AIRSTREAMS
Renewables, Inc.

Renewable Energy and Communications Tower Technician Program

Program Description

Course #AS1007

AS1007
Renewable Energy and Communications Tower Technician Program

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Course Synopsis

This course offers a complete complement of safety and technical modules designed to prepare each student for an entry-level position in the wind, communication tower and many other industrial focused industries. Emphasis will be placed on working safely in all aspects of the technician job and the basic technical skills required when working with electricity and hydraulics. Throughout the course students apply their knowledge during verbal reviews, quizzes, hands-on lab practical evaluation sessions, and written exams.

This course assumes little to no previous experience. Background in basic electrical and mechanical concepts is not a requirement, but will contribute to learning.

Course Organization

Class hours are 8:00 – 5:00, Monday through Friday with 1 hour scheduled for a lunch break.

This is a lecture and lab course consisting of 240 hours in which lesson topics are presented by the instructor. Instructor ratio is 24 to 1 students in the classroom and 8 to 1 for the labs. Written quizzes are given for each lesson and hands-on lab sessions with practical evaluations using simulators or simulated equipment are completed during the metering, electrical, torque, signalperson, rigging capstan hoist, CADWELDING, and lines and antenna lessons.

Tower climbing exercises, conditioning, practice, and practical evaluations take place on an actual wind farm and on the school provided wind and telecom simulated towers.

Self-paced homework assignments with quizzes are also assigned throughout the course.

Written final exams are given at the end of each gate.

Course Objective

Upon completion of all lessons, given written safety and technical exams and hands-on practical evaluations, the student will explain, describe, identify, and demonstrate how to safely troubleshoot, service, and maintain industrial equipment including, but not limited to, wind turbines and communication towers. Written exam pass criteria is 80% for safety and 70% for technical subjects. All practical evaluations are pass or fail.

Each lesson will present its own specific objective.

Text and Required Supplies

1. Student text materials will be provided.
2. Personal Protective Equipment (PPE) hard hat, safety glasses, climbing gear is provided while in class.
3. Required dress:
   - Sturdy work/hiking boots (composite or steel toed preferred, but not required), steel or fiberglass shank, with a defined heel.
   - Cotton pants, cotton long sleeve shirts
   - Form fitting, durable work gloves (Examples: CLC Handyman, Mechanix Wear, Iron Clad)
   - Cold weather gear (Examples: Wind resistant lined work jackets, hooded sweatshirt, balaclava, insulated overalls or coveralls, natural fiber upper/lower “long johns”)
   - Exposed metal jewelry such as watchbands, earrings, rings, piercings, metal stitching, metal framed glasses, or necklaces are not allowed while working with electrically energized equipment.

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Lesson Objectives and Criteria
Note: The following order of lessons is subject to change in the classroom.

