

COURSE OUTLINE

**Industrial Technology 157  
Verdugo Power Academy I**

**I. Catalog Statement**

The Verdugo Power Academy I is the first course in a two course sequence that prepares candidates for an Electrical Line Mechanic (ELM) position. Development of basic skills needed to be successful candidates is emphasized. These skills include: overall safety considerations and knowledge of the basic tools and materials involved with the electrical theory that is specific to this trade.

Total Lecture Units: 4.0

Total Laboratory Units: 3.5

**Total Course Units: 7.5**

Total Lecture Hours: 64.0

Total Laboratory Hours: 176.0

**Total Faculty Contact Hours: 240.0**

Prerequisite: None.

Note: A maximum of 17.5 units will be granted for any combination of ITECH 155, ITECH 157 and ITECH 158.

**II. Course Entry Expectations**

Skills Level Ranges: Reading 5; Writing 5; Listening/Speaking 5; Math 3.

**III. Course Exit Standards**

Upon successful completion of the required coursework, the student will be able to:

1. describe electrical theory;
2. identify hot line tools and their use;
3. explain personal protective grounding practices;
4. explain single and three-phase construction;
5. explain grounding principles;
6. explain conductor handling and control;
7. explain transformer operation;
8. explain the purpose of substations;
9. explain underground equipment operations;
10. describe the characteristics of conductors, insulators, and semi-conductors;

11. apply electrical formulas to circuit problem solving;
12. explain the rules for installation and maintenance of electric supply stations and equipment;
13. describe hazards of electrical system components;
14. describe terms and definitions of the trade;
15. perform common aerial lift operations.

**IV. Course Content**

**Total Faculty Contact Hours = 240**

A. Electric Power Principles	Lecture 14 hours
1. Ohms law	Lab 6 hours
2. Electrical formulas and calculations	
3. Schematic diagrams	
B. Electrical Codes	
1. OSHA (Standards-29 CFR) regulations	Lecture 8 hours
2. NFPA (National Fire Protection Association) regulations	Lab 8 hours
3. NEC (National Electrical Code)	
C. Safe Work Practices	Lecture 4 hours
1. Responsibilities and expectations	Lab 12 hours
2. Safety meetings	
3. Safe work model	
D. Single-Phase and Three-Phase Rubber Gloving	Lecture 4 hours
1. Glove ratings	Lab 28 hours
2. Proper maintenance and testing	
3. Tool manipulation	
E. SMART Grid	Lecture 4 hours
1. Grid control principles	Lab 20 hours
2. Network communication principles	
F. Hot Stick Operations	Lecture 4 hours
1. Hot stick testing	Lab 16 hours
2. Human distance factor	
G. Lockout/Tagout	Lecture 4 hours
1. Control authority	Lab 4 hours
2. Circuit isolation procedure	
H. Meter Installation and Service	Lecture 4 hours
1. Arc-flash protection	Lab 12 hours
2. Troubleshooting practices	
I. Meter Reader/Installer Safety	Lecture 4 hours

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|---|-----------------|
| 1. Analog meter reading                                       | Lab 4 hours     |
| 2. Digital meter replacement procedure and service initiation |                 |
| <br>  |                 |
| J. Underground Electrical Installation                        | Lecture 4 hours |
| 1. Cable replacement techniques                               | Lab 20 hours    |
| 2. Cable splicing techniques                                  |                 |
| 3. Vault entry testing and ventilation                        |                 |
| <br>  |                 |
| K. Underground Electrical Systems                             | Lecture 4 hours |
| 1. Duct and maintenance hole systems                          | Lab 20 hours    |
| 2. Direct-bury systems  |                 |
| 3. System protection requirements                             |                 |
| <br>  |                 |
| L. Underground Electrical Troubleshooting                     | Lecture 4 hours |
| 1. Fault indicators   | Lab 20 hours    |
| 2. System sectional testing                                   |                 |
| 3. Transformer faults due to temperature or moisture          |                 |
| <br>  |                 |
| M. Personal Protective Grounding                              | Lecture 2 hours |
| 1. Applying protective grounds                                | Lab 6 hours     |
| 2. Electric field induction                                   |                 |
| 3. Principles to control current and voltage                  |                 |

**V. Methods of Instruction**

The following methods of instruction may be used in the course:

1. lecture;
2. demonstration;
3. multimedia presentations.

**VI. Out of Class Assignments**

The following out of class assignments may be used in the course:

1. individual projects (e.g. written assignments, reading reports);
2. group projects (e.g. homework problems, problems solving demonstrations, discussion on textbook topics).

**VII. Methods of Evaluation**

The following methods of evaluation may be used in the course:

1. midterm examination;
2. final examination;
3. manipulation skills evaluation (e.g. use of Hot Stick, Rubber Gloving, meter installation and underground electrical installation).

**VIII. Textbook**

Kurtz and Shoemaker, *The Lineman and Cableman's Handbook*, [Current Edition].

Hightstown, N.J.: McGraw Hill, 2009.

10<sup>th</sup> Grade Textbook Reading Level. ISBN: 978-0-071-46789-6

**IX. Student Learning Outcomes**

1. Student will be able to demonstrate knowledge of electrical circuits, power principles and electricity codes.
2. Student will be familiar with the SMART grid system and its functions.