	☐	☐	
Functional air conditioning/heating?	☐	☐	
Functional lighting adequate for reading/writing?	☐	☐	
Working projector/smartboard/computer equipment?	☐	☐	
Cleanliness and maintenance satisfactory?	☐	☐	
Emergency exits clearly marked and accessible?	☐	☐	

Laboratories

Item	Yes	No	Comments/Issues
Lab equipment functional and regularly maintained?	☐	☐	
Safety equipment available (eyewash stations, fire extinguishers, etc.)?	☐	☐	
Proper ventilation systems working?	☐	☐	
Clear safety signage and operating instructions displayed?	☐	☐	
Stock of essential lab materials and consumables adequate?	☐	☐	
Hazardous materials properly stored and labeled?	☐	☐	

IT and Physical Assets

Item	Yes	No	Comments/Issues
Computers and printers operational?	☐	☐	
Software licenses updated?	☐	☐	
Wi-Fi coverage reliable across all teaching spaces?	☐	☐	
Backup power systems (generators/UPS) functional?	☐	☐	

General Facilities

Item	Yes	No	Comments/Issues
Accessible facilities for disabled persons available?	☐	☐	
Restrooms clean, functional, and sufficient?	☐	☐	
Security measures adequate (cameras, emergency alarms)?	☐	☐	

Review Process Steps

Step	Description
1. Self-Assessment	Each department completes the Infrastructure QA Checklist for their labs, classrooms, and local facilities.
2. Central Audit	Facilities Management, Library Administration, and IT Office conduct their technical inspections and evaluations.
3. Consolidation	University QA Office consolidates self-assessments and central audit findings into a master Infrastructure Audit Report.
4. Reporting and Approval	Report presented to Institutional Academic and Facilities Committee and University Council.
5. Action Planning	Required improvements prioritized, budgets proposed, and timelines set.
6. Monitoring	Improvements are tracked during the following semester, with a mid-year progress report.

Documentation and Evidence

- Completed Infrastructure QA Checklists
- Annual Consolidated Infrastructure Audit Report

Figure 26: Infrastructure Quality Assurance (QA) Checklist.

9.3 Departmental Laboratories and Facilities

The laboratory infrastructure of the REE Department is a cornerstone of its pedagogical approach, designed to bridge theory and practice across the curriculum. Each lab is explicitly tied to specific core courses, creating a scaffolded, hands-on learning pathway for students. This demonstrates how the department invests in infrastructure that directly supports the achievement of its PLOs, particularly those related to experimentation (PLO 6) and design (PLO 2). All laboratories used by the REE program are located in the state-of-the-art **Renewable Energy and Robotics Laboratories Centre (RERC)**.

9.3.1 Renewable Energy Laboratory

This lab supports foundational courses like REE 320 (Fundamentals of Renewable Energy). It provides an exploratory platform for multiple renewable energy domains, enabling students to build essential skills. Key equipment includes solar PV kits, mini wind turbines, solar thermal systems, and energy storage units.

9.3.2 Solar Energy Laboratory

This lab supports the specialized course REE 420/420L (Solar Energy). It allows students to engage in the design, implementation, and performance assessment of photovoltaic systems, simulating real-world energy generation conditions with setups for off-grid, grid-tied, and tracking applications.

9.3.3 Wind Energy Laboratory

Dedicated to REE 460/460L (Wind Energy), this lab provides a controlled environment for studying wind turbine operation, power output analysis, and system integration. Infrastructure includes both horizontal-axis (HAWT) and vertical-axis (VAWT) wind turbines, a weather station, and a blower system to simulate various wind conditions.

9.4 Computing Resources

In addition to general campus computing resources, the REE curriculum incorporates specialized software essential for modern engineering practice. Students gain proficiency in industry-standard tools such as **PVsyst** for the design and simulation of photovoltaic systems and **MATLAB** for modeling and analyzing power electronics and control systems. Access to this software is provided in campus computer labs.

Table 7: Specialized Equipment in REE Laboratories

Laboratory Name	Key Equipment/System	Supported Courses
Renewable Energy Lab	Solar PV Kits, Mini Wind Turbines, Solar Thermal Systems, Energy Storage Units	REE 320
Solar Energy Lab	Off-Grid PV Systems, Grid-Tied PV Systems, Solar Tracking Systems, PVsyst Software	REE 420, REE 420L
Wind Energy Lab	HAWT and VAWT Turbines, Weather Station, Blower System, Motor-Generator Systems	REE 460, REE 460L

9.5 Student Support Services

The REE Department is supported by the university's comprehensive student support services, which are designed to foster a supportive learning environment and promote overall well-being.

