Eastern West Virginia Community and Technical College
COURSE ASSESSMENT REPORT

Course Title and Number: Wind Turbine Troubleshooting & Repair WTT 260	**Academic Term and Year of Assessment Activity (Ex: Fall, 2014):** Spring, 2019
Report Submitted By: E. Putze	**Number of Students Assessed:** 2
Date Report Submitted: 8-2-2019	**Number of Sections Included:** 1
Course Delivery Format (list all modalities used in sections assessed. Ex: web based, VDL, traditional section, hybrid course, etc.): Lab exercises with hands-on training and computer applications, reading, web-based assignments, one-on-one instruction	

Course Role in the Curriculum
Provide a description of the role the course serves in the curriculum (i.e. general education requirement, program technical core, restricted elective, etc.). Note all as appropriate.

Role in College Curriculum: Technical Core for Wind Energy Technology, AAS

Catalog Description: This course emphasizes the skills essential to routine maintenance and repair of wind turbine electrical and mechanical systems. The student will learn the practices of installation, operation, maintenance, troubleshooting, and repair of wind turbine systems.

Assessment Methods
Provide a description of the assessment process used. Include description of instrument and performance standards in description. Note all methods.

Lab Exercises: Amatrol's *Wind Turbine Electric Hub Learning System* and *Wind Turbine Generator Control Learning System* software and hands-on trainers were used for lab exercises. The following topics were covered: *Hub Operation, Pitch Control System, Battery Power, Emergency Power System, Hub Troubleshooting, Power Generation, System Communications and Control Software, & System Operation.* The instructor was present throughout all labs; facilitated learning through demonstration and interaction with students; and observed student performance. Troubleshooting; demonstration and operation of multimeters; and analysis and interpretation of schematic diagrams were all demonstrated by students and assessed by the instructor.

Written Tests: Written tests, which were primarily multiple choice, were based mostly on material in *Maintenance Fundamentals for Wind Technicians; author: Wayne Kilcollins; publisher: Delmar, Cengage Learning; 2013* and Amatrol's *Wind Turbine Electric Hub Learning System* and *Wind Turbine Generator Control Learning System* software. One-on-one instruction, online Blackboard assignments, and Amatrol online learning were utilized to enable learning. Selected questions from the fifteen tests given were used for assessment.

Final Exam: Each student was required to troubleshoot faults on the hub and generator trainers using a multimeter and schematic diagrams.

Assessment Results

Provide a summary of results including tables/charts. Incorporate information from previous assessments as appropriate. Append additional pages if necessary. If appending, include notation in box to "See attached".

Course Outcome & Indicator	# of Students Answering Correctly	# of Students Answering Incorrectly	Composite
+ 1(a)	1.86	0.14	2.0
++ 1(b)	2.0	0.0	2.0
+++ 2(a)	1.93	0.07	2.0
2(b)	2.0	0.0	2.0
2(c)	2.0	0.0	2.0
3(a)	2.0	0.0	2.0
3(b)	2.0	0.0	2.0
3(c)	2.0	0.0	2.0
3(d)	2.0	0.0	2.0
Total Answers	17.79	0.21	18
Percentage	98.83%	1.17%	100%

+ Lab Exercises score and Lab Worksheets score for each student were combined and used to assess performance by extrapolating number of students successfully meeting the course outcome and number of students not meeting the course outcome

++ The Final Exam score for each student was used to assess performance by extrapolating number of students successfully meeting the course outcome and number of students not meeting the course outcome

+++ The Lab Exercises score, Lab Worksheets score, and Final Exam score for each student were combined and used to assess performance by extrapolating number of students successfully meeting the course outcome and number of students not meeting the course outcome

Course Level Assessment Summary of Outcomes, Indicators and Results Add additional rows to table if necessary				
Learning Outcomes (Insert learning outcomes assessed during this cycle)	**Indicator (Insert indicators used for each outcome: exam question, scoring rubric, etc. Be specific)**	**Percent of Correct Responses**	**Percent of Incorrect Responses**	**Performance Standard Met (75%)* (yes or no)**
Learning Outcome 1: *Utilize wind turbine hub and generator training simulators to learn and operate system components and to demonstrate troubleshooting skills*	+ (a) Amatrol's *Wind Turbine Electric Hub Learning System* and *Wind Turbine Generator Control Learning System* software and hands-on trainers were used for lab exercises. The following topics were covered: *Hub Operation, Pitch Control System, Battery Power, Emergency Power System, Hub Troubleshooting, Power Generation, System Communications and Control Software, & System Operation.* Troubleshooting, individually and in teams; demonstration and operation of multimeters; and analysis and interpretation of schematic diagrams were all demonstrated by students and assessed by the instructor.	93%	7%	Yes
Learning Outcome 1: *Utilize wind turbine hub and generator training simulators to learn and operate system components and to demonstrate troubleshooting*	++ (b) For the final exam, each student was required to troubleshoot faults on the hub and generator trainers using a multimeter and schematic diagrams.	100%	0%	Yes

skills				
Learning Outcome 2: *Discuss the importance and functions of PPE and the safety protection systems*	+++ a) Each student was required to demonstrate proper use of Personal Protective Equipment (PPE) throughout all lab exercises and the final exam.	96.6%	3.4%	Yes
Learning Outcome 2: *Discuss the importance and functions of PPE and the safety protection systems*	b) Chapter 10 Test, Question #5 (M/C): "Which of the following is **not** considered essential safety equipment for wind tower maintenance?" Answer: "Lift bag"	100%	0%	Yes
Learning Outcome 2: *Discuss the importance and functions of PPE and the safety protection systems*	c) Chapter 11 Test, Question #23 (M/C): "Tie-offs are used with:" Answer: "Safety harness lanyards"	100%	0%	Yes
Learning Outcome 3: *Demonstrate how to isolate electrical and*	a) Chapter 11 Test, Question #16 (M/C): "If disassembly of a yaw-drive motor brake assembly is required, a(n) _____ should be performed:"	100%	0%	Yes

mechanical energy by using Lock Out Tag Out (LOTO) procedures	Answer: "LOTO"			
Learning Outcome 3: *Demonstrate how to isolate electrical and mechanical energy by using Lock Out Tag Out (LOTO) procedures*	b) Chapter 11 Test, Question #22 (M/C): "When isolating energy sources prior to inspecting and performing maintenance on PLC's, electrical controls, and sensors, LOTO should be verified by using:" Answer: "A voltmeter"	100%	0%	Yes
Learning Outcome 3: *Demonstrate how to isolate electrical and mechanical energy by using Lock Out Tag Out (LOTO) procedures*	c) Chapter 12 Test, Question #19 (M/C): "Part of LOTO when entering the hub is activating the:" Answer: "Rotor lock"	100%	0%	Yes
Learning Outcome 3: *Demonstrate how to isolate electrical and mechanical energy by using Lock Out Tag Out (LOTO) procedures*	d) Chapter 13 Test, Question #12 (M/C): "The isolation of all energy sources, including mechanical and electrical, is called:" Answer: "LOTO"	100%	0%	Yes

+ Lab Exercises score and Lab Worksheets score for each student were combined and used to assess performance by extrapolating number of students successfully meeting the course outcome and number of students not meeting the course outcome

++ The Final Exam score for each student was used to assess performance by extrapolating number of students successfully meeting the course outcome and number of students not meeting the course outcome

+++ The Lab Exercises score, Lab Worksheets score, and Final Exam score for each student were combined and used to assess performance by extrapolating number of students successfully meeting the course outcome and number of students not meeting the course outcome

* Please note if using a different minimum performance standard.

Conclusions

Provide a brief summary of conclusions derived based on analysis of data. Append additional pages if necessary. If appending, include notation in box to "See attached".

The performance standard of 75% was exceeded by all nine indicators spread over the three Learning Outcomes assessed.

Previous Assessment Reports and Results

Date of Previous Assessment: Spring, 2017

List of Outcomes Not Met: N/A

Summary of Actions Taken to Address Unmet Learning Outcomes: Append additional pages if necessary. If appending, include notation in box to "See attached". N/A

N/A

Action Plan and Date for Reassessment

Identify action plan for improvement or maintaining current performance levels including outcomes identified for re-assessment, curriculum revision, LOT proposal, new or revised course activities to reinforce learning outcomes, etc. Append additional pages if necessary. If appending, include notation in box to "See attached".

Will test and analyze each fault in the Amatrol troubleshooting software to identify and correct anomalies.

Assessment Committee Recommendation/Approval (To be posted by Assessment Committee Chair)
□ Approved as presented x Approved with recommendations for future reports (Explanation Required) • Use current template • Present Assessment Results in a more familiar and accessible format • Include more detail in the Action Plan which addresses any specific shortcoming(s) □ Resubmission Required. Reason for Resubmission: **Date: 9/13/19**