1. **ROMBLON STATE UNIVERSITY VISION AND MISSION**

**VISION**

A research-based academic institution committed to excellence and service in nurturing globally competitive workforce towards sustainable development.

**MISSION**

The Romblon State University is committed to:

1. Provide advanced education, higher technological and professional instruction.
2. Provide training in agriculture and fishery, for science and technology, education, arts, agriculture, and other relevant fields of study.
3. Undertake research and extension services.
4. Provide progressive leadership in its areas of specialization.
5. THE RSU COLLEGE OF ENGINEERING AND TECHNOLOGY OUTCOMES-BASED EDUCATION FRAMEWORK

**RSU VISION AND MISSION**



**Figure 1.** *The RSU CET Framework.*

The RSU CET programs adapt the Outcomes-Based Education (OBE) framework as shown (Fig. 1). At a glance, it is a 10 = 1 with an overhead dash. The number 10 usually depicts completeness and totality; equal sign depicts result; the number 1 depicts unity or common vision, and the overhead dash depicts sustainability. Thus, the unified, meaningful, and synergistic interaction among all internal and external stakeholders will surely result in the attainment of a common vision and mission in a sustainable manner.

To attain this, the core Teaching and Learning Strategies and Activities (TLSAs) must be properly aligned with the Program Outcomes (POs), Program Educational Objectives (PEOs), and the university’s vision and mission. It must continuously undergo Assessment and Evaluation (A & E) internally so that the necessary improvements will be determined and immediately implemented. The internal and external stakeholders which form the Program Advisory Council (PAC) will be periodically consulted to obtain feedback and inputs for the improvement of the program. This will ensure Continuous Quality Improvement (CQI). Furthermore, the program must be subjected to local, national, and international accreditation to ensure quality and globalcompetitiveness.

 The formulation of CET OBE Framework is anchored on CHED handbook on Typology, Outcomes-Based Education (OBE), and Institutional Sustainability Assessment (ISA) 2014. It is supported by CMO No. 37 series of 2012, known as the Policies, Standards, and Guidelines on the Establishment of an Outcome-Based Education System in HEIs offering Engineering Programs.

1. **PROGRAM EDUCATIONAL OBJECTIVES (PEO)**

The Program educational objectives (PEOs) are broad statements that describe what graduates are expected to achieve in their professional and career practice three to five years after graduation. These are based on the needs of the program’s constituents.

The Electrical Engineering Program Educational Objectives and Relationship to RSU Mission:

|  |  |
| --- | --- |
|  Three to five years after graduation, the Electrical Engineering alumni shall (1) have advanced their practice or achievement in the field of Electrical Engineering and/or other endeavors or advocacies supported by their acquired electrical engineering education; (2) strive to be globally competitive through living by the RSU philosophy, vision and mission values, pursuing continuing education, and practicing continuous quality improvement in their personal lives, and continuously scanning, adopting, and building on the best practices in their field. | MISSION |
| 1 | 2 | 3 | 4 |
| **PEO1**: The graduates of Electrical Engineering should demonstrate *peer-recognized expertise* together with the ability to articulate that expertise and use it for contemporary problem solving in the analysis, design, and evaluation of electrical and electronic devices and systems. | **√** |  | **√** |  |
| **PEO2**: The graduates of Electrical Engineering should demonstrate *engagement* in the engineering profession, locally and globally, by contributing to the ethical competent and creative practice of engineering or other professional careers. | **√** |  | **√** |  |
| **PEO3**: The graduates of Electrical Engineering should demonstrate *sustained learning* and adapting to a constantly changing field through graduate work, professional development and self-study. | **√** | **√** |  |  |
| **PEO4**: The graduates of Electrical Engineering should demonstrate *leadership* and initiative to ethically advance professional and organizational goals, facilitate the achievements of others, and obtain substantive results. | **√** |  | **√** | **√** |
| **PEO5**: The graduates of Electrical Engineering should demonstrate a *commitment to teamwork* while working with others of diverse cultural and interdisciplinary backgrounds. | **√** |  |  | **√** |

1. **PROGRAM OUTCOMES:**

Program Outcomes (POs) specify what students are expected to know and be able to do by the time of graduation. These relate to skills, knowledge, and behaviors that students acquire as they progress through the program.

The POs of the EE program are based on the CMO. 88, series of 2017. The total POs of the CMO is twelve (12) and was adopted by the program.

By the time of graduation, student of the program shall have developed the ability to:

**PO1:** Apply knowledge of mathematics and sciences to solve complex engineering problems;

**PO2:** Develop and conduct appropriate experiment, analyze and interpret data;

**PO3:** Design a system, component, or process to meet desired needs within realistic constrains such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability, in accordance with standards;

**PO4:** Function effectively on multi-disciplinary and multi-cultural teams that establish goals, plan tasks, and meet deadlines;

**PO5:** Identify, formulate and solve complex problems in electrical engineering;

**PO6:** Recognize ethical and professional responsibilities in engineering practice;

**PO7:** Communicate effectively with a range of audiences;

**PO8:** Understand the impact of engineering solutions in a global, economic, environmental, and societal context;

**PO9:** Recognize the need for additional knowledge and engage in lifelong learning;

**PO10:** Articulate and discuss the latest developments in the field of electrical engineering;

**PO11:** Apply techniques, skills, and modern engineering tools necessary for electrical engineering practice; and

**PO12:** Demonstrate knowledge and understanding of engineering and manage projects in multidisciplinary environments.

1. **RELATIONSHIP OF PROGRAM OUTCOMES TO PROGRAM EDUCATIONAL OBJECTIVES**

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| --- | --- |
| **Program Outcomes****(PO)** | **Program Educational Outcomes** |
| **PEO1** | **PEO2** | **PEO3** | **PEO4** | **PEO5** |
| **PO1:** Apply knowledge of mathematics and sciences to solve complex engineering problems; | **√** | **√** |  |  |  |
| **PO2:** Develop and conduct appropriate experiment, analyze and interpret data; | **√** | **√** |  |  |  |
| **PO3:** Design a system, component, or process to meet desired needs within realistic constrains such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability, in accordance with standards; | **√** | **√** | **√** |  | **√** |
| **PO4:** Function effectively on multi-disciplinary and multi-cultural teams that establish goals, plan tasks, and meet deadlines; |  | **√** |  | **√** | **√** |
| **PO5:** Identify, formulate and solve complex problems in electrical engineering; | **√** |  | **√** |  |  |
| **PO6:** Recognize ethical and professional responsibilities in engineering practice; |  | **√** | **√** | **√** |  |
| **PO7:** Communicate effectively with a range of audiences; |  | **√** |  |  | **√** |
| **PO8:** Understand the impact of engineering solutions in a global, economic, environmental, and societal context; |  | **√** | **√** |  | **√** |
| **PO9:** Recognize the need for additional knowledge and engage in lifelong learning; |  |  | **√** |  |  |
| **PO10:** Articulate and discuss the latest developments in the field of electrical engineering; | **√** | **√** | **√** |  |  |
| **PO11:** Apply techniques, skills, and modern engineering tools necessary for electrical engineering practice; and | **√** | **√** | **√** |  |  |
| **PO12:** Demonstrate knowledge and understanding of engineering and manage projects in multidisciplinary environments. | **√** |  |  | **√** | **√** |

The Program Outcomes (PO) and Program Educational Objectives (PEO) alignment table ensures that POs are constructively aligned to contribute to the attainment of PEOs. All POs are aligned with at least one (1) PEO indicating that such POs are necessary in the development of the PEOs.

1. **PERFORMANCE INDICATORS FOR POs**

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| --- | --- |
| **Program Outcomes****(PO)** | **Performance Indicators per PO** |
| **PO1:** Apply knowledge of mathematics and sciences to solve complex engineering problems; | Apply the concepts of advanced engineering mathematics to solve complex electrical engineering problems  |
| Apply chemical principles in determining chemical components with application of mathematical calculations |
| Apply mathematical computations in power systems analysis |
| **PO2:** Develop and conduct appropriate experiment, analyze and interpret data; | Apply the concepts of statistics subject to gather, collect and analyze data |
| Collect, evaluate, assess, transform data into meaningful and useful information |
| Design and conduct experiments, analyze and interpret data, document and dissemination |
| **PO3:** Design a system, component, or process to meet desired needs within realistic constrains such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability, in accordance with standards; | Apply the design analysis of an electrical circuit for a specific project |
| Explain the schematic process of the components in the circuit designed |
| Apply short circuit fault analysis on the given network of power system |
| **PO4:** Function effectively on multi-disciplinary and multi-cultural teams that establish goals, plan tasks, and meet deadlines; | Conduct experimentation projects in teams with specific goals and deadline |
| Apply the programming language on PLC and microprocessors/microcontrollers in the design of specific project |
| Apply in teams the discussion of physics subject through actual movements and simulations |
| **PO5:** Identify, formulate and solve complex problems in electrical engineering; | Identify the missing data on equations given to electrical engineering problems |
| Formulate equations based on the given parameters on electrical engineering problems |
| Solve advance electrical problems using mathematical calculations |
| Formulate equations in advance engineering mathematics to solve transient problems in electrical engineering |
| **PO6:** Recognize ethical and professional responsibilities in engineering practice; | Apply the electrical standards and practices in an ethical workplace and manner |
| Provide professional ethical decisions in electrical engineering project management |
| Conduct design analysis on electrical systems with ethical contributions towards meeting other fields ethical standards |
| **PO7:** Communicate effectively with a range of audiences; | Explain confidently the process and viability of the designed electrical circuit |
| Prepare a group/individual report explaining the different management schemes in an electrical projects |
| Explain the importance of information on literature and studies in research conduct. |
| **PO8:** Understand the impact of engineering solutions in a global, economic, environmental, and societal context; | Explain ways on water treatment and its importance in environmental protection |
| Explain the economic viability of power generation system and its impact towards national economic growth |
| Explain the economic viability of power transmission & distribution system and its impact towards national economic growth |
| **PO9:** Recognize the need for additional knowledge and engage in lifelong learning; | Conduct research on several fields of electrical engineering |
| Conduct extension projects from research outputs for the better of local communities’ livelihoods |
| Explain the need for further research and development in electrical fields of study |
| **PO10:** Articulate and discuss the latest developments in the field of electrical engineering; | Apply the latest software developments and its impact towards grid improvements |
| Apply the latest instrumentation and control design in the improvement of electrical facilities |
| Apply the latest software developments in the fast emerging of variable renewable energy resources |
| **PO11:** Apply techniques, skills, and modern engineering tools necessary for electrical engineering practice; and | Apply the correct tools and equipment in the installation of electrical devices |
| Explain the proper gesture and techniques in the installation of electrical equipment |
| Conduct an OJT and submit a report from an internship training conducted |
| **PO12:** Demonstrate knowledge and understanding of engineering and manage projects in multidisciplinary environments. | Explain the characters and importance of a project leader/ manager |
| Explain the responsibilities of electrical practitioners, ie, electrician, project engineer, project manager, etc. |
| Identify the fault points on power system and apply analysis as part of management scheme towards solving complex electrical problems. |

Performance indicators for each of the program outcomes are used to provide a more focused and specific assessment of the outcomes either by providing different levels of competence for the program outcomes (i.e. from demonstrate in the first performance indicator to apply in the second indicator) or demonstrating the same level of ability in different fields covered by the same program outcome (i.e. demonstrate the ability to communicate in written form . . . and demonstrate the ability to communicate orally . . .)

1. **PROGRAM ASSESSMENT AND EVALUATION**
2. **Program Assessment**

This refers to one or more processes that identify, collect, and prepare data to evaluate the attainment of Program Outcomes and Program Educational Objectives.

1. **Program Evaluation**

This pertains to one or more processes for interpreting the data and evidence accumulated from the assessment. Evaluation determines the extent at which the Program Outcomes and the Program Educational Objectives are achieved by comparing actual achievement values set targets and standards. Evaluation results in decisions and actions regarding the continuous improvement of the program.

1. **Assessment and Evaluation of PEOs**

This may include the following: the stakeholders of the program, have to be contacted through surveys or focus group discussion to obtain feedback data on the extent of the achievement of the PEOs.

1. **Assessment and Evaluation of POs**

In the case of the Program Outcomes Assessment, the defined Performance Indicators shall be connected to key Courses (usually the Demonstrating or “D” course in the curriculum Map), and an appropriate Assessment Methods (AM) may be applied. These methods may be direct or indirect depending on whether the demonstration of learning was measured by actual observation and authentic work of the student or through gathered opinions from the students or his peers.

1. **MATRIX OF PERFORMANCE INDICATORS LINKING WITH KEY COURSES AND ASSESSMENT METHODS**

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| --- | --- | --- |
| **Performance Indicators** | **Key Courses** | **Assessment Methods** |
| **PO1** | **1** | Apply the concepts of advanced engineering mathematics to solve complex electrical engineering problems | Electrical Circuits 2 | Solved Problems/Problem Sets |
| **2** | Apply chemical principles in determining chemical components with application of mathematical calculations | Material Science & Engineering | Quizzes and Examinations |
| **3** | Apply mathematical computations in power systems analysis | Power System Analysis | Quizzes and Examinations |
| **PO2** | **1** | Apply the concepts of statistics subject to gather, collect and analyze data | Engineering Data Analysis | Solved Problems/ Problem Sets |
| **2** | Collect, evaluate, assess, transform data into meaningful and useful information | Research Methods | Research Journal |
| **3** | Design and conduct experiments, analyze and interpret data, document and dissemination | Research Project or Capstone Design Project | Research Output/ Thesis |
| **PO3** | **1** | Apply the design analysis of an electrical circuit for a specific project | Industrial Electronics | Project Output |
| **2** | Explain the schematic process of the components in the circuit designed | Electrical Machines 1 | Technical Engineering Essay/ Report |
| **3** | Apply short circuit fault analysis on the given network of power system | Power System Analysis | Quizzes and Examinations |
| **PO4** | **1** | Conduct experimentation projects in teams with specific goals and deadline | Instrumentation and Control | Technical Engineering Essay/ Report |
| **2** | Apply the programming language on PLC and microprocessors/microcontrollers in the design of specific project | Microprocessor Systems | Project Output |
| **3** | Apply in teams the discussion of physics subject through actual movements and simulations | Physics for Engineers | Laboratory Activities |
| **PO5** | **1** | Identify the missing data on equations given to electrical engineering problems | Engineering Data Analysis | Quizzes and Examinations |
| **2** | Formulate equations based on the given parameters on electrical engineering problems | Engineering Mathematics for EE | Quizzes and Examinations |
| **3** | Solve advance electrical problems using mathematical calculations | Distribution System and Substation Design | Quizzes and Examinations |
| **4** | Formulate equations in advance engineering mathematics to solve transient problems in electrical engineering | Power System Analysis | Technical Engineering Report |
| **PO6** | **1** | Apply the electrical standards and practices in an ethical workplace and manner | On the Job Training | OJT Report |
| **2** | Provide professional ethical decisions in electrical engineering project management | EE Laws, Codes and Ethics | Quizzes and Examinations |
| **3** | Conduct design analysis on electrical systems with ethical contributions towards meeting other fields ethical standards | Management of Engineering Projects | Technical Engineering Report |
| **PO7** | **1** | Explain confidently the process and viability of the designed electrical circuit | Electrical Circuits 1 | Quizzes and Examinations |
| **2** | Prepare a group/individual report explaining the different management schemes in an electrical projects | Management of Engineering Projects | Technical Engineering Report |
| **3** | Explain the importance of information on literature and studies in research conduct. | Research Methods | Quizzes and Examinations |
| **PO8** | **1** | Explain ways on water treatment and its importance in environmental protection | Environmental Science and Engineering | Class Presentation/ Reporting |
| **2** | Explain the economic viability of power generation system and its impact towards national economic growth | Engineering Economics | Class Presentation/ Reporting |
| **3** | Explain the economic viability of power transmission & distribution system and its impact towards national economic growth | Engineering Economics | Class Presentation/ Reporting |
| **PO9** | **1** | Conduct research on several fields of electrical engineering | Research Projects or Capstone Design Project | Research Output/ Thesis |
| **2** | Conduct extension projects from research outputs for the better of local communities’ livelihoods | Technopreneurship | Group Report/ Presentation |
| **3** | Explain the need for further research and development in electrical fields of study | Seminars and Colloquia | Group Report/ Presentation |
| **PO10** | **1** | Apply the latest software developments and its impact towards grid improvements | Fundamentals of Power Plant Engineering Design | Laboratory Activity/ Simulation |
| **2** | Apply the latest instrumentation and control design in the improvement of electrical facilities | Instrumentation and Control | Laboratory Activity/ Simulation |
| **3** | Apply the latest software developments in the fast emerging of variable renewable energy resources | Professional Elective 2 – Renewable Energy For Sustainable Development | Laboratory Activity/ Simulation |
| **PO11** | **1** | Apply the correct tools and equipment in the installation of electrical devices | Electrical Apparatus and Devices | Quizzes and Examinations |
| **2** | Explain the proper gesture and techniques in the installation of electrical equipment | Management of Engineering Projects | Technical Engineering Report |
| **3** | Conduct an OJT and submit a report from an internship training conducted | On the Job Training | OJT Report |
| **PO12** | **1** | Explain the characters and importance of a project leader/ manager | Management of Engineering Projects | Technical Engineering Report |
| **2** | Explain the responsibilities of electrical practitioners, ie, electrician, project engineer, project manager, etc. | Electrical Engineering Orientation | Quizzes and Examinations |
| **3** | Identify the fault points on power system and apply analysis as part of management scheme towards solving complex electrical problems. | Power System Analysis | Quizzes and Examinations |

