

# 3 Year Electricity Metering Instruction Program for Utility Apprentices

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# Our Revolutionary Training Program

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## Objective

**To provide electricity metering instruction for utility sponsored/approved electricity metering apprentices / trainees.** Our revolutionary program delivers a strong foundation of metering knowledge and provides insight into the role they have within the utility. Our focus is to develop the required skills and critical thinking abilities of apprentices, which boosts their confidence in the ability to perform their work. Nourishing the whole person to become a success journeyman metering professional, owning the skills of their trade.

## Program Overview, Format, and Timeline

### Overview

Beginning with the very basic foundations of electricity mechanics, we bring everyone to a common ground from which to begin building up their metering skills. Course topics are designed to be sequentially delivered in such a manner as to develop a solid understanding of metering and its related skills. We start with a high level overview of an electric utility. From Generation to Customer Load and everything that goes on in between, we reference the “big picture” and the importance of their role in the utility, then break it down into pieces, so that they can see how it all fits together. We work our way through to intermediate level comprehension and finish up their development with an advanced skill set that is comparable to a Seasoned Journeyed Professional.

### Program Format

Our program is framed within the guidelines, requirements, and standards for Electricity Metering Apprenticeship Programs that have long been established by the IBEW’s and JATC’s of Washington, Oregon, Utah, Arkansas, Texas, and Colorado. We achieve the goal of delivering 432 required instructional hours in a three year (36 month) period by having participants attend a total of 108 4-hour training sessions.

### Timeline

Each 4-hour session consists of direct training and interaction with the instructor. 10 sessions are done in person and 98 sessions are done via live instruction webinar. There are 36 weeks of training per year for each year of the 3 year program. These weeks are scheduled\* out over each 12 month period.

- Two weeks of in-person training located in the Pacific Northwest:
  - ◆ **FirstWeek™** contains 8 Sessions and is held at the beginning of the program. It is a necessary component for the success of the program. Participants are encouraged to get to know each other, network, and prepare for 3 years of online instruction together.
  - ◆ **ExitWeek™** consists of the final 2 sessions, review of program material, and the administration of our Exit Exam for HITT’s ‘seal of approval’ certification.
- Sessions begin with an open forum discussion and brief review of the previous week’s instruction.
  - ◆ Questions related to field training experiences are also addressed during this time. Situational discussions in which all Apprentices are encouraged to participate and share their learning experiences both in the field and shop.
  - ◆ We use these discussions as a format for building strategic knowledge through their tactical awareness and developing critical thinking skills.
  - ◆ Metering safety and vocabulary are part of every class session!

*\*Note: Schedules for each year are provided at the beginning of the year and discussed as a group.*

# Curriculum

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## Course Topics

- 1) Vocabulary and Definitions
- 2) Electric Meter Safety
- 3) Electricity Training
- 4) Self-Contained Single Phase Metering Principles
- 5) Mathematics for Electricity Metering
- 6) Vector Training for Electricity Metering
- 7) Self-Contained Single Phase Metering Proofs
- 8) Customer Relations
- 9) Application of Single Phase AMI Metering Principles
- 10) Single Phase Distribution Transformer Theory and Connections
- 11) Revenue Protection
- 12) Rates, Tariffs and Policies
- 13) Demand Metering
- 14) Field Test Instruments and Equipment
- 15) Instrument Rated Single Phase Metering Principles
- 16) Instrument Transformers
- 17) Instrument Rated Single Phase Metering Proofs
- 18) Self-Contained Three Phase Metering Principles
- 19) Self-Contained and Instrument Rated Metering Commonalities
- 20) Self-Contained Three Phase Metering Proofs
- 21) Application of Three Phase AMI Metering Principles
- 22) Three Phase Distribution Transformer Theory and Connections
- 23) Pulse Metering
- 24) Instrument Rated Three Phase Metering Principles
- 25) Instrument Rated Three Phase Metering Proofs
- 26) Reactive Metering
- 27) High Voltage Metering
- 28) High Voltage Metering Proofs
- 29) Telemetry Metering
- 30) Totalizing Metering

**BE  
SAFE  
ALL  
WAYS**

### Training Materials provided by HITT

Books, Workbooks, and Materials (for each participant) include:

- Meterman's Bible Set (3 books): Single Phase, Three Phase and Three Phase Primary
- 6 Workbook binders containing worksheets and training presentations
- Meter Voltage Reference Guide
- Specialty Metering Diagrams Reference Manual (The Legacy of Var-Hour Metering)
- Distribution Transformer Connections Training Manual and Field Guide (DTC)
- Metering Diagrams - Proofs and Truths Explained (Single Phase and Three Phase)
- Class Materials: Calculators, protractors, scales and other items that assist with instruction.

