

# Assessment Report

## PART 1: CONTACT & PROGRAM IDENTIFICATION

Report Year and Contact Information:		
2019-2020	Janet Hughes	jhughes41@cnm.edu
<b>Academic Year</b>	<b>Contact Person</b>	<b>Email</b>

Name of Program:	Courses:																					
Electrical Trades Degree: Photovoltaic Installation	<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 12.5%;">ELTR 1005</td> <td style="width: 12.5%;">ELTR 1015</td> <td style="width: 12.5%;">ELTR 1020</td> <td style="width: 12.5%;">ELTR 1030</td> <td style="width: 12.5%;">ELTR 1210</td> <td style="width: 12.5%;">ELTR 1215</td> <td style="width: 12.5%;">ELTR 1220</td> </tr> <tr> <td>ELTR 1230</td> <td>ELTR 2005</td> <td>ELTR 2015</td> <td>ELTR 2020</td> <td>ELTR 2030</td> <td>ELTR 2605</td> <td>ELTR 2615</td> </tr> <tr> <td>ELTR 2630</td> <td>ELTR 2692</td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </table>	ELTR 1005	ELTR 1015	ELTR 1020	ELTR 1030	ELTR 1210	ELTR 1215	ELTR 1220	ELTR 1230	ELTR 2005	ELTR 2015	ELTR 2020	ELTR 2030	ELTR 2605	ELTR 2615	ELTR 2630	ELTR 2692					
ELTR 1005	ELTR 1015	ELTR 1020	ELTR 1030	ELTR 1210	ELTR 1215	ELTR 1220																
ELTR 1230	ELTR 2005	ELTR 2015	ELTR 2020	ELTR 2030	ELTR 2605	ELTR 2615																
ELTR 2630	ELTR 2692																					

## PART 2: PROGRAM SUMMARY

Provide a high-level review of the program to include highlights, successes, challenges, significant changes, and significant resources needed to support the program.
<p>In ELTR 2605 there were 13 students in the fall of 2019 and 13 completed with a passing grade. In ELTR 2692 there were 13 students registered, 12 completed with a passing grade, and 1 did not complete in the fall of 2019. In ELTR 2615 there were 12 students registered and all 12 completed with a passing grade in the fall of 2019. In ELTR 2630 there were 12 students registered and all 12 completed with a passing score in fall of 2019. Spring of 2020 registration and completion was as follows: In ELTR 2605 there were 19 students registered, and 19 completed with a passing grade. In ELTR 2692, there were 18 registered and 18 completed with a passing grade. In ELTR 2615 there were 19 registered, 16 completed with a passing grade, and there were 3 incompletes. In ELTR 2630 there were 18 students registered, 14 completed with a passing grade, and there were 4 incompletes. The overall average scores increased both semesters with an average score for the year of 94%. The students take the NABCEP Associate Exam at the beginning of the Advanced PV course ELTR 2630. The exam preparation is the ELTR 2605 class, Photovoltaics Fundamentals and Applications. In the fall of 2019 passed. In the spring of 2020 passed. The overall NABCEP Associate Exam passing rate increased to 95%. In the lab Last year 1 new lab station with a new SMA inverter was completely built by the students and successfully commissioned in ELTR 2630. One of the off-grid systems, with a Lithium-ion battery pack and SolarEdge battery inverter was fine-tuned by the students. The SolarEdge equipment wall was completed by the students in the ELTR 2630 class. I know of 2 students who were hired into the</p>

solar industry. There may have been other hiring's that I am not aware of. One student in the spring was hired by a local racking company as an intern during the term.

**Part 3: DATA REVIEW**

<b>Program Data</b> <b>(Each Review Year is defined as Summer, Fall, and Spring terms)</b>	<b>Review Year</b> <b>19-20</b>	<b>Review Year</b> <b>18-19</b>	<b>Review Year</b> <b>17-18</b>
Annual number of graduate awards is greater than 10	14	16	11
Number of declared majors	47	53	53
Average class size	17	16	16
Annual Average class retention rate is 70% or above (SAGE 65%)	94%	91%	91%
Annual C-Pass rate for coursework is 60% or above	86%	87%	87%
Average class fill rate at 60% or above capacity within a term or over a year	79%	75%	75%
Transfer numbers/percent	NA	0 (0%)	1 (9%)

Full-time to part-time faculty ratio	57: 4	59: 5	49: 7
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**Summarize how your program met or did not meet the target measures based on the data above.**

The average class fill rates are higher than 60% and are increasing each year from 75% in review year 2017- 2018 to 79% in 2019 to 2020. In the PV courses the average class fill rate was 90% in the spring or 2020. The retention rate is above 70% and has grown from 91% in 2017-2018 to 94% in 2019-2020. The annual C-Pass rate for coursework is above 60% and is shown as 87% in 2017-2019 and 86% in 2019-2020. In the PV class it has been higher. It averaged out at 94% for those students completing in 2019-2020. The annual number of graduates has been greater than 10 and has increased from 11 in 2017-2018 to 14 in 2019-2020.

