



**CEBU INSTITUTE OF TECHNOLOGY**  
**U N I V E R S I T Y**

**Electrical Engineering Department**

## **FINAL ORAL VALIDATION DOCUMENTATION**

**EE482 – K01**

**RESEARCH PROJECT OR CAPSTONE DESIGN PROJECT 2**

**SUBMITTED BY:**

**DAMUAG, CHARIMEL JHON R.  
OBISO, RECHELLE ANN S.  
PACRES, MA. RACHEL JANE A CECILA V.  
VILLASENCIO, CYRIL DANE C.  
VIRTUDAZO, ZELL DIANNE C.**

**SUBMITTED TO:**

**ENGR. JUDE DAVID T. BADAL  
INSTRUCTOR**

**I. Research Title:**

Enhancing Energy Efficiency Through Modification of Electrical Plans:  
Addressing Power Instability and Improving Power Consumption in SAL,  
LRAC, and T-Room Buildings at Cebu Institute of Technology – University

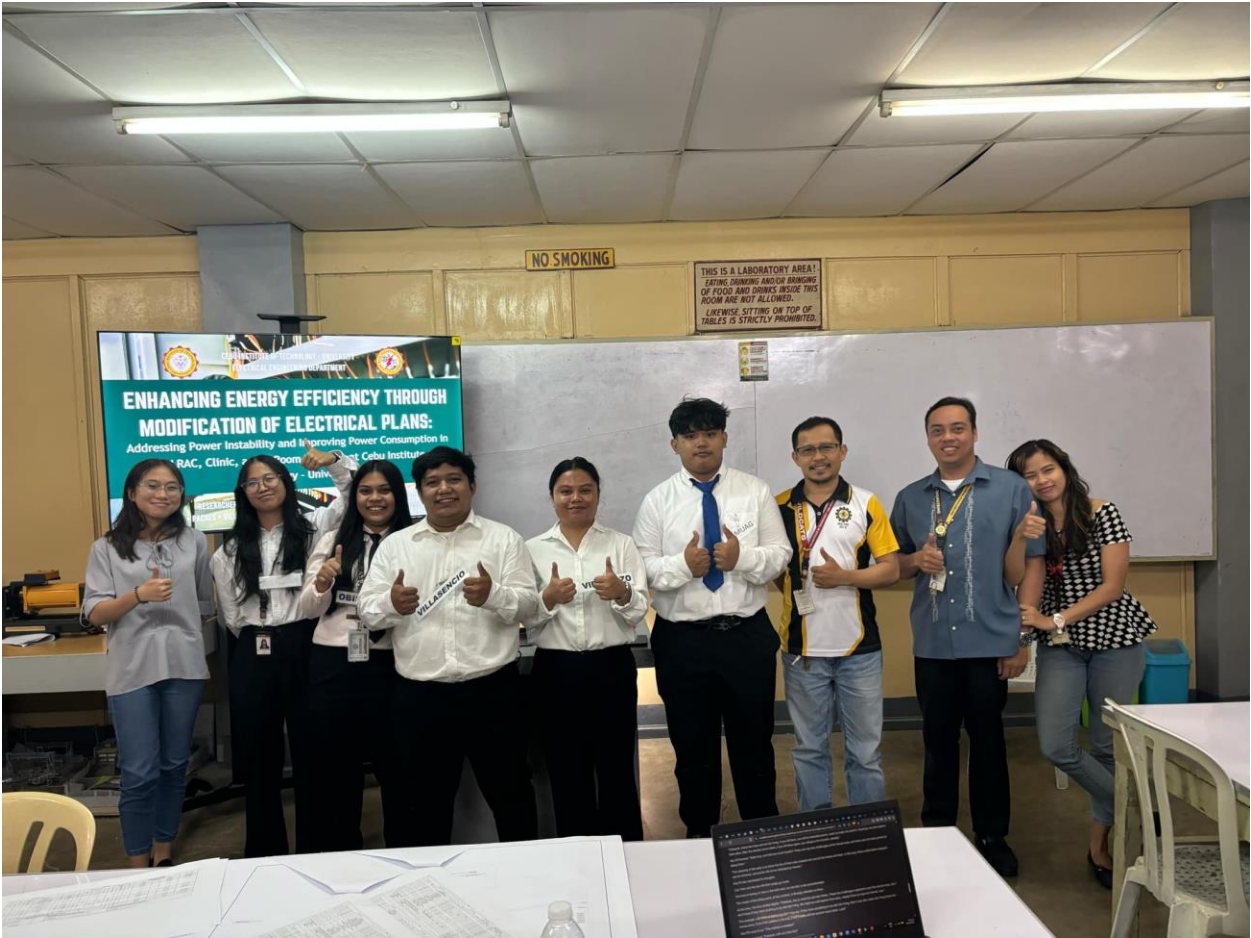
**II. Abstract:**

This study addresses energy inefficiencies at Cebu Institute of Technology – University focusing on the SAL, LRAC, and T-Room buildings. Outdated wiring, power fluctuations, and the absence of as-built electrical plans have led to