



AIRSTREAMS

Renewables, Inc.

***Renewable Energy
and
Communications
Tower Technician Program-IDL***



Program Description
Course #AS1007-IDL

AS1007-IDL
Renewable Energy and Communications Tower Technician Program-IDL

Main Campus: 13681 Chantico Road, Tehachapi, CA 93561

Phone: 661-822-3963 **Fax:** 661-822-6966

www.air-streams.com

Course Synopsis

This course is delivered 3 weeks Interactive Distance Learning (IDL), 3 weeks resident training on campus at the main campus in Tehachapi, CA.

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 final 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 lecture theory lessons are delivered via IDL on Zoom, Quizzes and Exams administered on Canvas, and lab hands on practical evaluation take place during the resident portion of the training.

Instructor ratio is 1 instructor to 24 students during IDL and classroom. Instructor ratio for resident labs is 8 students to 1 instructor. 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 during resident training.

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 subjects and 70% for technical subjects. All practical evaluations are pass or fail.

Each lesson will present its own specific objective.

Student Materials and Supplies

1. Student text materials will be provided by Airstreams.
2. Personal Protective Equipment (PPE) hard hat, safety glasses, climbing gear is provided while in resident training.

**AS1007-IDL
Renewable Energy and Communications Tower Technician Program-IDL
Lesson Objectives**

Note: The following order of lessons is subject to change

Interactive Distance Learning (IDL) Lessons

IDL Lesson Title	Objectives
Gate 1	
Orientation	Introduction to the course, academic and conduct policies, Airstreams Renewables, Inc. company, and staff and faculty members. Distribution of syllabus, Zoom-IDL and Canvas training.
Introduction to Wind and Communication Tower Industries	At the end of this lesson, in a group verbal review, the student will be able to: <ul style="list-style-type: none"> • 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
Safety In the Industries	At the end of this lesson, given a written quiz and using reference materials, the student will: <ul style="list-style-type: none"> • 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
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 <ul style="list-style-type: none"> • 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
First Aid, CPR and AED <i>American Red Cross AED- Adult, CPR-Adult, Standard First Aid cards (2 years)</i>	At the end of this American Red Cross program, given a written quiz using reference materials and a practical evaluation, students will: <ul style="list-style-type: none"> • 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 CPR and care for breathing and cardiac emergencies in adults • Explain and Demonstrate how to use automatic external defibrillators
OSHA 10 Hour Construction Safety <i>OSHA 10 Construction Card (no expiration)</i>	The OSHA 10-Hour for Construction course provides the student with basic industrial safety concepts in a variety of different subjects. The execution and requirements of the training are detailed in the <i>OSHA Training Requirements in OSHA Standards (OSHA-2254)</i> , <i>OSHA Outreach Training Program Construction Industry Procedures (2019)</i> , and <i>OSHA Outreach Training Program Requirements (2019)</i> documents
OSHA: Intro to OSHA	At the end of this lesson, given a written quiz and using reference materials, the student will accurately explain and describe: <ul style="list-style-type: none"> • What OSHA is • What OSHA does • Hazards addressed in OSHA standards • Employee rights
<i>OSHA Focus-Four: Fall Hazards</i>	At the end of this lesson, using reference materials, the student will accurately explain and describe: <ul style="list-style-type: none"> • 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?

AS1007-IDL
Renewable Energy and Communications Tower Technician Program-IDL
Lesson Objectives

