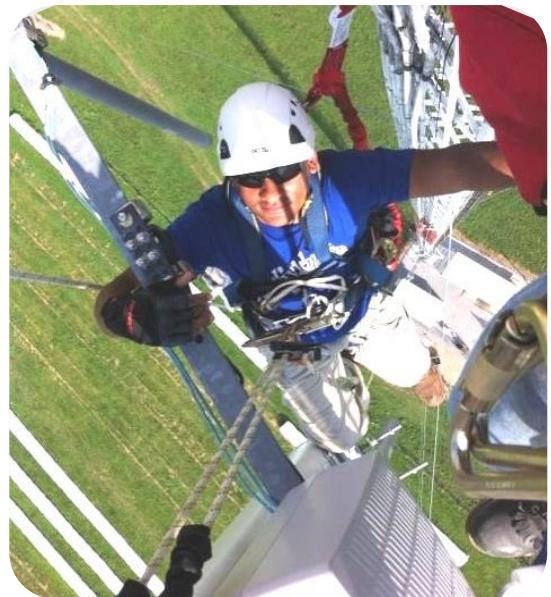




AIRSTREAMS

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, and telecommunication basics lessons.

Tower climbing exercises, conditioning, practice, and practical evaluations take place 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

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

Lesson Title	Objective
Gate 1	
Orientation	Distribution of syllabus and loaned tablet for access to student materials. Introduction to the course, academic and conduct policies, Airstreams Renewables, Inc. company, and staff and faculty members.
Introduction to Industries	At the end of this lesson, the student will be able to accurately explain and describe: <ul style="list-style-type: none"> • Give a basic explanation of a wind turbine • Give a basic explanation of a cell tower • Give a basic explanation of solar energy and PV power • Explain advantages and disadvantages of wind energy • Explain the types of employment opportunities within the industries • Describe what and why an injury and illness prevention program is in place • Define employer responsibilities • Identify dangers found with the wind, communication tower, and solar power site environments
Resume/Cover Letter Workshop	Upon completion of this workshop, using a current resume and cover letter and/or a newly constructed resume and cover letter, the student will be able to: <ul style="list-style-type: none"> • Demonstrate the skills to draft a new or revised resume and cover letter that will effectively “sell” skills and experience to this industry • Identify the main components of a good resume and cover letter • Identify acceptable resume and cover letter formats
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 <ul style="list-style-type: none"> • 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
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 Safety 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. No more than 7.5 hours of instruction may be given per day for the OSHA 10.	
1. Intro to OSHA	At the end of this lesson, given a written exam 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
2. <i>OSHA Focus Four</i> Fall Hazards	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?

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Lesson Title	Objective
Gate 1	
3. <i>OSHA Focus Four</i> Electrical Hazards	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
4. <i>OSHA Focus Four</i> Struck By Hazards	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
5. <i>OSHA Focus Four</i> Caught In or Between Hazards	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
6. <i>OSHA Focus Four</i> PPE	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
7. <i>OSHA Focus Four</i> Health Hazards in Construction and Hazardous Materials	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
8. <i>OSHA Focus Four</i> Materials Handling	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
9. <i>OSHA Focus Four</i> Tools	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
10. <i>OSHA Focus Four</i> Excavations	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?

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Lesson Title	Objective
Gate 1	
Signalperson w/practicals <i>ARI Signalperson certificate (5 years)</i>	Upon completion of this course, the student will be given a written exams and a practical evaluation to assess their ability to accurately: <ul style="list-style-type: none"> • Identify basic crane terminology and definitions • Explain radius, boom deflection, center of gravity, drift, 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 at operational level • Identify criteria for lifting personnel
Level 1 Crane Rigging w/practicals <i>ARI Level 1 Rigging certificate (5 years)</i>	Upon completion of this course, 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 2	
Authorized Climber and Rescue Prerequisite for Telecommunica- tions Basics Practical Evaluation <i>Authorized Climber and Rescue Certification (2 years)</i>	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) • 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 3	
Basic Electrical Theory <i>Electrical Safety Certificate (3 years)</i>	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>	1. Define electricity or electrical current. 2. Explain the two things that occur when current flows.
<i>Module 2: Properties of Electricity</i>	3. Describe the three properties of electricity, their units of measure and relationship with each other.
<i>Module 3: DC & AC Current</i>	4. Explain the two kinds of current flow. 5. Explain the basics of electromagnetic induction. 6. Identify common values of voltage used in industrial electrical circuits.

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Lesson Title	Objective
Gate 3	
<i>Module 4: Properties of Circuits and Components</i>	7. Describe conductors and insulators. 8. Describe the three properties of circuits and components and their units of measure. 9. Identify basic electrical components and describe their schematic symbols, their basic uses, and how to check them.
<i>Module 5: Basic Electrical Circuits</i>	10. Explain the three parts of electrical circuits, and their purposes. 11. Explain the three categories of electrical sources and their characteristics. 12. Explain the two circuit arrangements and their effect on the relationship of voltage current. 13. 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 • Explain the steps to establish an Electrically Safe Work Condition (ESWC) • Explain use of insulated electrical tools and how to identify them • 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 various safety electrical boundaries
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 • 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	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: <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 and demonstrate: <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 and demonstrate: <ul style="list-style-type: none"> • Basic Megger / Hipot safety • Megger usage
Handheld Meters At the end of these lesson modules, given a written quiz, you will be able to accurately define:	
1. Phase Rotation Meter	At the end of this lesson, given a written quiz 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
2. Infrared Testers	<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
3. Tic Tracers	<ul style="list-style-type: none"> • Tic Tracer functionality • Safe and accurate Tic Tracer usage • Hot Cold Hot procedure using a Tic Tracer