increased energy consumption and safety risks. Through site inspections, AutoCAD-based designs, and ETAP simulations, the research identified inefficiencies and proposed modifications to improve energy efficiency, reduce power losses, and enhance safety. The findings provide actionable insights for sustainable energy management practices and provide a framework for optimizing electrical systems within educational institutions.

**III. Date of Oral Defense:**

The capstone design project 2 final oral defense was conducted on April 28, 2025 at 8:30PM-9:20PM in Allied 138.

IV. Pictures:



**Figure 1** Proponents, Adviser, and Panelists

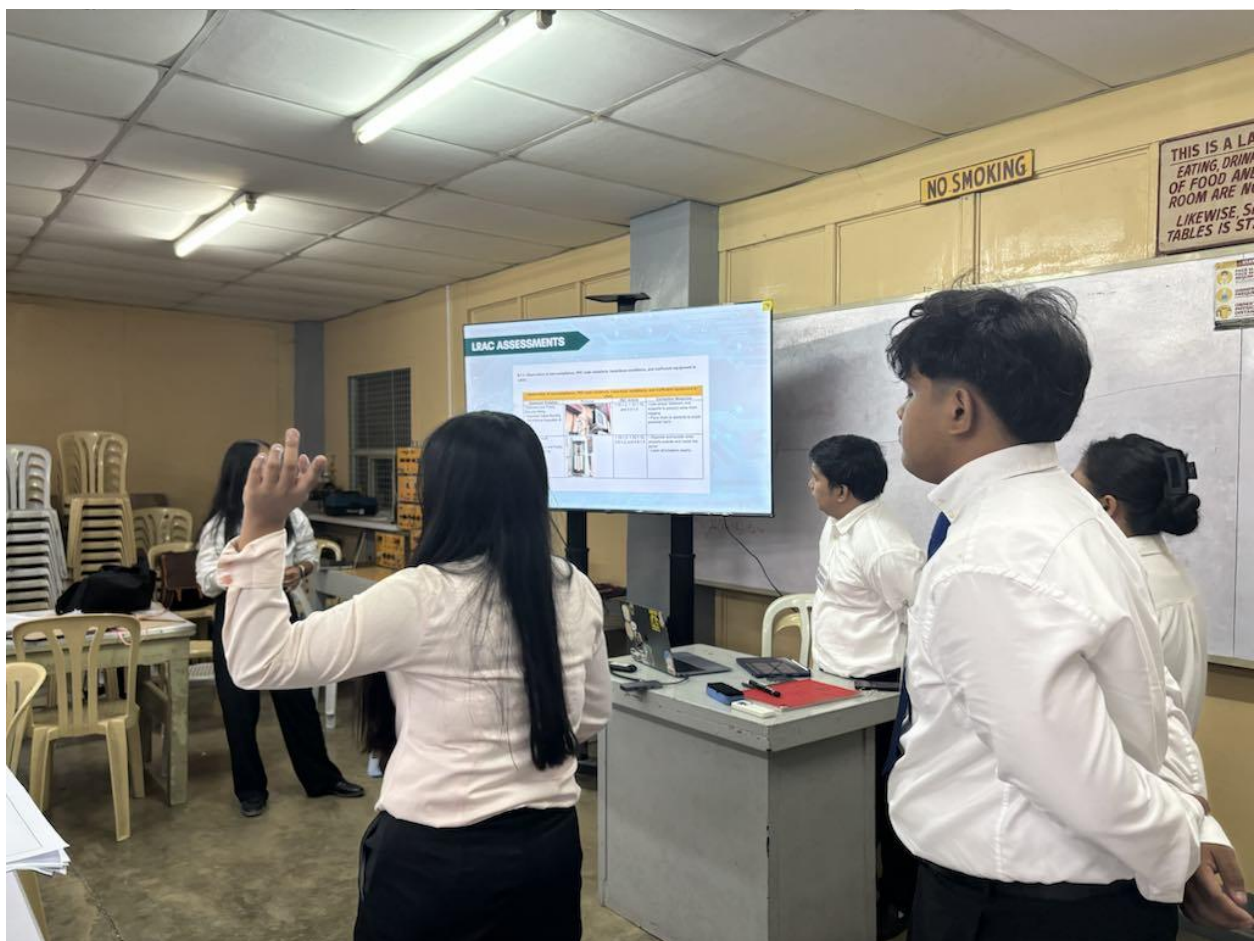
Figure 1 shows the image of the proponents together with the Research Adviser, Engr. Jude David T. Badal. Also, with the panelist, Engr. Joker A. Zeta and Engr. Marianne A. Tapayan. It was taken April 28, 2025, held in Allied 138 after the defense have been approved with revisions on the paper.



