

Connecticut Technical High School System
Connecticut State Department of Education

ELECTRICAL
APPRENTICESHIP
INFORMATION PACKET
2013-14

Covering the following licenses:

E-2 Electrician

L-6 Low Voltage

T-2 Telephone Interconnect

C-6 Telephone Interconnect/Low Voltage

The following section, Apprentices Responsibilities, is taken from the **Apprentice Handbook & Progress Report**, which is given to each apprentice at the beginning of their training by the Office of Apprenticeship Training, Connecticut State Labor Department.

Apprentice Responsibilities:

1. **Work safely.**
2. **Avoid absenteeism and tardiness at work and at school.**
3. **Attend and participate in related instruction and maintain the highest possible grades.**
4. **Be involved and show dedication to your training (both on the job and in the classroom).**
5. **Keep track of your training hours, (either in the form of work records or logbook) and advise your supervisor of any deficiencies in your apprenticeship training.**
6. **Show dedication and interest in learning the trade.**
7. **Show respect to the skilled journeypersons training and supervising you.**
8. **Comply with the provisions of the Apprentice Agreement.**
9. **Follow your sponsor's written work rules and policies.**
10. **You must be accompanied by a journeyperson while on the job site.**

Concerning related classroom instruction, each apprentice student is expected:

- To purchase the textbooks required for each course
- To complete all instructor assigned quizzes and exams as well as any academic reinforcement activities.

NOTE: A minimum grade of 75% is necessary to pass each course.

Regional Apprenticeship Representatives

Office of Apprenticeship Training

Department of Labor

860-263-6085

Region 1: Paul Femia, paul.femia@ct.gov

(860) 263-6128

Towns Served:

Andover	Griswold	New London	Sterling
Ashford	Groton	North Stonington	Stonington
Bozrah	Hampton	Norwich	Thompson
Brooklyn	Hebron	Old Lyme	Tolland
Canterbury	Killingly	Plainfield	Union
Chaplin	Lebanon	Pomfret	Voluntown
Columbia	Ledyard	Preston	Waterford
Coventry	Lisbon	Putnam	Willington
East Lyme	Lyme	Scotland	Windham
Eastford	Mansfield	Sprague	Woodstock
Franklin	Montville	Stafford	

Region 2: Larry Satchell, larry.satchell@ct.gov

(860) 263-6084

Towns Served:

Bloomfield	Glastonbury	South Windsor
Bolton	Granby	Suffield
East Granby	Hartford	Vernon
East Hartford	Manchester	Wethersfield
East Windsor	Newington	Windsor
Ellington	Rocky Hill	Windsor Locks
Enfield	Somers	

Region 3: Owen Golding, owen.golding@ct.gov

(860) 263-6083

Towns Served:

Avon	Goshen	Oxford	West Hartford
Barkhamsted	Hartland	Plymouth	Winchester
Bethel	Harwinton	Roxbury	Woodbury
Bethlehem	Kent	Salisbury	
Bridgewater	Litchfield	Sharon	
Brookfield	Middlebury	Sherman	
Burlington	Morris	Simsbury	
Canaan	New Fairfield	Southbury	
Canton	New Hartford	Thomaston	
Colebrook	New Milford	Torrington	
Cornwall	Newtown	Warren	
Danbury	Norfolk	Washington	
Farmington	North Canaan	Watertown	

Regional Apprenticeship Representatives

Region 4: Gina Knox, gina.knox@ct.gov

(860) 263-6277

Towns Served:

Ansonia	Greenwich	Ridgefield	Westport
Bridgeport	Milford	Shelton	Wilton
Darien	Monroe	Stamford	
Derby	New Canaan	Stratford	
Easton	Norwalk	Trumbull	
Fairfield	Redding	Weston	

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Region 5: Tammie Whiting, tammie.whiting@ct.gov