## Course Structure

### **Section One:** Weeks 1–22

Self-Contained Single Phase Metering 1 and 2; Electricity Meter Safety 1; Definitions and Vocabulary 1; Electricity 1; Electricity Metering Principles 1; Mathematics for Electricity Metering 1; Single Phase Distribution Transformers 1; Demand Metering 1; Customer Relations 1; Field Test Instruments and Equipment 1; Revenue Protection 1; Rates, Tariffs and Policies 1; Safe Procedures for Installing and Removing Single Phase Self-Contained Meters; **First Check Point Assessment** (6 Month Equivalent)

### **Section Two:** Sessions 23 – 44

Instrument Rated Single Phase Metering 1 and 2; Electricity Meter Safety 2; Definitions and Vocabulary 2; Electricity 2; Electricity Meter Principles 2; Instrument Transformers 1; Mathematics for Electricity Metering 2; Single Phase Distribution Transformers 2; Demand Metering 2; Rates, Tariffs and Policies 2; Field Test Instruments and Equipment 2; **Second Check Point Assessment** (12 Month Equivalent)

### **Section Three:** Sessions 45 – 68

Self-Contained Three Phase Metering 1 and 2; Electricity Meter Safety 3; Electricity 3; Meter Vocabulary and Definitions 3; Application of Single Phase AMI Metering Principles; Electricity Meter Principles 3; Self-Contained and Instrument Rated Metering Commonalities; Three Phase Distribution Transformer Connections 1; Mathematics for Electricity Metering 3; Pulse Metering 1; Customer Relations 2; Demand Metering 3; Revenue Protection 2; Field Test Instrument & Equipment 3; Rates, Tariffs and Policies 3; **Third Check Point Assessment** (18 Month Equivalent)

### **Section Four:** Sessions 69 – 92

Instrument Rated Three Phase Metering 1 and 2; Meter Safety 4; Electricity 4; Meter Vocabulary and Definitions 4; Mathematics for Electricity Metering 4; Electricity Meter Principles 4; Pulse Metering 2; Three Phase Distribution Transformer Connections 2; Demand Metering 4; Application of Three Phase AMI Metering Principles; Instrument Transformers 2; Rates, Tariffs and Policies 4; Field Test Instrument & Equipment 4; Meter Communications 1; **Fourth Check Point Assessment** (24 Month Equivalent)

### **Section Five – Building the Final Foundations:** Sessions 93 – 106

High Voltage Metering 1 and 2; Reactive Metering 1 and 2; Meter Safety 5; Electricity 5; Meter Vocabulary and Definitions 5; Mathematics for Electricity 5; Electricity Meter Principles 5; Three Phase Distribution Transformer Connections 3; Customer Relations 3; Meter Communications 2; Totalizing Metering; Pulse Metering 3; Telemetry Metering; **Fifth Check Point Assessment** (30 Month Equivalent)

### **Section Six – Review Focused for Retention:** Sessions 107 & 108

Electricity Meter Principles; Field Metering Safety; Electricity; Meter Vocabulary and Definitions; Customer Relations; Mathematics for Electricity; Demand Metering; Pulse Metering; Single and Three Phase Transformer Connections; High Voltage Metering; Field Test Equipment; Rates, Tariffs and Policies; Instrument Transformers; Reactive Metering; Meter Communications; Totalizing Metering; **Exit Exam and Certification**

## Check Point Assessments

Check Point Assessments will be proctored by the sponsoring utility's mentor/journeyman and then sent back to HITT for review and evaluation, then scanned and emailed to the apprentice and their manager. These assessments are then reviewed together in class, once everyone has received theirs back.

Check Point Assessments measure the strengths and weaknesses of each student. Apprentices must achieve a 75% (or better) accuracy at minimum, with an 85% (or better) requirement to qualify as an HITT certified metering professional. These assessments also help guide the course and identify areas where additional instructional support is needed (the apprentice's mentor or journeyman will be contacted in each case as necessary).

### There are five (5) Check Point Assessments (four of which will be proctored):

- 1) Single Phase Self-Contained Metering
- 2) Single Phase Instrument Rated Metering
- 3) Three Phase Self-Contained Metering
- 4) Three Phase Instrument Rated Metering
- 5) High Voltage Metering and Full Course Review (HITT administered)

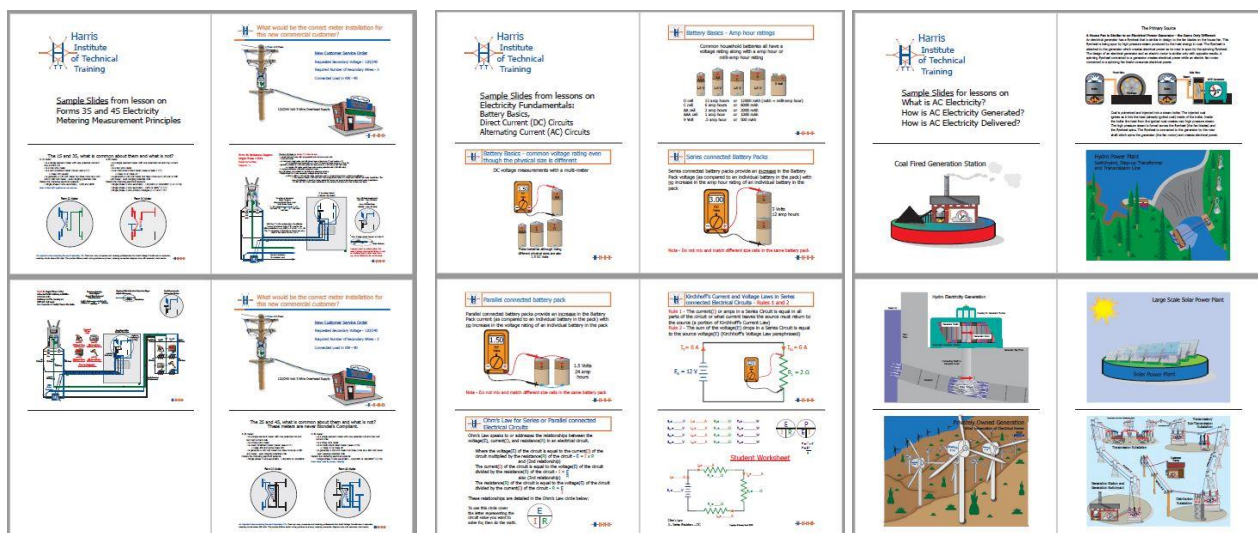
NOTE: These assessments are **not** designed to remove an apprentice from the training program specifically, but rather to serve as a valuable tool by which to measure the apprentices' progress and are significant to the development of an apprentice's skills. Mentors and instructors use these to identify areas of strength and areas where further training needs to be applied.

Again, it's crucial to understand that these Check Point Assessments are **not** designed as a disciplinary resource, but rather a reference to be combined with related factors to determine the overall progress in field and on-the-job performance of the apprentice, as well as meeting company specific requirements for defined apprenticeship standards.

## Samples of Curriculum Material

### Seeing is believing

There are 53 pages of selected samples from our 1<sup>st</sup> year curriculum material attached at the end of this document (or as a separate .PDF file if viewing via email). We have provided you with these samples to have something to compare and review against your current materials and programs. While 53 pages might seem like a lot of material for a 'sample', we wanted to be sure you had a real feel for our style. We believe you'll appreciate getting to 'see' what we have to offer and how our program 'looks'. We'd be happy to discuss any questions you may have about the material in these sample pages, so please don't hesitate to contact us.



# Keys to a Successful Program

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## Mentoring

It is not just the application of learned tactical awareness, but the actual experience of applying that awareness to the work, that garners the need for a mentor's guidance to strengthen and develop the strategic knowledge of an apprentice. **"They just don't know, what they don't know"** is a testament of many seasoned Journeyman Metermen when they are referencing the 'greenness' of an apprentice's skills in the field. Apprentices need the wisdom and tutelage of a knowledgeable and seasoned professional in order to become a successful and safe journeyman themselves.

**A successful Mentor allows the apprentice to put their skills to the test under their watchful eye,** keen to safety observations and potential hazards that their own experiences and the strategic knowledge (stories) of others have provided them with. A great Mentor leads the apprentice with enough freedom to experience the work and yet be aware of potential dangers and possibly unsafe conditions as they do so.

**Fostering and building Mentoring among peers.** We're all on the same team! Honoring the individual strengths that help each other to build up areas where weaknesses exist, are what make a meter department strong. Apprentices who have gone through our program have found themselves in a unique position to help peers and co-workers 'refresh' their own knowledge with all the exciting energy of their learning being brought to the Meter Shop, Fieldwork, Peers, and Mentors. Our role as an instructor of apprentices, is taken seriously, emulating a positive role modeling experience.

## Safety Focused, Communications, and the Shop Environment

First and foremost in our training, we emphasize that Safety begins with the individual. **No one is more responsible for your safety than you are.** We strive to impart the wisdom that "it's your life and livelihood that are at risk" whether you are driving to the store or working on 480V hot-work; you are ultimately the one responsible for choosing to Be Safe All Ways and that includes being fully present.

**Individuality. Learning styles. Personal experiences. Diversity.** These are all pieces that influence our ability to communicate, with an understanding that reality is based upon each person's perspective and unique experiences. Effective communication begins with having a "common ground" or agreed point of understanding. Knowing what the processes are for the work to be done, having expectations for the various types of metering to be worked on or installed, and the ability to work as a team are key components to developing a strong foundation in a meter shop and amongst the electrical crafts people who are part of it.

We introduce and explain **"Ground Truth and Official Truth"**, both of which have their place in a utility, but for a meter shop it is vital that 'ground truths' be allowed. This helps to maintain a healthy and safe working environment. Metering professionals must be afforded the safety for Ground Truth discussions amongst peers and supervisors. Not an environment for those who need to feed their Ego or to 'show off' their skills. The meter shop is where having a sense of respect for the metering craft is an honored value.

## Having an Expectation

**The one key feature that sets a metering professional apart is their ability to trouble-shoot a situation.** In performing their work, it is necessary to have a skill set that allows the Journeyman (and Apprentice) to have expectations regarding the work at hand. To understand the why's and how's of metering and electricity. How will you be able to identify a problem or even know what to look for if you don't have an expectation for each trouble shooting situation? "Have an expectation" is a term used in our training and participants will hear this often throughout their training when it is applicable.



# Costs and Budgeting

## Program Costs

| Program Costs: Hours and Materials per Apprentice   | Costs    |
|---|----------|
| 432 Instructional Hours   | \$21,550 |
| Books, Workbooks, and Training Materials  | \$1,856  |
| Program Total   | \$23,406 |
| <b>Payment Options:</b>   |          |
| <b>Option A:</b> Total Program Paid in full (10% Discount)  | \$21,065 |
| <b>Option B:</b> Paid Annually (3 Payments of \$7,812)<br><i>Due by the 10th of September of each training year *</i>                     | \$23,436 |
| <b>Option C:</b> Paid Quarterly (12 Payments of \$1,961)<br><i>Due by the 10th of Sept., Dec., Mar., and June of each training year *</i> | \$23,532 |
| <i>*includes admin fee</i>  |          |

## Travel Costs

### A) Required travel:

- 1) **FirstWeek™**, a crucial component to the success of the webinar group's ability to foster strong and healthy relationships and build a network of trust and familiarity with fellow apprentices and the instructor. **September 2018** (6 Days / 5 Nights).
- 2) **ExitWeek™** for administering the HITT Certification Exam. **June 2021** (4 Days / 4 Nights).
  - ◆ Locations will either be in Seattle, WA or Portland, OR.

### B) Meter School Participation:

- 1) Apprentices should at minimum be encouraged to attend the preferred Meter School (regionally) for your utility. This helps the apprentice to establish a network among peers in the local area/region.
- 2) Or, if possible, the ideal would be to consider having the apprentice attend WEI's NW Meter School in Seattle, WA while they are enrolled in our program. This would include two (2) Meter School sessions: **August 2019 and August 2020**. (Dates TBD, generally 3<sup>rd</sup> week of August).
  - ◆ Apprentices will then be able to participate in the **Hands-on Labs** that Brad has taught since 1996. These labs provide students the opportunity to visually experience what happens to the meter when incorrect connections are present. They will manually manipulate formulas, perform vector analysis, and solve for power factor results.
  - ◆ It also allows for the group to continue building the bonds of brotherhood that occur during an apprenticeship journey taken together.

## Materials Costs

### A) Each apprentice will need the following items to participate:

- 1) Laptop or desktop computer with camera.
- 2) A headset w/ mic
- 3) Access to Software/Apps:
  - ◆ Webinars are conducted via GoToMeeting
  - ◆ YouTube access for viewing videos during class.
- 4) The Edison Institute's "Handbook for Electricity Metering" (This not provided by HITT, but is strongly recommended that one be obtained).