**Figure 2** Objectives and Capstone 1 TRN Presentation

The capstone 2 oral defense was attended by the following individuals: Engr. Marianne A. Tapayan, Engr. Joker A. Zeta, and Atty. Engr. Julito B. Añora, Jr. as our panelists and Engr. Irish May G. Saludar and Engr. Jude David T. Badal as our advisers.

Mr. Villasencio presented the objectives of capstone design project 2. Following, Ms. Pacres presented the comments of Engr. Joker A. Zeta on our thesis revision notes which to identify the buildings/connections linked to the powerhouse distribution panels and ensure readings align with the provided data. Also, the comments of Engr. Marianne A. Tapayan which to present only the relevant buildings within scope, clearly comparing the as-built and proposed designs, and ensure the data is well-organized and easy to interpret—avoid screenshots and use clean tables or structured formats for clarity.



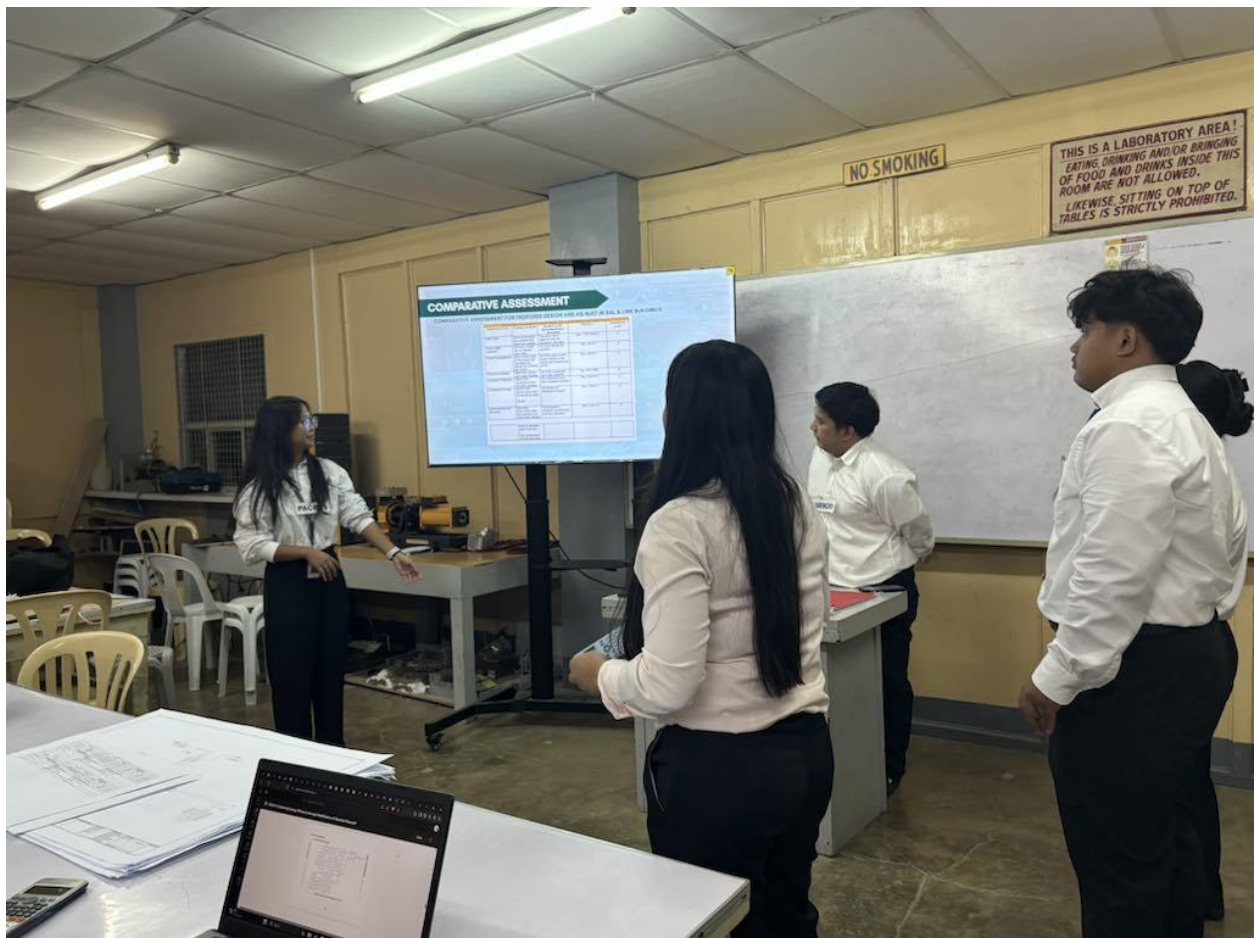
**Figure 3** SAL, LINK, TROOM, CLINIC, and LRAC Buildings Assessments and Comparative Assessment