Lesson Title	Objectives and Criteria
Tablet 101	This lesson introduces the tablet you will be using during class to access your curriculum.
Introduction to Wind and Communication Tower Industries	At the end of this lesson, in a group verbal review, the student will be able to: • Give a basic explanation of a wind turbine and a cell tower • Explain advantages of wind energy • Explain disadvantages of wind energy • Explain the types of employment opportunities within the industrial sectors.
Resume/Cover Letter Workshop	Upon completion of this workshop, students will be able to demonstrate the skills to draft a new or revised resume that will effectively sell skills and experience to a future employer.
Interview Workshop	Upon completion of this workshop, given a mock interview in both a one on one and group interview environment, students will be able to: • Demonstrate how to make the right first impression • Demonstrate how to handle difficult interview questions • Dress for interview success • Determine their personal interviewing style • Communicate effectively • Demonstrate how to effectively close the interview • Exhibit interview questioning skills
Gate 1	
Safety in the Industries	At the end of this lesson, given a written quiz and using reference materials, the student will: • Describe what and why an injury and illness prevention program is in place • Define employer responsibilities • Define employee responsibilities • Identify dangers found within the wind and communication tower industries • Describe common safety programs *Written Quiz: 80% with remediation to 100%*
First Aid, CPR and AED *American Red Cross AED- Adult, CPR-Adult, Standard First Aid cards (2 years)*	At the end of this American Red Cross program, given a written quiz using reference materials and a practical evaluation, students will: • Define, recognize and demonstrate care for a variety of first aid emergencies, such as burns, cuts and scrapes, sudden illnesses, head, neck and back injuries, and heat and cold emergencies • Define and CPR and care for breathing and cardiac emergencies in adults • Explain and Demonstrate how to use automatic external defibrillators *Written Quiz: 80% with remediation to 100%. Hands on Practical: Pass or Fail*
OSHA 10 Hour Construction lessons: *OSHA 10 Hour Construction Safety Card (no expiration)*	
1. Intro to OSHA	At the end of this lesson, given a written quiz and using reference materials, the student will accurately explain and describe: • What OSHA is • What OSHA does • Hazards addressed in OSHA standards • Employee rights *Per the OSHA and industry standard, all OSHA lesson tests are remediated to 100% In addition to the mandatory Intro to OSHA quiz, a post test is used to validate the learning for the remaining OSHA lessons.*
2. Fall Hazards	At the end of this lesson, using reference materials, the student will accurately explain and describe: • What is a fall hazard? • Safe work habits to prevent injury • How to recognize fall hazards • At least three methods of fall protection available for protecting workers • What is PFAS?

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Gate 1 continued	
3. Electrical Hazards	At the end of this lesson, using reference materials, the student will accurately explain and describe: • What an electrocution hazard is • Where electrocution hazards exist • Types of electrocution hazards • Methods to minimize or eliminate electrocution hazards • What PPE to use
4. Struck By Hazards	At the end of this lesson, using reference materials, the student will accurately explain and describe: • What a struck by hazard is • Where a struck by hazard may exist • Types of struck by hazards • Methods to minimize hazards • What PPE to use
5. Caught In or Between Hazards	At the end of this lesson using reference materials, the student will accurately explain and describe: • What is a caught-in or -between hazard? • Types of caught-in or -between hazards • Where these hazards may exist • Methods to minimize these hazards • PPE to use
6. PPE	At the end of this lesson, using reference materials, the student will accurately explain and describe: • What PPE is • Why PPE is used • Types of PPE to use • How to care for PPE • Required PPE in the industries
7. Health Hazards in Construction and Hazardous Materials	At the end of this lesson, using reference materials, the student will accurately: • Explain what “the right to know” is • List various types of PPE used to handle hazardous materials • Describe basic first aid requirements for exposure to hazardous materials • Describe what spills and leaks are • Define what labels and SDSs are and the importance of their use • Define LOTO (Lockout Tagout) • Define a Confined Space • Define two categories of respirators
8. Materials Handling	At the end of this lesson, using reference materials, the student will accurately explain and describe: • What is material handling? • Material handling hazards • Proper lifting of materials • How to avoid material hazards
9. Tools	At the end of this lesson, using reference materials, the student will accurately explain and describe: • When to inspect tools • Appropriate types of PPE to use with tools • When to use guards • Proper storage of tools • Safe handling techniques for hand and power tools
10. Excavations	At the end of this lesson, using reference materials, the student will be able to explain and describe: • Excavation hazards and risks. • Proper protective systems. • Who inspects?

Lesson Objectives and Criteria

Note: The following order of lessons is subject to change in the classroom.