**Part 4: PROGRAM LEARNING OUTCOME ANALYSIS.**

Learning Outcome	Population or Course(s) Assessed	Assessment Methods	Summary of Assessment Results
Apply the proper NEC and local codes for installing PV equipment.	ELTR 2692, ELTR 2630	Final Exam, Test or quiz, Practical exam, In-class activities, Instructor observation, and Homework assignments.	Mastery level minimum average score target of 80%. Mastery level average score met was 98% in ELTR 2692 and 97% in ELTR 2630
Calculate the size and configuration of the battery bank and array based on system requirements.	ELTR 2630	Test or quiz, In-class activities, Instructor observation, and Homework assignments.	Mastery level minimum average score target of 80%. Mastery level average score met was 97% in ELTR 2630

Learning Outcome	Population or Course(s) Assessed	Assessment Methods	Summary of Assessment Results
Demonstrate knowledge of assembling fixed, flat ballasted, and tracking racking systems.	ELTR 2692, ELTR 2630	Test or quiz, Practical exam, In-class activities, and Instructor observation.	Mastery level minimum average score target of 80%. Mastery level average score met was 98% in ELTR 2692 and 97% in ELTR 2630
Demonstrate knowledge of basic specifications of batteries and charge controllers.	ELTR 2605, ELTR 2692, ELTR 2630	Final Exam, Test or quiz, In-class activities, Instructor observation, and Homework assignments.	Mastery level minimum average score target of 80%. Mastery level average score met was 92% in ELTR 2605, 98% in ELTR 2692, and 97% in ELTR 2630
Demonstrate knowledge of module specifications and characteristics.	ELTR 2605, ELTR 2692, ELTR 2630	Final Exam, Test or quiz, Practical exam, In-class activities, Instructor observation, and Homework assignments.	Mastery level minimum average score target of 80%. Mastery level average score met was 92% in ELTR 2605, 98% in ELTR 2692, and 97% in ELTR 2630
Demonstrate knowledge of navigating, finding, and understanding sections of the NEC that are critical to installing and inspecting photovoltaic systems	ELTR 2630, ELTR 2615	Final Exam, Test or quiz, In-class activities, Instructor observation, and Homework assignments.	Mastery level minimum average score target of 80%. Mastery level average score met was 97% in ELTR 2630 and 94% in ELTR 2615
Demonstrate knowledge of one and three-line drawings for different PV system configurations.	ELTR 2692, ELTR 2630	Practical exam, In-class activities, Instructor observation, and Homework assignments.	Mastery level minimum average score target of 80%. Mastery level average score met was 98% in ELTR 2692 and 97% in ELTR 2630

Learning Outcome	Population or Course(s) Assessed	Assessment Methods	Summary of Assessment Results
Demonstrate knowledge of series and parallel wiring.	ELTR 2605, ELTR 2692, ELTR 2630	Final Exam, Test or quiz, Practical exam, In-class activities, Instructor observation, and Homework assignments.	Mastery level minimum average score target of 80%. Mastery level average score met was 92% in ELTR 2605, 98% in ELTR 2692, and 97% in ELTR 2630
Demonstrate knowledge of special conditions applicable to PV Systems	ELTR 2630, ELTR 2615	Final Exam, Test or quiz, Practical exam, Instructor observation, and Homework assignments.	Mastery level minimum average score target of 80%. Mastery level average score met was 97% in ELTR 2630 and 94% in ELTR 2615
Demonstrate knowledge of testing and commissioning PV grid-direct systems.	ELTR 2630	Test or quiz, In-class activities, Instructor observation, and Homework assignments.	Mastery level minimum average score target of 80%. Mastery level average score met was 97% in ELTR 2630
Demonstrate knowledge of the functions and requirements for electrical balance of system (BOS) components.	ELTR 2605, ELTR 2692, ELTR 2630	Final Exam, Test or quiz, Practical exam, In-class activities, Instructor observation, and Homework assignments.	Mastery level minimum average score target of 80%. Mastery level average score met was 92% in ELTR 2605, 98% in ELTR 2692, and 97% in ELTR 2630
Identify and use the required types of disconnects and their locations.	ELTR 2692, ELTR 2630	Final Exam, Test or quiz, Practical exam, In-class activities, Instructor observation, and Homework assignments.	Mastery level minimum average score target of 80%. Mastery level average score met was 98% in ELTR 2692 and 97% in ELTR 2630