(860)263-6154

Towns Served

Bethany	East Haddam	Killingworth	North Haven	Westbrook
Branford	East Hampton	Madison	Old Saybrook	Woodbridge
Chester	East Haven	Marlborough	Orange	
Clinton	Essex	Middlefield	Portland	
Colchester	Guilford	Middletown	Salem	
Deep River	Haddam	New Haven	Seymour	
Durham	Hamden	North Branford	West Haven	

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Region 6: Keri Lamontagne, keri.lamontagne@ct.gov

(860) 263-6129

Towns Served:

Beacon Falls	Meriden	Southington
Berlin	Naugatuck	Wallingford
Bristol	New Britain	Waterbury
Cheshire	Plainville	Wolcott
Cromwell	Prospect	

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Electrical Work Licenses: Licenses Expire annually: September 30th

Section 20-330 of the Connecticut General Statutes

"Electrical work" means the installation, erection, maintenance, alteration or repair of any wire, cable, conduit, busway, raceway, support, insulator, conductor, appliance, apparatus, fixture or equipment which generates, transforms, transmits or uses electrical energy for light, heat, power or other purposes.

E-1 Unlimited Electrical Contractor

The holder of this license may do all electrical work as defined in section 20-330 of the General Statutes.

E-2 Unlimited Electrical Journeyman

The holder of this license may do the same work as an E-1 licensee, but only while in the employ of a contractor licensed for such work.

L-5 Limited Electrical Contractor

The holder of this license may perform only work limited to ADT, similar or low voltage signal work, audio and sound systems. The installation or repair of any electrical work for plating or similar low voltage work is not authorized. The voltage of the system is not to exceed 25 volts or five amperes where such work commences at an outlet receptacle or connection previously installed by a person holding the proper electrical license.

L-6 Limited Electrical Journeyman

The holder of this license may perform the same work as the L-5 licensee, but only while in the employ of a contractor licensed for such work..

C-5 Limited Electrical Contractor

The holder of this license may perform only work limited to ADT, similar or low voltage signal work, audio and sound systems, and telephone-interconnect systems. The installation, repair, maintenance of any electrical work for plating is not authorized. The voltage of any system is not to exceed forty-eight (48) volts or five (5) amperes where such work commences at an outlet receptacle or connection previously installed by a person holding the proper electrical license.

C-6 Limited Electrical Journeyman

The holder of this license may perform the same work as the C-5 licensee, but only while in the employ of a contractor licensed for such work.

T-1 Limited Electrical Contractor

The holder of this license may perform only work limited to telephone-interconnect systems where such work commences at an outlet receptacle or connection previously installed by a person holding the proper electrical license.

T-2 Limited Electrical Journeyman

The holder of this license may perform the same work as the T-1 licensee, but only while in the employ of contractor licensed for such work.

Connecticut Technical High School System

Effective- January 1, 2002

E-2 ELECTRICAL APPRENTICESHIP

COURSE SEQUENCE AND PREREQUISITES

Related Instruction- 720 Hours

OJT - 8000 Hours

COURSES (EACH COURSE IS 36 HOURS)	Course number	Semester	Prerequisites
FIRST YEAR COURSES:			
Basic Math Computations	A0001	1	
Blueprint Reading	A0031	1	
Algebra with Trigonometry	A0005	2	A0001
Electrical Theory I	A0901	2	
OSHA-30	A0099	2	
SECOND YEAR COURSES:			
Electrical Code I	A0904	1	
Telecom Cabling	A0925	1	
Electrical Code II	A0905	2	A0904
Basic Telecommunications	A0924	2	
Electrical Theory II	A0902	2	A0901
THIRD YEAR COURSES:			
Electrical Code III	A0909	1	A0904, A0905
Motor Controls	A0906	1	
Basic Alarm Technology	A0927	2	
Semiconductors for Electricians	A0908	2	
Logic Circuits-Programmable Controllers, Part 1	A0914	2	A0906
FOURTH YEAR COURSES:			
Logic Circuits-Programmable Controllers, Part II	A0926	1	A0914
Motor and Generator Theory	A0907	1	
Fire, Access & CCTV Systems	A0928	2	
Electrical Code IV	A0910	2	A0904, A0905, A0909
Power Distribution and Load Calculations	A0917	2	