# Instructor Background and Qualifications

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## Brad Harris – BIO

### **Electricity Metering Expert, Instructor, Technical Author, and the Founder of HITT.**

Brad started his electricity metering career in the warehouse of a utility in Salt Lake City, Utah. From there he moved into meter reading, then became the Night Collector. In 1981, he began his electricity metering apprenticeship, a journey that would ultimately lead him to develop his lifelong passion for the electricity metering craft. Upon graduating from his apprenticeship in 1984, Brad literally began teaching apprentices the very next day and has been teaching electricity metering principles, mathematical concepts, and electrical theories ever since. Brad moved into the meter relay department, completing his certification for that training as well, which has further enriched his passion for this craft work.

Brad's combined relay tech and metering experiences provided him with the skills and knowledge necessary to teach electricity metering to Apprentices, Journeyman, Managers, Related Field Personnel, Account Mgrs., and Customer Service Representatives. It is his heartfelt desire to see each apprentice achieve journeyman status along with the life skills needed to become successful, both personally and professionally, that fuels his commitment to providing strong shoulders for all those whom he has come before and those who are yet to be. Brad's concern for personal safety is at the heart of his instruction and delivery at all times and is a core value of HITT.

### **Keynote Speaker**

- **\*\*Mid-South Electric Meter School (MSEMA) Tennessee**
- **\*North Carolina Electric Meter School (NCMS) Myrtle Beach, NC**
- **\*Rocky Mountain Electric Meter Association (RMEMA) Ft. Collins, CO**
- **Southwest Electric Meter Association (TEEX-SWEMA) Bryan, TX**
- **\*\*Northwest Meter School (NWMS) Seattle, WA**
- **\*Arkansas Electric Meter School – Fayetteville, AR**
- **EUSERC – Sacramento, CA**
- **\*International Lineman's Rodeo and Safety Conference**

***\*Keynote Speaker***  
***\*\*Returning Keynote Speaker***

### **Training Facility Set up and Lab Design**

In 1996, Brad assisted with the design, development, and building of electricity meter training centers at two PacifiCorp locations: Wilsonville, OR and Sandy, UT. It was his participation with these two centers that inspired a Seattle City Light manager to seek him out in 2010 to work on a joint project with Centralia Community College and the Pacific NW Center of Excellence. He was a strong asset for their development of a hands-on AMI lab and training facility at City Light's South Service Center for all metering and field related personnel.

### **AMI Program Team**

While employed at Seattle City Light, Brad played a key role as a participant on the AMI Program Team, helping to guide them through all the connectivity related to the Tech Meter Operations and how specific Business Processes impacted the AMI Implementation Plan. He was contracted back 1 year later to help identify and finalize the business processes of Tech Meter in preparation for the impending scheduled deployment date.

## Training Delivered

Brad has trained apprentices at or provided customized Journeyman refresher training for the following:

- PacifiCorp (Portland, OR)
- Tillamook PUD (Tillamook, OR)
- Idaho Falls Power (Idaho Falls, ID)
- APEX (Burlington, VT)
- Consumers Power (Albany, OR)
- Eugene Water & Electric Board (Eugene, OR)
- Portland General Electric (Portland, OR)
- Seattle City Light (Seattle, WA)
- City Utilities (Springfield, MO)
- Maui Electric Company (Maui, HI)
- Yakama Power (Yakama Nation, WA)
- Oregon Trail Electric Coop (Baker City, OR)
- Empire Electric Association, REC (Cortez, CO)
- Weatherford Utilities (Weatherford, TX)
- Ozarks Electric (Fayetteville, AR)

## Previous Employment:

- Dual Employment: (2012 – 2017)
  - ◆ Seattle City Light – Apprenticeship Office, Tech Metering, AMI Team
  - ◆ South Seattle Comm. Coll. – Night School Instructor – Metering Apprenticeship Program
- Harris Institute of Technical Training – Founder, Owner, and Primary Trainer (2006 to current)
- PacifiCorp (Utah Power) – Trainer, Meterman, Relay Tech., Collector, Warehouse, and Meter Reading

## HITT Contact Information

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## Social Media Connectivity

**LinkedIn:** Bradley W. Harris  
<https://www.linkedin.com/in/bradleymetergodharris/>

**YouTube:** Metergod HITT  
<https://www.youtube.com/channel/UCg8YwGXE84luq8kQ0zB4OKw>