Learning Outcome	Population or Course(s) Assessed	Assessment Methods	Summary of Assessment Results
Identify and verify code compliant, safe sizing of conductors and overcurrent protection for DC and AC circuits	ELTR 2630, ELTR 2615	Final Exam, Test or quiz, Practical exam, In-class activities, Instructor observation, and Homework assignments.	Mastery level minimum average score target of 80%. Mastery level average score met was 97% in ELTR 2630 and 94% in ELTR 2615
Identify and verify code compliant, safe use of wiring methods and selection of the appropriate materials for specific sites and installations.	ELTR 2630, ELTR 2615	Final Exam, Test or quiz, Practical exam, In-class activities, Instructor observation, and Homework assignments.	Mastery level minimum average score target of 80%. Mastery level average score met was 97% in ELTR 2630 and 94% in ELTR 2615
Identify the electrical codes, regulations, and practices applicable to PV systems.	ELTR 2605, ELTR 2630, ELTR 2615	Final Exam, Test or quiz, In-class activities, Instructor observation, and Homework assignments.	Mastery level minimum average score target of 80%. Mastery level average score met was 92% in ELTR 2605, 97% in ELTR 2630 and 94% in ELTR 2615
Install batteries according to manufacturer's specifications.	ELTR 2630	In-class activities, and Instructor observation.	Mastery level minimum average score target of 80%. Mastery level average score met was 97% in ELTR 2630.
Install various PV module array systems per local code, manufacturers, and site specifications.	ELTR 2692, ELTR 2630	Practical exam, In-class activities, and Instructor observation.	Mastery level minimum average score target of 80%. Mastery level average score met was 98% in ELTR 2692 and 97% in ELTR 2630

Learning Outcome	Population or Course(s) Assessed	Assessment Methods	Summary of Assessment Results
Practice the proper use of tools.	ELTR 2692, ELTR 2630	Practical exam, In-class activities, and Instructor observation.	Mastery level minimum average score target of 80%. Mastery level average score met was 98% in ELTR 2692 and 97% in ELTR 2630
Recognize and identify code compliant, safe selection of components and code compliant, safe installation layouts, and documentation required for photovoltaic systems that are utility interactive with and without energy storage	ELTR 2630, ELTR 2615	Final Exam, Test or quiz, Practical exam, In-class activities, Instructor observation, and Homework assignments.	Mastery level minimum average score target of 80%. Mastery level average score met was 97% in ELTR 2630 and 94% in ELTR 2615
Recognize major principles and considerations for designing PV systems with batteries.	ELTR 2630	Test or quiz, Practical exam, In-class activities, Instructor observation, and Homework assignments.	Mastery level minimum average score target of 80%. Mastery level average score met was 97% in ELTR 2630.
Verify code compliant utility interconnections of PV systems	ELTR 2630, ELTR 2615	Final Exam, Test or quiz, Practical exam, In-class activities, Instructor observation, and Homework assignments.	Mastery level minimum average score target of 80%. Mastery level average score met was 97% in ELTR 2630 and 94% in ELTR 2615

**Interpretation of Assessment findings**

The courses use some competency-based learning. The courses are set up in modules and the students are required to achieve a 70% or greater in all activities of the module before they can move on. It is my observation that this structure is supporting the students to achieve the 80% mastery that has been set. It seems to be working. There are usually 1 to 2 students who have external life situations that impact their learning. It might be health issues, or work-related issues, or personal life issues. The results are that they get way behind in the course work and are forced to race through the work at the end. These students were able to achieve mastery despite their life situations. Having all the course work online except the labs makes it easier for these students to get through the course. Having one on one interaction with each student is critical to supporting them through their challenges. These courses have a lot of new information to absorb. Repetition is needed to absorb the information. The mastery level minimum average score target of 80% was met and exceeded in all the learning outcomes. The average scores were in the 94% to 98% range.

**Part 6: ADDITIONAL ACTION PLAN IN SUPPORT OF STUDENT LEARNING (IF APPROPRIATE)**

Upcoming year	Changes planned for the upcoming year	Data motivating this change
2020-2021		
2020-2021		
2020-2021		

**Please Select all the following that characterize the types of changes described in the above action plan:**

- Assessment criteria revision
- Assessment methodology revision
- Assignment revision
- Budgetary reallocation
- Change in teaching approach
- Course content revision
- Curricular Revision
- Faculty training/development
- Process revision

**Part 6: COMMENTS**

Use this section to record any comments, notes, or questions from individuals who reviewed this report.

School Dean:

SAAC Representative: