CNM ANNUAL STUDENT LEARNING ASSESSMENT REPORT

Due to the Student Academic Assessment Committee by October 15

Central New Mexico Community College

PART 1: REPORT INFORMATION

Report Year and Contact Information			
2018-2019	Janet Hughes	Jhughes41@cnm.edu	53256
Academic Year	**Contact Person**	**CNM Email**	**CNM Office Extension**

Subject of this Report
AT--ELTR_AAS--Electrical Trades Photovoltaic Concentration

PART 2: CONTEXT IN WHICH THE ASSESSMENT TOOK PLACE

Program/Area Highlights and Successes (Wherever applicable, include course completion rates, job placement outcomes, and licensing examination pass rates. See the program information dashboard at https://livecnm.sharepoint.com/sites/Dashboards/SitePages/Program%20Information%20Dashboard.aspx (access restricted to CNM employees) and other reports at https://www.cnm.edu/depts/opie.)

Lecture videos were completed for ELTR 2630. In ELTR 2605 there were 13 students registered in all 4 classed in the fall of 2018 and 13 completed with a passing grade. In ELTR 2692 there were 12 students registered and all 12 completed with a passing grade in the fall of 2018. In ELTR 2615 there were 12 students registered and all 12 completed with a passing grade in the fall of 2018. In ELTR 2630 there were 11 students registered and all 11 completed with a passing score in fall of 2018. Spring of 2019 registration and completion was as follows: In ELTR 2605 there were 15 students registered, 2 did not show up and were dropped, and 13 completed with a passing grade. In ELTR 2692, there were 11 registered and 11 completed with a passing grade. In ELTR 2615 there were 12 registered and 12 completed with a passing grade. In ELTR 2630 there were 11 students registered and 11 completed with a passing grade. The overall average scores increased both semesters with an average score for the year of 92%. The students take the NABCEP Associate Exam towards the end of the Advanced PV course ELTR 2630. In the fall of 2018 10 of 11 passed. In the spring of 2019 all 11 passed. The overall NABCEP Associate Exam passing rate increased to 95%. In the lab Last year 1 new lab station with a Solar Edge inverter was completely built by the students and successfully commissioned in ELTR 2630. One of the off grid systems, with an Outback Power Systems inverter was completed and commissioned in the ELTR 2630 class by the students. Another off grid system was mounted and partially built out in the ELTR 2630 class by the students. We received a new lithium battery pack and a Solar Edge battery inverter last year. The battery pack and the inverter were mounted and the system was partially built out by the students in the ELTR 2630 class. Over the last year I know of 5 students out of the PV program that have been hired by local solar industry. One of the students already worked in the industry and came in to get more education. There may have been other hirings that I am not aware of.

Changes Implemented During the Past Year in Support of Student Learning
All of the class lectures videos have been completed. I was able to spend more time in the in person classes coaching students one on one, discussing topics on class activities that students wanted more support on, and putting calculation examples on the board for discussion. The students also had more time to work on activities during class time so they didn't have to do as much outside of class.

PART 3: REPORT ON ASSESSMENT OF STUDENT LEARNING

Assessment Method	Type of Assessment Tool	Population or Course(s) Assessed	Graduate Learning Outcome(s) Assessed	Mastery Level (E.g., "Minimum score of 3 on a rubric scaled 0-4" or "Minimum score of 75%")	Targeted % Achieving Mastery	Outcome
Assignments, Quizzes, Tests, and Labs	Direct & Internal	ELTR 2692, ELTR 2615, and ELTR 2630	Demonstrate knowledge of navigating, finding, and understanding sections of the NEC that are critical to installing and inspecting photovoltaic systems.	Minimum score of 80%	92%	Target met
Labs	Direct & Internal	ELTR 2692 and ELTR 2630	Install various PV module array systems per local code, manufacturers, and site specifications.	Minimum score of 80%	92%	Target met
Assignments and Labs	Direct & Internal	ELTR 2692 and ELTR 2630	Demonstrate knowledge of one and three-line drawings for different PV system configurations.	Minimum score of 80%	92%	Target met
Assignments, Quizzes, Tests, and Labs	Direct & Internal	ELTR 2605, ELTR 2692, ELTR 2630	Identify and use the required types of disconnects and their locations.	Minimum score of 80%	92%	Target met
Assignments, Quizzes, Tests, and Labs	Direct & Internal	ELTR 2605, ELTR 2692, ELTR 2615. And ELTR 2630	Demonstrate knowledge of module specifications and characteristics.	Minimum score of 80%	92%	Target met

Assignments, Quizzes, Tests, and Labs	Direct & Internal	ELTR 2605, ELTR 2692, ELTR 2630	Demonstrate knowledge of series and parallel wiring.	Minimum score of 80%	92%	Target met
Assignments, Quizzes, Tests, and Labs	Direct & Internal	ELTR 2605, ELTR 2692, ELTR 2615, ELTR 2630	Demonstrate knowledge of the functions and requirements for electrical balance of system (BOS) components.	Minimum score of 80%	92%	Target met
Assignments, Quizzes, Tests, and Labs	Direct & Internal	ELTR 2692, ELTR 2615, and ELTR 2630	Apply the proper NEC and local codes for installing PV equipment.	Minimum score of 80%	92%	Target met
Assignments, Quizzes, Tests, and Labs	Direct & Internal	ELTR 2605, ELTR 2692, ELTR 2630	Demonstrate knowledge of testing and commissioning PV grid-direct systems.	Minimum score of 80%	92%	Target met
Assignments, Quizzes, Tests, and Labs	Direct & Internal	ELTR 2692, ELTR 2615, and ELTR 2630	Demonstrate knowledge of navigating, finding, and understanding sections of the NEC that are critical to installing and inspecting photovoltaic systems	Minimum score of 80%	92%	Target met