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Lesson	Objective
Gate 4	
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. Module 1 serves as a review of Basic Electrical Theory. At the end of the lesson, given a written exam, students will be able to:
<i>Module 1 – Basic Electrical Theory Review</i>	<ol style="list-style-type: none"> 1. Explain 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 a generators produce electrical energy. 25. Explain the basic difference between synchronous and asynchronous generators. 26. Explain the basic purpose of a Frequency Converter.
<i>Module 6 – Expanded AC Theory and Electrical Circuits</i>	<ol style="list-style-type: none"> 27. Explain how some components can function as either a source and/or a load; give three examples: <ul style="list-style-type: none"> o Rechargeable Batteries o Capacitors o Transformers 28. List two electrical components that retain voltage and the hazards associated with them: <ul style="list-style-type: none"> o Batteries o Capacitors 29. Explain the effects that capacitance and inductance have on AC circuits: <ul style="list-style-type: none"> o Capacitance o 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 should be.

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Lesson Title	Objective
Gate4	
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 • Describe basic gearbox inspections
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 faults
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
SCADA	Upon completion of this lesson, given a written quiz and using your reference materials, you will be able to accurately: <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
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 • Identify elements of a solar circuit
Electrical Troubleshooting Practical Evaluations	By completion of this lesson of interactive and hands-on activities on electrical trainers, the student will be able to: <ol style="list-style-type: none"> 1. Safety Procedures: <ol style="list-style-type: none"> 1.1. Consistently adhere to electrical safety boundaries. 1.2. Consistently use 4-Way communication to energize/de-energize circuit. 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 safe 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 Source 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 Load 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 Conductive Path 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

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

Lesson Title	Objective
Gate 5	
Fasteners, Torque and Tension <i>Fasteners, Torque and Tension Certificate</i>	At the end of all FT&T lessons, given a quiz before given a closed book written exam and a hands-on practical Evaluation, you will be able to explain the basic dynamics of fasteners and demonstrate how to safely use hand-held and hydraulic torque and tension equipment.
<i>Lesson 1 Introduction</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 Principles of bolted joints</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 Fasteners</i>	<ul style="list-style-type: none"> • Recognize different types of bolts and nuts, their characteristics, and how fasteners impart clamping force 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 Tightening with Torque</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 Tools for Torquing and Tensioning</i>	<ul style="list-style-type: none"> • Recognize the various types of manual, pneumatic, hydraulic and electric torque wrenches; compare the features and advantages of each type of device • Recognize the parts of a hydraulic tensioner and their functions • Describe how a hydraulic tension works to put load into a bolt • Explain the benefits and disadvantages of hydraulic tensioning vs. torquing • Identify how pump pressure is measured
<i>Lesson 6 Bolting Patterns</i>	<ul style="list-style-type: none"> • Explain how to implement a sequential and gradual tightening plan to produce 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
<i>Lesson 7 Keeping Bolts Tight</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 Safe Handling</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

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Lesson Title	Objective
Gate 5	
Fasteners, Torque & Tension Practical Evaluations	<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.
Gate 6	
Telecommunication Basics <i>Telecommunication Basics Certificate</i>	<p>Upon completion of this lesson, given a written quiz using reference material and a practical evaluation, the student will be able to accurately identify and/or define and demonstrate:</p> <p><i>Module 1: Cell Site Basics</i></p> <ul style="list-style-type: none"> • Site Compound and Leased Areas • Types of Structures • Explain Tower Sectors • Non-structural equipment • Hazard Assessment <p><i>Module 2: Grounding & Welding</i></p> <ul style="list-style-type: none"> • Grounding vs Bonding • Types of Underground Connections • Exothermic Welding • Importance of Grounding • Welding Inspections • Welding Safety <p><i>Module 3: Lines & Technology</i></p> <ul style="list-style-type: none"> • Various Types of Lines on a Structure • Proper Weatherproofing • Principals of Color Coding • Various Cable Supports • BTS Overview • Power & Fiber Distribution • RRU & RRH • TMA & Diplexer • Microwave Antennas • Antennas & Alignment

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

Lesson Title	Objective
Gate 6 continued	
Telecommunication Basics	<p><i>Module 4: Capstan & Hoisting Operations</i></p> <ul style="list-style-type: none"> • Explain Different Types of Hoists and Their Uses • Safe Capstan Hoist Operations • Tagline Systems • ANSI A10.48 Rigging Guidelines
RF Safety Awareness <i>RF Safety Awareness Card (2 years)</i>	Upon completion of this course the student will be given a written and practical exam and be able to accurately identify and/or define: <ul style="list-style-type: none"> • Standards & Regulations that apply to RF Radiation. • Differences between ionizing and non-ionizing radiation. • Effects of RF radiation on the body • What MPE limits are. • Elements of an RF Safety Program. • Identify and assess RF hazards. • How to use RF equipment and PPE. • RF awareness signs and their meaning.
Telecommunication Basics Practical Evaluations	Students will demonstrate the skills learned in the Telecom modules for the practical evaluations.