Connecticut Technical High School System

Effective- January 1, 2002

T-2 Telephone Interconnect Electrical Apprenticeship

COURSE SEQUENCE AND PREREQUISITES

Related Instruction- 288 Hours

OJT-4000

Courses (EACH COURSE IS 36 HOURS)	Course Number	Year	Semester	Prerequisites
Basic Math Computations	A0001	1	1	
Blueprint Reading	A0031	1	1	
Electrical Theory I	A0901	1	2	
OSHA-30	A0099	1	2	
Electrical Code I	A0904	2	1	
Basic Telecommunications	A0924	2	1	
Electrical Theory II	A0902	2	2	A0901
Telecom Cabling	A0925	2	2	

Effective- January 1, 2002

L-6 Low Voltage Electrical Apprenticeship

COURSE SEQUENCE AND PREREQUISITES

Related Instruction- 288 Hours

OJT-4000

Courses (EACH COURSE IS 36 HOURS))	Course Number	Year	Semester	Prerequisites
Basic Math Computations	A0001	1	1	
Blueprint Reading	A0031	1	1	
Electrical Theory I	A0901	1	2	
OSHA-30	A0099	1	2	
Electrical Code I	A0904	2	1	
Basic Alarm Technology	A0927	2	1	
Electrical Theory II	A0902	2	2	A0901
Fire, Access & CCTV Systems	A0928	2	2	

C-6 Telephone Interconnect/Low Voltage Electrical Apprenticeship

COURSE SEQUENCE AND PREREQUISITES

Related Instruction- 360 Hours

OJT-4000

Courses (EACH COURSE IS 36 HOURS)	Course Number	Year	Semester	Prerequisites
Basic Math Computations	A0001	1	1	
Blueprint Reading	A0031	1	1	
Electrical Theory I	A0901	1	1	
Electrical Code I	A0904	1	2	
OSHA-30	A0099	1	2	
Basic Alarm Technology	A0927	2	1	
Basic Telecommunications	A0924	2	1	
Fire, Access & CCTV Systems	A0928	2	2	
Electrical Theory II	A0902	2	2	A0901
Telecom Cabling	A0925	2	2	

E-2 Electrical Curriculum
Related Instruction-720 Hours
Table of Contents

Course: Basic Math Computations **A0001** **36 Hours**

- A. Computations Using Real Numbers
- B. Computations Using Fractions
- C. Computations Using Decimal Fractions
- D. Base, Rate, and Portion
- E. Computation of Area and Volume
- F. Units of Measurements

Course: Blueprint Reading **A0031** **36 Hours**

- A. Application of Building Codes and Standards
- B. Introduction to Blueprint Reading
- C. Alphabet of Lines and Symbols
- D. Orthographic Projection Drawings
- E. Construction Dimensions and Construction Materials
- F. Reading Plot Plans and Contour Maps
- G. Footings, Foundations and Floor Blueprint Structural Steel, Framing Blueprints
- H. Plumbing System Blueprints
- I. H.V.A.C. System Blueprints
- J. Electrical Systems Blueprints

Course: Algebra with Trigonometry **A0005** **36 Hours**

Prerequisite: Basic Math Computations

- A. Power and Roots
- B. Groupings
- C. Addition, Subtraction, Multiplication and Division of Polynomials
- D. Solving Word Problems
- E. Identifying Triangles and Angles
- F. Pythagorean Theorem
- G. Trigonometric Functions, Sines, Cosines & Tangents
- H. Solution of Problems

Course: Electrical Theory I **A0901** **36 Hours**

- A. Introduction to Electricity and Matter
- B. Electricity Production and Use
- C. Electrostatics and Basic Circuit Concepts
- D. Scientific Notation and Metric Prefixes
- E. Electric Measurements
- F. Conductors, Resistance & Insulators
- G. OHM's Law, Electrical Power and Energy
- H. Series Circuit Calculations
- I. Parallel Circuit Calculations
- J. Series – Parallel Circuits