Summary of Assessment Findings

92% of the students are meeting the target goals in every assessment. Rubrics are used in both the theory and lab instruction of the courses. The theory rubric for assignments includes 4 areas: No submission; Improvement required; Competent; and Excellent. 92% meets the excellent rubric which includes assignment is excellently done and meets all the required outcomes, follows all instructions, completed all required parts of the assignment, ideas are excellently presented and developed, many specific examples and detailed descriptions. The rubric for labs includes the same 4 areas. The 92% is the excellent category which includes questions and/or date is completed with more detail, all tasks are completed with excellent detail, all results and/or observations are made and met all outcomes, lab reports are written excellently, excellent participation, and followed directions and procedures. There was an increase of 12% this year in mastery. There was an increase to a 95% passing rate for the NABCEP Associate Exam.

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 in spite of their life situations. Having all the course work online except the labs makes it easier for these students to get through the course. Having some one on one time with the students seems critical to supporting them through their challenges. These courses have a lot of new information to absorb. Repetition is needed to absorb the information. Click or tap here to enter text.

Action Plan in Support of Student Learning (Describe changes to be made that are based at least in part on the assessment interpretation. If the assessment did not yield useful information, describe changes to be made in the assessment methodology and/or criteria.)
Action plan to accomplish 100% mastery: Continue to work in time for more one on one interaction in online sessions using Blackboard Collaborate Ultra and in face to face classes with students. Use phone apps such as Kahoot to give impromptu quizzes for increased repetition of class material. In the face to face classes, have them work in groups on a practice problem and then designate one person from the group to present the solution to the class. Give each group a different problem to work out and share. Have the rest of the class ask questions and give feedback. Continue to work on interactive learning ideas for more repetition and practice with the course material. Continue to fine tune the curriculum assignments, quizzes, tests, and lectures to improve content for better understanding. This coming year I am introducing an online 3D software tool that will give the students more interactive lessons for another method of learning the material called Interplay. This coming year I am restructuring the layout of the ELTR 2605 having the Learning Modules exactly model the NABCEP Associate Job Task Analysis. I believe this will assist the students in preparing for the exam.

Please select all of 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

Recommendations, Proposals, and/or Funding Requests	Budget Needed
The PV department has an exciting opportunity on the horizon. A 3.5MW PV system with energy storage is being built at the West Side Campus late 2019 or early 2020. There will be a utility scale lab built as part of this project. A new program is in the beginning stages of being planned that could include multiple courses in AT and Ingenuity, and bring in interested local, national, and global individuals and groups to participate. This is a completely new area for the PV department. The program has been focused on residential and small commercial systems to this point. Utility scale systems use the same PV fundamentals, however the equipment, racking, and wiring used are completely different, and is on a much higher scale than anything that has been taught before. It is exciting because it is new, a unique program, and will have a broad reach. It could very well be the first of it's kind in the US. Utility scale PV is the fastest growing employment opportunity in the Albuquerque area. The program will be important to promote and expose high school students to, so they can prepare for future	Click or tap here to enter text.

employment. The PV department will require support to make this large undertaking a reality. The currently planned launch is spring 2021.	

PART 4: REMAINING YEARS IN CURRENT ASSESSMENT CYCLE PLAN (including any revisions) **– OR -- UPCOMING ASSESSMENT CYCLE PLAN** (if this was the final year)

Years of Full Cycle	**Next Year's Assessment Focus** (Describe how the next planned assessment is expected to provide information that can be used toward improving student learning.)
5	I plan to continue to reassess each assignment, quiz, test, and activity making notes on the questions that most students miss. That will allow me to make decisions to replace or chance the wording and/or add discussions and added content to the lectures to improve the learning in these areas. Evaluate new online 3d interactive software lessons that I am adding this coming year to see if and how retention of course material is increased.

Graduate Learning Outcomes to Be Assessed	Years in which Assessment Is Planned	Population/Courses to Be Assessed	Planned Assessment Approach
Identify the electrical codes, regulations and practices applicable to PV systems.	5	ELTR 2620, ELTR 2630, ELTR 2615	Quizzes, Discussion Forums
Calculate the size and configuration of the battery bank and array based on system requirements.	5	ELTR 2630	Labs, Assignments, Quizzes, Tests
Install batteries according to manufacturer's specifications.	5	ELTR 2630	Labs
Demonstrate knowledge of testing and commissioning PV grid-direct systems.	5	ELTR 2630	Labs, Assignments, Quizzes, Tests
Demonstrate knowledge of navigating, finding, and understanding sections of the NEC that are critical to installing and inspecting photovoltaic systems	5	ELTR 2692, ELTR 2615, ELTR 2630	Assignments, Quizzes
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	5	ELTR 2692, ELTR 2615, ELTR 2630	Quizzes and Discussion Forums
Identify and verify code compliant, safe sizing of conductors and overcurrent protection for DC and AC circuits	5	ELTR 2692, ELTR 2615, ELTR 2630	Quizzes
Identify and verify code compliant, safe use of wiring methods and selection of the appropriate materials for specific sites and installations.	5	ELTR 2692, ELTR 2615, ELTR 2630	Quizzes
Demonstrate knowledge of special conditions applicable to PV Systems	5	ELTR 2615	Quizzes
Verify code compliant utility interconnections of PV systems	5	ELTR 2615	Quizzes

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Click or tap here to enter text.	Click or tap here to enter text.	Click or tap here to enter text.	Click or tap here to enter text.
Click or tap here to enter text.	Click or tap here to enter text.	Click or tap here to enter text.	Click or tap here to enter text.
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