Note: The following order of lessons is subject to change

IDL Lesson Title	Objectives
<i>OSHA Focus-Four: Electrical Hazards</i>	At the end of this lesson, using reference materials, the student will accurately explain and describe: <ul style="list-style-type: none"> • What an electrocution hazard is • Where electrocution hazards exist • Types of electrocution hazards • Methods to minimize or eliminate electrocution hazards • What PPE to use
<i>OSHA Focus-Four: Struck By Hazards</i>	At the end of this lesson, using reference materials, the student will accurately explain and describe: <ul style="list-style-type: none"> • 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
<i>OSHA Focus-Four: Caught In or Between Hazards</i>	At the end of this lesson using reference materials, the student will accurately explain and describe: <ul style="list-style-type: none"> • 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
<i>OSHA Elective: PPE</i>	At the end of this lesson, using reference materials, the student will accurately explain and describe: <ul style="list-style-type: none"> • What PPE is • Why PPE is used • Types of PPE to use • How to care for PPE • Required PPE in the industries
<i>OSHA Elective: Health Hazards in Construction and Hazardous Materials</i>	At the end of this lesson, using reference materials, the student will accurately: <ul style="list-style-type: none"> • 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
<i>OSHA Elective: Materials Handling</i>	At the end of this lesson, using reference materials, the student will accurately explain and describe: <ul style="list-style-type: none"> • What is material handling? • Material handling hazards • Proper lifting of materials • How to avoid material hazards
<i>OSHA Elective: Tools</i>	At the end of this lesson, using reference materials, the student will accurately explain and describe: <ul style="list-style-type: none"> • 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
<i>OSHA Elective: Excavations</i>	At the end of this lesson, using reference materials, the student will be able to explain and describe: <ul style="list-style-type: none"> • Excavation hazards and risks • Proper protective systems • Who inspects?

AS1007-IDL
Renewable Energy and Communications Tower Technician Program-IDL
Lesson Objectives

Note: The following order of lessons is subject to change

IDL Lesson Title	Objectives
Crane Signalperson <i>ARI Signalperson certificate</i> (5 years)	Upon completion of this lesson, the student will be assessed on the ability to accurately: <ul style="list-style-type: none"> • 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.
Level 1 Crane Rigging <i>ARI Level 1 Rigging certificate</i> (5 years)	Upon completion of this lesson, using the rigging handbook, the student will be given a written and practical exam and be able to accurately: <ul style="list-style-type: none"> • 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.
Gate 5	
Fasteners, Torque & Tension <i>Fasteners, Torque and Tension Certificate</i>	At the end of all FT&T lessons, given a closed book written exam the student will be able to demonstrate basic knowledge of industrial fasteners, manual and hydraulic torqueing, and hydraulic tensioning tools commonly used in wind energy and other industries.
Fasteners, Torque & Tension Presentation	Upon completion of this lessons, given a verbal quiz and using reference materials, the student will be able to accurately:
<i>Lesson 1</i>	<ul style="list-style-type: none"> • Explain how bolted joints are involved in and important to the success of all types of mechanical assemblies. • Identify the three major types of industrial bolting and the industries and activities where each type is most common.
<i>Lesson 2</i>	<ul style="list-style-type: none"> • Discuss the advantages of bolted joints, how bolts and joints interact to carry load, and the importance of creating tension in the joint to protect the fastener by: <ul style="list-style-type: none"> ○ Explaining how a bolt functions as a spring. ○ Giving an example of how tightening a bolt protects it and makes the joint stay together. ○ Discussing the concept of pre-load and why it is important to the success of the joint.
<i>Lesson 3</i>	<ul style="list-style-type: none"> • Recognize different types of bolts and nuts, their characteristics, and how fasteners impart clamping for to a joint by: <ul style="list-style-type: none"> ○ Describing a basic form of threaded fasteners and how it creates load. ○ Explaining the differences between coarse and fine threads. ○ Describing the most common bolt strength grades and how to identify them. ○ Explaining the reason why hardened washers improve bolting quality. ○ Explaining the importance of matching grades of bolts, nuts and washers.
<i>Lesson 4</i>	<ul style="list-style-type: none"> • Explain how to achieve, measure, and control the assembly forces on a joint by: <ul style="list-style-type: none"> ○ Defining various terms and formulas related to torque determination. ○ Describing the relationship between torque and load. ○ Discuss the factors that affect the torque-to-load relationship. ○ Reading and interpreting a torque chart.
<i>Lesson 5</i>	<ul style="list-style-type: none"> • Recognize the various types of manual, pneumatic and hydraulic torque wrenches; compare the features and advantages of each type of device <ul style="list-style-type: none"> ○ Recognize the parts of a hydraulic tensioner and their functions ○ Describe how a hydraulic tensioner works to put load into a bolt ○ Explain the benefits and disadvantages of hydraulic tensioning vs. torqueing ○ Discuss how mechanical tensioners work to put load into a bolt ○ Identify how pump pressure is measured
<i>Lesson 6</i>	<ul style="list-style-type: none"> • Explain how to implement a sequential and gradual tightening plan to product uniform load results on bolted joint of all types by: <ul style="list-style-type: none"> ○ Describing how in most joints the bolts are “interactive” ○ Explaining the need for both sequential and incremental tightening ○ Discussing the importance of consistency of tightness ○ Numbering the tightening sequence on various joints for single and multiple tools use ○ Explaining the advantages of multiple tools used simultaneously