Lesson Title	Objectives and Criteria
Gate 1 continued	
Signalperson *ARI Signalperson certificate (5 years)*	Upon completion of this course, the student will be assessed on the ability to accurately: • Identify basic crane terminology and definitions • Explain boom deflection, center of gravity, and how to compensate for it • Identify the hazards and safety concerns associated with overhead lifting • Recognize the applicable OSHA and ASME standards. • Demonstrate hand signals per ASME B30.5 and B30.3. • Demonstrate voice communication and recognize safety concerns when using them. • Explain the pre-lift planning process *Final Exam: 80%. Practical Evaluation: Pass or Fail*
Level 1 Crane Rigging *ARI Level 1 Rigging certificate (5 years)*	Upon completion of this course, using the rigging handbook, the student will be given a written and practical exam and be able to accurately: • Define responsibilities and safety rules for rigging and hoisting loads • Accurately inspect, select, maintain, and reject rigging equipment and hardware • Identify rigging hardware and slings along with defining their limitations • Identify load ratings, safety factors, and stresses imposed by hoisting • Calculate material load weights • Identify capacities of rigging and attach the appropriate rigging with the correct hitch configuration *Final Exam: 80%. Practical Evaluation: Pass or Fail*
Gate 2	
Authorized Climber and Rescue *Authorized Climber and Rescue Certification (2 years)*	Upon completion of this lesson, given a written exam (80%) and a practical evaluation (pass or fail), the student will be able to accurately: • Identify and/or define the health and safety governing body regulations for fall protection • Define your responsibilities and those of your employer • Define and identify the risks involved when working at heights on various tower structures • Define and demonstrate how to perform an inspection of Personal Fall Protection Equipment (PFPE) • Properly don and use a full body harness • Demonstrate the mechanics and performance of each piece of PFPE you are required to use on the job • Define common hazards for PFPE • Demonstrate how to properly tie and use knots • Demonstrate safe and proper climbing techniques on both wind and cell towers • Demonstrate safe and proper rescue techniques on various tower structures *Final Exam: 80% Hands on Practical: Pass or Fail*
Gate 3	
Alternating Current Theory	At the end of this lesson, given a written quiz and the use of reference material, the student will be able to accurately: • Explain the difference between AC and DC • Identify electronic component influence on AC circuits • Define the use of transformers • Describe generator and frequency converter/inverter basics • Explain three phase AC basics • Define electric motor basics • Define reactive poser, impedance and power factor basics *Written Quiz: 70% with remediation to 100%*
Direct Current Theory	At the end of this lesson, given a written quiz and using reference materials, the student will be able to accurately: • Define Direct Current • Identify the basic components of a circuit • Identify the source and load • Define HVDC *Written Quiz: 70% with remediation to 100%*

Lesson Objectives and Criteria

Note: The following order of lessons is subject to change in the classroom.