1. **MATRIX OF KEY COURSES LINKING WITH ASSESSMENT METHODS AND TARGETS AND STANDARDS**

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| --- | --- | --- |
| **Key Courses** | **Assessment Methods** | **Targets and Standards** |
| Electrical Circuits 2 | Solved Problems/Problem Sets | 70% of the students get satisfactory rating |
| Material Science & Engineering | Quizzes and Examinations | 70% of the students get satisfactory rating |
| Power System Analysis | Quizzes and Examinations | 70% of the students get satisfactory rating |
| Engineering Data Analysis | Solved Problems/ Problem Sets | 70% of the students get satisfactory rating |
| Research Methods | Research Journal | 70% of the students get satisfactory rating |
| Research Project or Capstone Design Project | Research Output/ Thesis | 70% of the students get satisfactory rating |
| Industrial Electronics | Project Output | 70% of the students get satisfactory rating |
| Electrical Machines 1 | Technical Engineering Essay/ Report | 70% of the students get satisfactory rating |
| Power System Analysis | Quizzes and Examinations | 70% of the students get satisfactory rating |
| Instrumentation and Control | Technical Engineering Essay/ Report | 70% of the students get satisfactory rating |
| Microprocessor Systems | Project Output | 70% of the students get satisfactory rating |
| Physics for Engineers | Laboratory Activities | 70% of the students get satisfactory rating |
| Engineering Data Analysis | Quizzes and Examinations | 70% of the students get satisfactory rating |
| Engineering Mathematics for EE | Quizzes and Examinations | 70% of the students get satisfactory rating |
| Distribution System and Substation Design | Quizzes and Examinations | 70% of the students get satisfactory rating |
| Power System Analysis | Technical Engineering Report | 70% of the students get satisfactory rating |
| On the Job Training | OJT Report | 70% of the students get satisfactory rating |
| EE Laws, Codes and Ethics | Quizzes and Examinations | 70% of the students get satisfactory rating |
| Management of Engineering Projects | Technical Engineering Report | 70% of the students get satisfactory rating |
| Electrical Circuits 1 | Quizzes and Examinations | 70% of the students get satisfactory rating |
| Management of Engineering Projects | Technical Engineering Report | 70% of the students get satisfactory rating |
| Research Methods | Quizzes and Examinations | 70% of the students get satisfactory rating |
| Environmental Science and Engineering | Class Presentation/ Reporting | 70% of the students get satisfactory rating |
| Engineering Economics | Class Presentation/ Reporting | 70% of the students get satisfactory rating |
| Engineering Economics | Class Presentation/ Reporting | 70% of the students get satisfactory rating |
| Research Projects or Capstone Design Project | Research Output/ Thesis | 70% of the students get satisfactory rating |
| Technopreneurship | Group Report/ Presentation | 70% of the students get satisfactory rating |
| Seminars and Colloquia | Group Report/ Presentation | 70% of the students get satisfactory rating |
| Fundamentals of Power Plant Engineering Design | Laboratory Activity/ Simulation | 70% of the students get satisfactory rating |
| Instrumentation and Control | Laboratory Activity/ Simulation | 70% of the students get satisfactory rating |
| Professional Elective 2 – Renewable Energy For Sustainable Development | Laboratory Activity/ Simulation | 70% of the students get satisfactory rating |
| Electrical Apparatus and Devices | Quizzes and Examinations | 70% of the students get satisfactory rating |
| Management of Engineering Projects | Technical Engineering Report | 70% of the students get satisfactory rating |
| On the Job Training | OJT Report | 70% of the students get satisfactory rating |
| Management of Engineering Projects | Technical Engineering Report | 70% of the students get satisfactory rating |
| Electrical Engineering Orientation | Quizzes and Examinations | 70% of the students get satisfactory rating |
| Power System Analysis | Quizzes and Examinations | 70% of the students get satisfactory rating |

1. **CONTINUOUS QUALITY IMPROVEMENT**

There shall be documented process for the assessment and evaluation of program educational objectives and program outcomes.

The comparison of achieved performance indicators with declared targets or standards of performance should serve as basis for the priority projects or programs for improving the weak performance indicators. Such projects and programs shall be documented as well as the results of its implementation. This regular cycle of documentation of projects, programs for remediation and their successful implementation shall serve as the evidence for Continuous Quality Improvement (CQI).