AS1007-IDL
Renewable Energy and Communications Tower Technician Program-IDL
Lesson Objectives

Note: The following order of lessons is subject to change

IDL Lesson Title	Objectives
<i>Lesson 7</i>	<ul style="list-style-type: none"> • Explain the most common causes of bolt loosening and what to do about keeping joints tight by: <ul style="list-style-type: none"> ○ Discussing the potential impact of loose joints on safety, quality and schedule ○ Discussing the most common causes for bolt loosening ○ Explaining what measures to take to avoid or reduce loosening
<i>Lesson 8</i>	<ul style="list-style-type: none"> • Identify the: <ul style="list-style-type: none"> ○ Hazards and how to avoid them when performing bolting work ○ The minimum PPE requirements when performing bolting work ○ Also, upon completion of this lesson, the student will demonstrate how to safely and accurately use the hydraulic torqueing equipment.
Basic Hydraulics	Upon completion of this lesson, given a written quiz, the student will be able to: <ul style="list-style-type: none"> • Describe how hydraulic fluid systems operate • Identify the applications of hydraulic systems for Wind Turbine Generators (WTGs) • Identify the units of measures used in hydraulic systems • Explain the purpose and function of various basic hydraulic components • Identify schematic symbols for basic hydraulic components
<i>Gate 3</i>	
Basic Electrical Theory <i>Electrical Safety Certificate</i> (3 years)	The Basic Electrical Theory is divided into 5 modules designed to provided structured areas for taking breaks. There are review questions built-in to the end of each Module to provide a formative assessment. Upon completion of this lesson the student will be able to accurately define and demonstrate:
<i>Module 1: Atomic Structure and Electricity</i>	<ol style="list-style-type: none"> 1. Define electricity or electrical current. 2. Explain the two things that occur when current flows. <ul style="list-style-type: none"> • Heat is created. • A magnetic field is created
<i>Module 2: Properties of Electricity</i>	<ol style="list-style-type: none"> 3. Describe the three properties of electricity, their units of measure and relationship with each other. <ul style="list-style-type: none"> • Voltage • Current • Power 4. Identify various electrical terms by their letter abbreviations.
<i>Module 3: DC & AC Current</i>	<ol style="list-style-type: none"> 5. Explain the two kinds of current flow. <ul style="list-style-type: none"> • Direct Current (DC) • Alternating Current (AC) 6. Explain the basics of electromagnetic induction. 7. Identify common values of voltage used in industrial electrical circuits. 8. Identify various electrical terms by their letter abbreviations.
<i>Module 4: Properties of Circuits and Components</i>	<ol style="list-style-type: none"> 9. Describe conductors and insulators. 10. Describe the three properties of circuits and components and their units of measure. <ul style="list-style-type: none"> • Resistance • Capacitance • Inductance 11. Identify basic electrical components and describe their schematic symbols, their basic uses, and how to check them. <ul style="list-style-type: none"> • Batteries • Fuses • Resistors • Capacitors • Inductors • Diodes 12. Identify various electrical terms by their letter abbreviations.