Lesson Title	Objectives and Criteria
Gate 3 continued	
Voltage Test Procedures 50 Volts or Higher *Electrical Safety Certificate (upon completion of all electrical lessons) (3 years)*	At the end of this lesson, given a written quiz and using reference materials, the student will accurately: • Define volts, amps, ohms • Explain the causes of high voltage Arc Flash • List the current thresholds that can harm the human body • List the types of Arc Flash PPE required to work on circuits of 50 volts or higher • List the types of burns associated with electrocution and arc flash • List the various safety electrical boundaries • Explain use of insulated electrical tools and how to identify them *Written Quiz: 80% with remediation to 100%*
Electrical Measurement Safety	Upon completion of this lesson, given a written quiz and using reference material, the student will be able to: • Describe the IEC 61010 category ratings and how they affect the end user • Demonstrate the ability to safely use and care for the metering equipment covered in this lesson • Describe the safety specifications for DMMs and testers • Demonstrate the ability to minimize and avoid electrical measurement hazards *Written Quiz: 80% with remediation to 100%*
Multimeters	At the end of this lesson, given a written quiz using reference material and a hands on practical exam, the student will accurately define and demonstrate: • Types of multimeters (analog and digital) • Basic multimeter safety • Basic multimeter functionality • Multimeter symbols and their meaning • Multimeter care and maintenance • Safe and accurate multimeter usage *Written Quiz: 80% with remediation to 100%. Practical Evaluation: Pass or Fail*
Amp Clamps	At the end of this lesson, given a written quiz using reference material and a hands on practical exam, the student will accurately define and demonstrate: • Define what an Amp Clamp is • Define the symbols on an Amp Clamp • Safe use of an Amp Clamp *Written Quiz: 80% with remediation to 100%. Practical Evaluation: Pass or Fail*
Megohmmeters	At the end of this lesson, given a written quiz using reference material and a hands on practical exam, the student will accurately define and demonstrate: • Basic Megger / Hipot safety • Megger usage *Written Quiz: 80% with remediation to 100%. Practical Evaluation: Pass or Fail*
Infrared Testers	At the end of this lesson, given a written quiz and a hands on practical exam, the student will accurately define and demonstrate: • Safe use of an Infrared (IR) tester • The features of an IR tester • The distance to spot ratio • Field of view • Emissivity *Written Quiz: 80% with remediation to 100%*
Phase Rotation Meter	At the end of this lesson, given a written quiz and a hands on practical exam, the student will accurately define and demonstrate: • What a Phase Rotation Meter is and what it does • The symbols on a Phase Rotation Meters • Safe use of the Phase Rotation Meter *Written Quiz: 80% with remediation to 100%.*
Tic Tracers	Upon completion of this lesson, given a written quiz and hands on practical exam, the student will be able to accurately define and demonstrate: • Tic Tracer functionality • Safe and accurate Tic Tracer usage • Hot Cold Hot procedure using a Tic Tracer *Written Quiz: 80% with remediation to 100%*

Lesson Objectives and Criteria

Note: The following order of lessons is subject to change in the classroom.

Lesson Title	Objectives and Criteria
Gate 4	
Electrical Systems, Components, and Schematics	At the end of this lesson, given a written quiz, using your reference materials, the student will be able to accurately: • List the 2 common electrical schematic methods • Identify various schematic symbols and labeling • Identify potential energy sources on a schematic diagram • Identify the elements of: – Safety-chain/loop, – Latching, – Lock-out – PLC to Motor-Control – Reversing sub-circuits • Follow an electrical schematic diagram to trace a circuit from source to load *Written Quiz: 70% with remediation to 100%*
PLC Demo & SCADA Demo	Instructor will demonstrate the basic functions of the Programmable Logic Computer and the SCADA system.
Wind Turbine Virtual Tour	This interactive video will provide and identify the various parts and components on a wind turbine.
Drivetrain Gearboxes	Upon completion of this lesson, given a written quiz and using reference materials, the student will be able to: • List the drive train components • Describe the function of the drive train components • Explain the gearbox functions *Written Quiz: 70% with remediation to 100%*
Yaw Systems	Upon completion of this lesson, using reference materials, the student will be given a written quiz and be able to identify and describe: • Yaw purpose / operation • Wind tracking data and devices • Component descriptions • Cable untwist function • Yaw system control • Yaw system faults *Written Quiz: 70% with remediation to 100%*
Maintenance Practices	Upon completion of this lesson, given a written quiz and using reference materials, the student will be able to: • Explain reasons, methods and importance of following maintenance procedures consistently • Explain hazards associated when performing maintenance procedures • Identify the consequences of not following proper maintenance procedures *Written Quiz: 70% with remediation to 100%*
Lab Volt Electrical Simulator Labs	Upon completion of this lesson of instruction, using the hands on electrical trainer simulator, the student will be able to demonstrate how to accurately and safely: • Follow LOTO procedures • Perform pre-power up checks and follow all electrical safety precautions including Hot Cold Hot Checks • Follow the schematics to build, operate and troubleshoot motor control circuits • Troubleshoot motor control circuits, components and devices to identify faults Practical Evaluation: Pass or Fail
Gate 5	
Fasteners, Torque and Tension *Fasteners, Torque and Tension Certificate*	At the end of all lessons in this course of instruction, given a closed book written exam and a hands on practical evaluation, the student will be able to explain the basic dynamics of fasteners and demonstrate how to safely use hand-held and hydraulic torque and tension equipment. *Written Quiz: 80% with remediation to 100%. Practical Evaluation: Pass or Fail*

Lesson Objectives and Criteria

Note: The following order of lessons is subject to change in the classroom.