During the oral defense, Ms. Virtudazo presented the SAL & LINK assessment focusing on evaluating electrical systems for safety, code compliance, and efficiency. Key issues found include rusted panels, poor wiring, and lack of circuit labeling—posing safety hazards and violating the Philippine Electrical Code (PEC). Corrective actions such as labeling breakers, replacing corroded parts, and organizing wiring are recommended.

Ms. Obiso presented the TROOM, CLINIC, and LRAC assessments, comparing existing and proposed electrical systems of the buildings. Upgrades include switching from fluorescent to LED lighting and updating circuit labels to improve load distribution and ensure PEC 2017 compliance.

Atty. Engr. Julito B. Añora, Jr. also advised to include pictures showing how panelboards should look—providing before and after comparisons in the assessments.



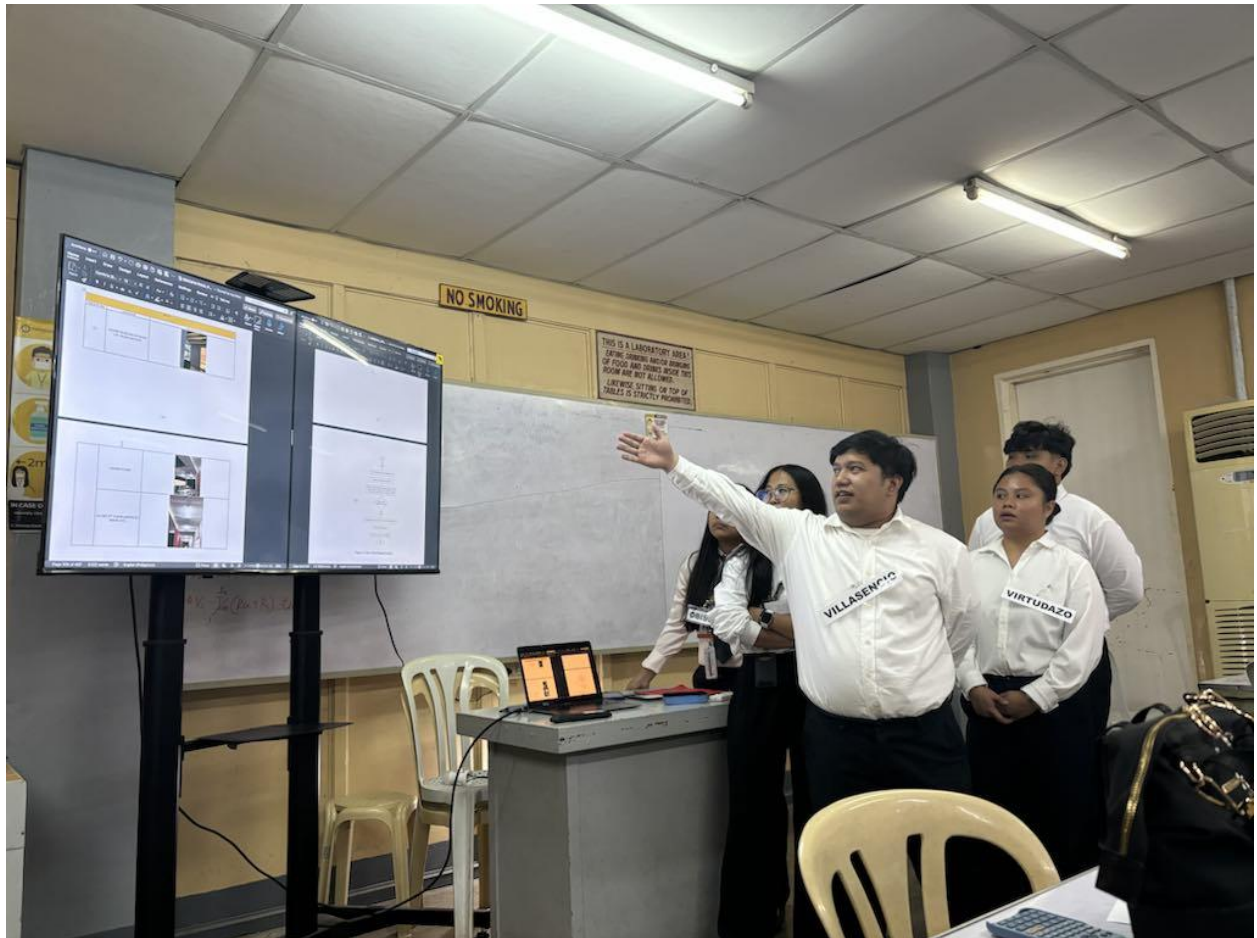


**Figure 4** Summary of ETAP Inefficiencies and Total Calculated KVA Savings

Ms. Pacres addressed critical inefficiencies in the SAL & Link Building, resolving excessive voltage drop at PB-06, overloaded cables (LINK/Q C DP-02), and insufficient breaker ratings by upgrading conductors, replacing cables to PEC standards, and installing 18 kA breakers. These measures achieved a 12.72% kVA reduction and PEC 2017 compliance.