AS1007-IDL
Renewable Energy and Communications Tower Technician Program-IDL
Lesson Objectives

Note: The following order of lessons is subject to change

IDL Lesson Title	Objectives
<i>Module 5: Basic Electrical Circuits</i>	13. Explain the three parts of electrical circuits, and their purposes. <ul style="list-style-type: none"> • Source • Load • Complete conductive path 14. Explain the three categories of electrical sources and their characteristics. <ul style="list-style-type: none"> • Storage devices • Generation devices • Isolation devices 15. Explain the two circuit arrangements and their effect on the relationship of voltage current. <ul style="list-style-type: none"> • Series • Parallel 16. Identify various electrical terms by their letter abbreviations.
Voltage Test Procedures 50 Volts or Higher	At the end of this lesson, given a written quiz and using reference materials, the student will accurately: <ul style="list-style-type: none"> • 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
Electrical Measurement Safety	Upon completion of this lesson, given a written quiz and using reference material, the student will be able to: <ul style="list-style-type: none"> • Describe the IEC 61010 category ratings and how they affect the end user • Describe the ability to safely use and care for the metering equipment covered in this lesson • Describe the safety specifications for DMMs and testers • Describe the ability to minimize and avoid electrical measurement hazards
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: <ul style="list-style-type: none"> • 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
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: <ul style="list-style-type: none"> • Define what an Amp Clamp is • Define the symbols on an Amp Clamp • Safe use of an Amp Clamp
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: <ul style="list-style-type: none"> • Basic Megger / Hipot safety • Megger usage
Infrared Testers	At the end of this lesson, given a written quiz, the student will accurately define: <ul style="list-style-type: none"> • Safe use of an Infrared (IR) tester • The features of an IR tester • The distance to spot ratio • Field of view • Emissivity
Tic Tracers	Upon completion of this lesson, given a written quiz exam, the student will be able to accurately define: <ul style="list-style-type: none"> • Tic Tracer functionality • Safe and accurate Tic Tracer usage • Hot Cold Hot procedure using a Tic Tracer

AS1007-IDL
Renewable Energy and Communications Tower Technician Program-IDL
Lesson Objectives

Note: The following order of lessons is subject to change

IDL Lesson Title	Objectives
Phase Rotation Meter	At the end of this lesson, given a written quiz and a hands-on practical exam, the student will accurately define: <ul style="list-style-type: none"> • What a Phase Rotation Meter is • What a Phase Rotation Meter does
Homework: ESD	Homework must be completed and reviewed <i>prior</i> to GATE 3 Exams. Upon completion of this lesson, given a written quiz and using reference materials, the student will be able to: <ul style="list-style-type: none"> • Define Electrostatic Discharge (ESD). • Identify how ESD damages electronic parts. • Define correct handling procedures for ESD sensitive electronic parts.
Intermediate Electrical Theory	Intermediate Electrical Theory is divided into 6 Modules. There are review questions built-in to the end of each Module to provide a formative assessment. <i>Module 1 serves as a review of Basic Electrical Theory.</i> At the end of the lesson, given a written exam, students will be able to:
<i>Gate 4</i>	
<i>Module 1 – Basic Electrical Theory Review</i>	<ol style="list-style-type: none"> 1. Define the IEC definition of ‘Low Voltage’. 2. Explain what frequency of an AC sine wave is. 3. List the two most common frequencies used in AC power transmission. 4. Explain what property of electricity affects the size of electrical conductors. 5. Explain what a Bridge Rectifier is, the schematic symbol, and what function a Bridge Rectifier serves. 6. Explain the difference between Neutral and Ground. 7. Explain basic steps of troubleshooting.
<i>Module 2 – Electrical Formulas</i>	<ol style="list-style-type: none"> 8. Explain the properties of voltage, current and resistance and how they interact with each other. 9. Explain Watt’s Law and the three formulas associated with it, and use the formulas to make calculations for power, voltage, and current. 10. Explain Ohm’s Law and the three formulas associated with it, and use the formulas to make calculations for voltage, current, and resistance. 11. Explain the relationship between voltage, current and resistance in series and parallel arrangements.
<i>Module 3 – Electromagnetic Principles and Devices</i>	<ol style="list-style-type: none"> 12. Explain the two most relevant Principles of Electromagnetism: <ul style="list-style-type: none"> o Current flow through a conductor produces a magnetic field. o Relative motion between a conductor and a magnetic field will induce current in the conductor. 13. List various electrical components that utilize electromagnetic Induction to operate. 14. Explain the purpose of transformers and how they work.
<i>Module 4 – 3-Phase AC Circuits</i>	<ol style="list-style-type: none"> 15. Explain the basic differences between single-phase and 3-phase AC power systems. 16. Explain the two different 3-phase sequences. <ul style="list-style-type: none"> o Right-Hand rotation o Left-Hand rotation 17. Explain the two different phase configurations for 3-phase components: <ul style="list-style-type: none"> o Delta o Wye
<i>Module 5 – Motors & Generators</i>	<ol style="list-style-type: none"> 18. Explain the two basic parts of motors and generators: <ul style="list-style-type: none"> o Stator o Rotor
<i>Module 5A - Motors</i>	<ol style="list-style-type: none"> 19. Define a Motor. 20. Explain the basic concept of how motors work. 21. Explain how an electrical circuit reverses the direction of a 3-phase motor. 22. List uses for motors on Wind Turbines.
<i>Module 5B -Generators</i>	<ol style="list-style-type: none"> 23. Define a Generator. 24. Explain the basic concept of how generators produce electrical energy. 25. Explain the basic difference between synchronous and asynchronous generators. 26. Explain the basic purpose of a Frequency Converter.

AS1007-IDL
Renewable Energy and Communications Tower Technician Program-IDL
Lesson Objectives

Note: The following order of lessons is subject to change

IDL Lesson Title	Objectives
Module 6 – Expanded AC Theory and Electrical Circuits	27. Explain how some components can function as either a source and/or a load; give three examples: <ul style="list-style-type: none"> ○ Rechargeable Batteries ○ Capacitors ○ Transformers 28. List two electrical components that retain voltage and the hazards associated with them: <ul style="list-style-type: none"> ○ Batteries ○ Capacitors 29. Explain the effects that capacitance and inductance have on AC circuits: <ul style="list-style-type: none"> ○ Capacitance ○ Inductance 30. Define impedance and how it affects AC circuits. 31. Explain the term phase-shift and the result of phase-shift. 32. Define True Power, Apparent Power and Reactive Power: 33. Explain what Power Factor is and ideal Power Factor of a WTG.
Wind Turbine Virtual Tour	This interactive video will provide and identify the various parts and components on a wind turbine such as: <ul style="list-style-type: none"> ● Major Wind Turbine Generator components (generator, gearbox, yaw motors, main shaft, etc.) ● Fall protection (anchor points, etc.) ● Electrical components (capacitors, motors, bus bars, etc.) ● Electrical safety (IEC Categories, PPE required, etc.) ● Industrial fasteners, torque stripes, etc. Hydraulic components.
Drivetrain & Gearboxes	Upon completion of this lesson, given a written quiz and using reference materials, the student will be able to: <ul style="list-style-type: none"> ● List the drive train components. ● Describe the function of the drive train components. ● Explain the gearbox functions.
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: <ul style="list-style-type: none"> ● Yaw purpose / operation. ● Wind tracking data and devices. ● Component descriptions. ● Cable untwist function. ● Yaw system control. ● Yaw system fault.
Maintenance Practices	Upon completion of this lesson, given a written quiz and using reference materials, the student will be able to: <ul style="list-style-type: none"> ● 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.
Homework SCADA	At the end of this lesson, given a written quiz and using reference materials, the student will be able to: <ul style="list-style-type: none"> ● Define what SCADA is and what it does. ● Describe information that SCADA produces. ● Explain the benefits of using SCADA.
Homework Fiber Optics	Upon completion of this lesson, using reference materials, the student will be given a written quiz and be able to: <ul style="list-style-type: none"> ● 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.

AS1007-IDL
Renewable Energy and Communications Tower Technician Program-IDL
Lesson Objectives

Note: The following order of lessons is subject to change

IDL Lesson Title	Objectives
Electrical Systems, Components, and Schematics	At the end of this lesson, given a written quiz, using the schematic book provided, you will be able to accurately: <ul style="list-style-type: none"> • Describe common electrical components. • Identify various schematic symbols and labeling. • Identify potential energy sources on a schematic diagram. • Identify the elements of sub-circuits. • Identify elements of an electrical schematic diagram to trace a circuit from source to load.
PLC Demo, and SCADA Demo Reading and Interpreting Schematics	Instructor will demonstrate the basic functions of the Programmable Logic Computer (PLC) and the Supervisory Control And Data Acquisition (SCADA) system. Instructor will engage students in reading and interpreting industrial electrical schematics.