Course: OSHA-30 **A0099** **36 Hours**

- A. Introduction to OSHA – 2 hours**
- B. Managing Safety and Health – 2 hours**
- C. OSHA Focus Four Hazards – 6 hours**
 - a. (1) Falls (minimum one hour and 15 minutes)**
 - b. (2) Electrocution**
 - c. (3) Struck-By (e.g., falling objects, trucks, cranes)**
 - d. (4) Caught-In or Between (e.g., trench hazards, equipment)**
- D. Personal Protective and Lifesaving Equipment – 2 hours**
- E. Health Hazards in Construction – 2 hours**
- F. Stairways and Ladders – 1 hour.**
- G. Electives - 12 hours**
 - a. Concrete and Masonry Construction**
 - b. Confined Space Entry**
 - c. Cranes, Derricks, Hoists, Elevators, & Conveyors**
 - d. Ergonomics**
 - e. Excavations**
 - f. Fire Protection and Prevention**
 - g. Materials Handling, Storage, Use and Disposal**
 - h. Motor Vehicles, Mechanized Equipment and Marine Operations; Rollover Protective Structures and Overhead Protection; and Signs, Signals and Barricades**
 - i. Powered Industrial Vehicles**
 - j. Safety and Health Programs**
 - k. Scaffolds**
 - l. Steel Erection**
 - m. Tools - Hand and Power**
 - n. Welding and Cutting**

Course: Electrical Code I **A0904** **36 Hours**

- A. Articles 80-225, 300-310 & Chapter 9**

Course: Telecom Cabling **A0925** **36 Hours**

- A. Telephone Cable**
- B. Connection Methods**
- C. Distribution**
- D. LAN Cabling**
- E. Grounding**
- F. Telecom Code**

Course: Electrical Code II **A0905** **36 Hours**

Prerequisite: Code I

- A. Articles 230-427 & Chapter 9**

Course: Basic Telecommunications **A0924** **36 Hours**

- A. Describing basic telephone terms and their usage
- B. Ohms Law and Circuits
- C. Dial Tone and Components of a Telephone
- D. LATAs Local Access Transport Area. Placing a Local Phone Call
- E. LD Network and Preferred Inter-exchange carrier. Placing a Long Distance Phone Call
- F. Understanding POTS Lines
- G. The Telecom Landscape – The Players
- H. The Telecom Landscape – The Customers
- I. Basic Voice Network Concepts
- J. Fundamentals of Transmission Systems
- K. Fundamentals of Data Communications
- L. Fundamentals of LANs
- M. ISDN BRI and PRI Lines
- N. Private Line Services
- O. Understanding Key Systems
- P. What is a PBX?
- Q. Voice Mail Integration with Key Systems and PBXs

Course: Electrical Theory II **A0902** **36 Hours**

Prerequisite: Electrical Theory I

- A. Introduction to Alternating Current
- B. Alternating-Current Circuits Containing Resistance and Inductance in Alternating – Current Circuits
- C. Series Circuits – Resistance and Impedance and Resolving Vectors
- D. Capacitors, dielectric of capacitors, elementary functions of each part. Capacitors connected in series and parallel. Also RC and RL time constants
- E. Capacitors in alternating current circuits. Capacitive reactance
- F. Series Circuits: Resistance, Inductive Reactance, and Capacitive Reactance
- G. AC parallel circuits with branches containing resistance, inductance and capacitance

Course: Electrical Code III **A0909** **36 Hours**

Prerequisite: Code I & II

- A. Articles 430 Motors – 490 Equipment over 600 volts

Course: Motor Controls **A0906** **36 Hours**

- A. Tools, Instruments and Safe Work Habits.
- B. Control Language, Symbols and Diagrams
- C. Logic Applied to Control Circuits
- D. Motor Control, Control Devices.
- E. Control Circuits
- F. Troubleshooting Control Circuits