Ms. Obiso's assessment of the T-Room, Clinic, and LRAC Buildings tackled severe voltage drops, overloaded breakers (150% capacity), and unbalanced loads (>10% imbalance). Through LED retrofits, breaker upgrades, and phase rebalancing, she achieved 2.45% and 8.58% kVA reductions in the respective buildings, culminating in an excellent system-wide 23.75% kVA savings (55.67 kVA).

Advisor Atty. Engr. Julito B. Añora, Jr. emphasized visual documentation (e.g., before-after panel comparisons, simulation graphs) and clarified that “Acceptable” (minimal compliance, e.g., 2.45% savings), “Optimal” (balanced efficiency, e.g., 12.72% reduction), and “Excellent” (holistic success, e.g., 23.75% savings) are beneficial classifications under PEC 2017, guiding future prioritization and refinements.



**Figure 6** Questions and Answers from the Panelists

The panel addressed the 7.2% voltage drop reduction, achieved by upgrading PB-06 conductors and rebalancing loads via ETAP simulations to meet PEC 2017's  $\leq 5\%$  limit. Before-and-after visuals (e.g., rusted vs. upgraded panelboards, ETAP graphs) will be included per Advisor Añora's guidance. Tables like 3.10 (conductor sizing) and 4.1 (kVA savings) comply with PEC 2017, emphasizing 23.75% total savings. The SAL & Link's 12.72% "Optimal" rating reflects cost-efficiency balance, while "Excellent" denotes holistic success (23.75% system-wide savings). The advisor stressed cross-referencing visuals in appendices for clarity.