Resident/On Campus Instruction and Practical Evaluation Lessons

Resident Lesson Title	Objectives
Gate 1 First Aid, CPR and AED <i>American Red Cross AED- Adult, CPR-Adult, Standard First Aid cards</i> (2 years)	At the end of this American Red Cross program, using reference materials, given a practical evaluation, students will: <ul style="list-style-type: none"> • 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 • Care for breathing and cardiac emergencies in adults • Demonstrate how to use automatic external defibrillators
Gate 2	
Authorized Climber and Rescue Presentation Prerequisite for Gate 6 practical evaluations	Upon completion of this lesson, given a written exam (80%) and a practical evaluation (pass or fail), the student will be able to accurately: <ul style="list-style-type: none"> • 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).
Authorized Climber and Rescue Practical Evaluations (PEs) <i>Authorized Climber and Rescuer Certification (2 years)</i> Prerequisite for Gate 6	Upon completion of this lesson, given a written exam (80%) and a practical evaluation (pass or fail), the student will be able to accurately: <ul style="list-style-type: none"> • 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.
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: <ul style="list-style-type: none"> • Different types of cell towers. • Ground components and structures. • Tower components and appurtenances.

AS1007-IDL
Renewable Energy and Communications Tower Technician Program-IDL
Lesson Objectives

Note: The following order of lessons is subject to change

Resident Lesson Title	Objectives
Lines & Antennas	Upon completion of this lesson, given a written quiz be able: <ul style="list-style-type: none"> Define and explain line and antenna procedures.
Capstan Hoist <i>Capstan Certificate</i>	Upon completion of this lesson, given a written quiz and a practical evaluation, the student will: <ul style="list-style-type: none"> Define a capstan hoist and its features. Define anchorages, blocks, ropes, and how to use and inspect them
CADWELDING <i>CADWELD Certificate</i>	Upon completion of this lesson, given a written quiz be able: <ul style="list-style-type: none"> Define the CADWELD process. Explain safety measures when using CADWELD.
Gate 6 Practical Evaluations:	Instructors may organize the PEs in an order that is most appropriate. Multiple stations may be operated. Lines & Antenna and the Capstan Hoist occur concurrently.
Lines and Antennas <i>Prerequisite:</i> <i>Authorized Climber & Rescuer</i>	Be able to properly and safely: <ul style="list-style-type: none"> Hang and remove an antenna from a tower. Demonstrate rigging techniques. Determine and demonstrate color coding. Perform weatherproofing. Perform grounding for coax line.
<i>Capstan Hoist</i>	Be able to safely and accurately perform a lift using a capstan hoist.
<i>CADWELDING</i>	Be able to properly and safely Perform a CADWELD.
<i>Weatherproofing & Color-Coding & Grounding</i>	Be able to properly and safely: <ul style="list-style-type: none"> Weatherproof a telecommunications line. Properly connect a grounding lug to a grounding plate.
Gate 3 Electrical Safety Practical Evaluations	Upon completion of this lesson the student will be able to: <ul style="list-style-type: none"> 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
Multimeters	Upon completion of this lesson, given a hands-on practical evaluation the student will be able to demonstrate: <ul style="list-style-type: none"> 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
Amp Clamps	Upon completion of this lesson, given a hands-on practical evaluation the student will be able to: <ul style="list-style-type: none"> Define what an Amp Clamp is Define the symbols on an Amp Clamp Demonstrate understanding and Safe use of an Amp Clamp
Megohmmeters	Upon completion of this lesson, given a hands-on practical evaluation the student will be able to demonstrate: <ul style="list-style-type: none"> Basic Megger / Hipot safety Megger usage Demonstrate understanding and safe use of Megohmmeters

AS1007-IDL
Renewable Energy and Communications Tower Technician Program-IDL
Lesson Objectives