Course: Basic Alarm Technology **A0927** **36 Hours**

- A. Terms & Definitions: Describing basic alarm terms and their usage.
- B. Basic Electronic Theory: Ohms Law and Circuits
- C. Perimeter Protection: Perimeter devices and sensors
- D. Sound Protection: Sound devices and sensors
- E. Interior Protection: Interior devices and sensors.
- F. Control Panel Features: Control Panel and Key Pad functionality.
- G. TELCO Connection with an RJ31X and line seizure. The Central Station

- A. Voltage Drop and Wire Sizes**
- B. Power Transformers**
- C. Three-Phase Power**
- D. Poly Phase Systems**
- E. Special Transformer Connections and Harmonics**
- F. Power Factor Correction**
- G. Load Calculations – Small Commercial Building – Phase I**
- H. Load Calculations – Small Commercial Building – Phase II**

Booklist for Electrical Apprentice Students:

PLEASE NOTE: The current National Electric Code must be brought to all Electrical Theory and Blueprint Reading Courses.

For Math Courses (A0001, A0005):

- Applied Mathematics, R. Jesse Phagan, Goodheart-Willcox Company, Inc., ISBN 1-56637-995-4
- Workbook: Applied Mathematics, R. Jesse Phagan, Goodheart-Willcox Company, Inc., ISBN 1-56637-996-2

For Blueprint Reading (A0031):

- Print Reading for Construction, Residential and Commercial by Walter C. Brown and Daniel P. Dorfmueller, Goodheart-Willcox Company, Inc. ISBN 1-59070-347-2.

For OSHA-30 (A0099):

- OSHA 1926 CFR 29

For All Electrical Theory Courses

- 2005 National Electric Code, National Fire Protection Association

For Electrical Theory I & II, Motor and Generator Theory & Power Distribution and Load Calculations (A0901, A0902, A0907 & A0917):

- Delmar's Standard Textbook of Electricity 3rd Edition by Stephen L. Herman. 2004 ISBN 1401825656

For Semiconductors for Electricians (A0908):

- Solid State Fundamentals for Electricians, Gary Rockis, American Technical Publishers, Item number 1634

For Logic Circuits-Programmable Controllers, Part I & II (A0914 & A0926):

- Delmar's Introduction to Programmable Logic Controllers, Gary Dunning, 2006 ISBN # 1401884261,
- Lab Manual ISBN # 140188427X

For Motor Controls (A0906):

- Electrical Motor Controls, Gary Rockis and Glen Mazur, American Technical Publishers Item number 1207
- Workbook, Item number 1208

For Basic Telecommunications & Telecom Cabling (A0924 & A0925):

- Newton's TELECOM Dictionary by Harry Newton, Miller Freeman Inc.
- BICSI Telecommunications Dictionary
- The Essential Guide to Telecommunications by Annabel Z. Dodd, Prentice Hall PTR, ISBN 0-13-064907-4
- 2005 National Electric Code, National Fire Protection Association

For Basic Alarm Technology & Fire, Access & CCTV Systems (A0927 & A0928):

- National Fire Alarm Code Handbook, National Fire Protection Association, Item number 72HB07

APPRENTICE PROGRAM
BOOK PUBLISHERS PHONE ORDER NUMBERS & WEBSITES

<u>Book Publishers</u>	<u>Phone Numbers</u>	<u>Website</u>
Goodheart-Willcox	1-800-323-0440	www.goodheartwillcox.com
Thomson Delmar Learning	1-800-347-7707	www.delmarlearning.com
National Fire Protection Association (NFPA)	1-800-344-3555	www.nfpa.org/index.asp
American Technical Publishers	1-800-323-3471	www.go2atp.com
International Code Council (ICC)	1-800-786-4452	www.iccsafe.org/e/category.html
CRC Press	1-800-272-7737	www.crcpress.com/default.asp
Amazon Bookstore	1-800-201-7575	www.amazon.com
BICSI	1-813-979-1991	www.bicsi.org/
Prentice Hall	1-800-282-0693	http://vig.prenhall.com/catalog/