Lesson Title	Objectives and Criteria
Gate 5 continued	
Basic Hydraulics	Upon completion of this lesson, given a written quiz, the student will be able to: • Describe hydraulics and what they are used for • Read a hydraulic schematic • Explain a basic hydraulic system • Troubleshoot a hydraulic system *Written Quiz: 70% with remediation to 100%.*
Gate 6	
Cell Site Basics	Upon completion of this lesson, given a written quiz and using reference material, the student will be able to accurately identify and/or define: • Different types of cell towers • Ground components and structures • Tower components and appurtenances *Written Quiz: 70% with remediation to 100%*
Radio Frequency Awareness	Upon completion of this lesson of instruction, the student will be able to accurately: • Define Radio Frequency (RF). • Define what makes RF dangerous. • Explain how RF works. • Identify the hazards when working around RF. • Identify how to avoid RF hazards. • Recognize RF signage and their implication/s. *Written Quiz: 80% with remediation to 100%*
Capstan Hoist *Capstan Hoist Certificate*	Upon completion of this lesson, given a written quiz and a practical evaluation, using reference material as needed, the student will: • Safely and accurately perform a lift using a capstan hoist • Define a capstan hoist and its features • Define anchorages, blocks, ropes, and how to use and inspect them Written Quiz: 70% with remediation to 100% Practical Evaluation: Pass or Fail
Lines and Antennas	Upon completion of this lesson, given a written quiz and a practical evaluation, using reference materials as needed, the student will be able to safely and accurately: • Hang and remove an antenna from a tower • Demonstrate rigging techniques • Determine and demonstrate color coding • Perform weatherproofing • Perform grounding for coax line • Define and explain line and antenna procedures *Written Quiz: 70% with remediation to 100%. Practical Evaluation: Pass or Fail*
CADWELDING *CADWELD Certificate*	Upon completion of this lesson, given a written quiz and a practical evaluation and using reference materials as needed, the student will: • Safely and accurately perform a CADWELD • Define the CADWELD process • Explain safety measures when using CADWELD *Written Quiz: 80% with remediation to 100%. Practical Evaluation: Pass or Fail*

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Note: The following order of lessons is subject to change in the classroom.

Lesson Title	Objectives and Criteria
Homework Assignments Distributed Throughout the Course	
Electrostatic Discharge (ESD)	Upon completion of this lesson, given a written quiz and using reference materials, the student will be able to: • Define Electrostatic Discharge (ESD) • Identify how ESD damages electronic parts • Define correct handling procedures for ESD sensitive electronic parts • *Self-paced Student Workbook. Written Quiz: 70% with remediation to 100%*
SCADA and Data Analysis Homework Gate 5	At the end of this lesson, given a written quiz and using reference materials, the student will be able to: • Define what SCADA is and what it does • Describe information that SCADA produces • Explain the benefits of using SCADA *Self-paced Student Workbook. Written Quiz: 70% with remediation to 100%*
Fiber Optics Gate 5	Upon completion of this lesson, using reference materials, the student will be given a written quiz and be able to: • Define fiber optics • Describe how information passes • Differentiate analog and digital • Demonstrate light loss measurement • Define basic components of a fiber optic system • Define how it works on a wind turbine • Define how it works on a cell tower *Self-paced Student Workbook. Written Quiz: 70% with remediation to 100%*
Communication Tower Vocabulary Gate 6	Upon completion of this lesson, the student will be able to accurately define or explain key telecom terms associated with the tower technician job. *Self-paced Student Workbook. Criteria: Written Quiz: 70% with remediation to 100%*