Note: The following order of lessons is subject to change

Resident Lesson Title	Objectives
<p>Gate 5 Fasteners, Torque & Tension Practical Evaluations</p>	<p>Upon completion of the lab session, the student will be able to demonstrate the ability to:</p> <ol style="list-style-type: none"> 1. General Disposition <ol style="list-style-type: none"> 1.1. Be attentive and engaged during instruction and activities. 1.2. Work effectively as a team member to accomplish industrial bolting tasks and goals. 2. Manual Torqueing <ol style="list-style-type: none"> 2.1. Set manual torque wrench properly (accounting for torque multiplier). 2.2. Properly use manual torque wrench and torque multiplier to achieve assigned torque. 2.3. Remove torque from torqued bolt using manual tools and torque multiplier. 3. Hydraulic Torqueing – Square Drive Tool <ol style="list-style-type: none"> 3.1. Determine pump output pressure for assigned torque value. 3.2. Connect and use hydraulic square-drive tool and pump to achieve desired torque. 3.3. Reverse direction to remove torque from fastener. 4. Hydraulic Torqueing – Narrow Clearance Tool <ol style="list-style-type: none"> 4.1. Determine pump output pressure for assigned torque value. 4.2. Connect and use hydraulic narrow-clearance tool and pump to achieve desired torque. 4.3. Reverse direction to remove torque from fastener. 5. Hydraulic Tensioning <ol style="list-style-type: none"> 5.1. Determine proper pressure for assigned tension (load). 5.2. Properly connect hoses to hydraulic tensioning tool and manual hydraulic pump. 5.3. Properly operate the tensioning tool achieve the assigned tension (load). 5.4. Remove tension from tensioned bolt using hydraulic tensioning tool and manual pump. 6. General Bolting Safety Awareness <ol style="list-style-type: none"> 6.1. Accurately set pressure in the electric-powered hydraulic pump. 6.2. Use the “all clear” communication practice and ensure safety of others. 6.3. Properly use back-up wrench. 6.4. Correct or mitigate tool failures such as torque-lock, loose hoses, etc. (if applicable). 6.5. Know when and how to wear PPE
<p>Gate 4 Electrical Troubleshooting Practical Evaluations <i>Prerequisites: GATE 3</i></p>	<p>By completion of this lesson of interactive and hands-on activities on electrical <i>trainers</i>, <i>the student will be able to:</i></p> <ol style="list-style-type: none"> 1. <i>Safety Procedures:</i> <ol style="list-style-type: none"> 1.1. <i>Consistently adhere to electrical safety boundaries.</i> 1.2. <i>Consistently use 4-Way communication to energize/de-energize circuit.</i> 1.3. Consistently achieve an ESWC: <ol style="list-style-type: none"> 1.3.1. De-Energize circuit using 4-Way communication. 1.3.2. Apply LOTO (Lock-Out-Tag-Out) device(s). 1.3.3. Properly perform Hot-Cold-Hot. 1.4. Consistently and properly inspects and uses all required PPE. 1.5. Consistently demonstrate <i>safe</i> use of ETE (Electrical Test Equipment). 2. Basic Electrical and Troubleshooting Skills: <ol style="list-style-type: none"> 2.1. Demonstrate ability to follow schematics to build and troubleshoot circuits. 2.2. Demonstrate comprehension of electrical components and circuits in operation. 2.3. Identify <i>Source</i> Faults (Minimum of 2): <ol style="list-style-type: none"> 2.3.1. Faulted Transformer Primary winding 2.3.2. Faulted Transformer Secondary winding Faulted Phase of 3-Phase Supply (Lockout Module, AC Power Supply, etc.) 2.3.3. Faulted DC Power Supply 2.4. Identify <i>Load</i> Faults (Minimum of 2): <ol style="list-style-type: none"> 2.4.1. Faulted Coil of Relay/Contactor (AC or DC) 2.4.2. Faulted Light Bulb (AC or DC) 2.4.3. Faulted Motor or Motor Phase 2.5. Identify <i>Conductive Path</i> Faults (Minimum of 4): <ol style="list-style-type: none"> 2.5.1. Faulted Latching Circuit path 2.5.2. Faulted Lockout Circuit path 2.5.3. Faulted Common/Neutral/Return path 2.5.4. Faulted Overload Relay, Circuit Breaker, or 3Ø Manual Starter 2.5.5. Faulted Contact of Relay/Contactor 2.5.6. Faulted Switch/Pushbutton/Emergency Stop Button 2.5.7. Faulted Wire/Connection