9.5.1 Administrative Services

These include student petitions, the university catalog, student orientation guides, student clearance applications, and a portal for online forms.

9.5.2 Academic Support Services

These include personalized academic advising, tutoring and learning resources, and extensive

library services to support research and learning.

SECTION – X

COMMUNITY ENGAGEMENT

10.1 Community Service Policy and Objectives

The Department of Renewable Energy Engineering recognizes community service as an essential pillar of its mission, alongside teaching and research. The department adheres to the community service policy provided by FBSU and aims to contribute to societal development by leveraging its expertise in engineering innovation and technical solutions, in alignment with national priorities such as Saudi Vision 2030.

10.1.1 Policy Statement

Community service in the REE Department is guided by the principles of:

- **Engagement:** Encouraging active participation of faculty, staff, and students in community initiatives.
- **Relevance:** Grounding activities in the department's disciplinary strengths in renewable energy.
- **Integration:** Integrating community service into teaching, student activities, and research to promote civic responsibility and practical learning.

10.1.2 Objectives

The department aims to:

- Enhance student civic engagement through community-based projects.
- Strengthen industry and community partnerships, particularly with key stakeholders like

NEOM.

- Encourage faculty-led outreach, such as public lectures and consultations.
- Contribute to national development goals aligned with Saudi Vision 2030.

Examples of these activities are shown in Figure 28 and Figure 29.

Figure 27: Renewable Energy Engineering Activities organized by COE

10.1.3 Implementation and Monitoring

The Student Affairs Committee oversees the planning and documentation of community service activities. The department submits an annual community service plan and report, and outcomes are evaluated based on KPIs such as the number of activities, participation rates, and stakeholder feedback.

10.2 Projects and Partnerships

The REE Department actively fosters projects and partnerships as part of its commitment to social responsibility and innovation. These collaborations leverage the department's academic expertise to address real-world challenges and support local and national development.

10.2.1 Community-Based Projects

The department encourages the initiation of community-focused projects that apply technical expertise to solve societal problems related to sustainable energy.

10.2.2 Capstone and Senior Projects with Community Impact

Final-year REE students are encouraged to select capstone project topics that address local community needs or benefit public and nonprofit sectors. These projects are supervised by faculty and often involve collaboration with external stakeholders, providing a direct link between academic work and community benefit.

SECTION – XI

REVIEW AND AMENDMENT OF QA MANUAL

11.1 Frequency and Responsibility of Review

This Quality Assurance Manual for the Department of Renewable Energy Engineering will be reviewed periodically to ensure its content remains accurate, relevant, and aligned with current industry standards, regulatory requirements, and departmental processes.

- **Frequency:** A full review will be conducted at least once a year. Additional reviews will be performed when new regulations are introduced, major process changes occur, or significant audit findings are identified.
- **Responsibility:** The Department's Quality Assurance Coordinator will oversee the review process, ensure updates are implemented, and approve final changes in consultation with the Department Chair and faculty.

11.2 Version Control and Update Log

A structured version control system and update log will be maintained to track changes, ensure traceability, and prevent confusion over document revisions. A change history table will be maintained, including the version number, date of update, a description of changes, and the approving authority.

References

1. Program Development Policy:(https://fbsu.edu.sa/Bylaws/AA-424-New-Program-Design-Policy.pdf)
2. NQF and NCAAA: https://www.etec.gov.sa/en/ncaaa
3. CLOs Development Policy:(https://fbsu.edu.sa/Bylaws/AA-409-CLOs-Development-Policy.pdf)
4. NCAAA Documents: https://etec.gov.sa/en/service/accreditation/servicedocuments
5. PLOs Procedure:(https://fbsu.edu.sa/Bylaws/AA-408-P01-PLO-Procedure.pdf)
6. Research:(https://fbsu.edu.sa/PDF/Scientific_Research_Publication_Incentives_Policy.pdf)

Approved by	**College of Engineering Council**
Date	**July 8th 2025**