

# National Joint Apprenticeship and Training Committee for the Electrical Industry

The National Joint Apprenticeship and Training Committee for the Electrical Industry (NJATC) is headquartered in Upper Marlboro, Maryland. The Executive Director, appointed by the NJATC Executive Committee, administers the program, and the national office is responsible for curriculum development, production, and distribution. Additionally, the NJATC develops national standards, operational procedures, and curriculum for local implementation. Workshops are conducted by the NJATC on a national, regional, and local level to ensure that national policies and curricula are understood, implemented, and properly utilized. Additionally, the NJATC conducts an annual training institute, which is presented at a major university specializing in educator development. This full week of college-level professional training is dedicated to the development of instructional skills, technological awareness, curriculum enhancement and a superior educational system. The Institute is designed to be an accumulative four-year educational experience for all instructors teaching in the NJATC's programs. To accomplish this mission, the Institute maintains a full-time staff comprised of curriculum specialists, technical writers, clerical and secretarial professionals, and other personnel.

The five-year inside apprenticeship program consists of a course of study designed to instruct the student in electrical theory, design, installation, and maintenance of electrical systems providing power, light, heat, air conditioning, refrigeration, control, communication, monitoring, and automation to residential, commercial, and industrial markets.

Web Address: [www.njatc.org](http://www.njatc.org)

**Source of Official Student Records:** ACE Transcript Service, American Council on Education, One Dupont Circle NW, Washington, DC 20036-1193.

**Additional Information About the Courses:** College Credit Recommendation Service, American Council on Education, One Dupont Circle NW, Washington, DC 20036-1193.

## ***NJATC Apprentice Inside Wiremen 1st Year Course***

**ACE Transcript Data:** 0001 NJAT

**Location:** Various locations throughout the U.S.

**Length:** *Version 1:* 130 hours and 2,000 hours field cooperative experience (1 year); *Version 2:* 180 hours (minimum) and 2,000 hours field cooperative experience (1 year); *Version 3:* 200 hours (minimum) and 2,000 hours (1 year) field cooperative experience.

**Dates:** *Version 1:* December 1982-October 1997; *Version 2:* November 1997-July 2000; *Version 3:* August 2000-Present.

**Objective:** *Versions 1, 2, and 3:* Initial year of a five-year course of study and field experience to prepare an apprentice for Journeyman Inside Wireman status in the electrical construction (inside) industry.

**Learning Outcome:** *Versions 1 and 2:* Upon successful completion of this course, the student will be able to demonstrate knowledge, skills, and abilities to apply the principles of basic electricity, National Electrical Codes, engineering reading, drawing and sketching, and mathematics in classroom instruction, demonstration, and supervised field experience; and complete all NJATC examinations (written, demonstration, and field competency) with a passing grade. All field and classroom performance tests must be completed to the mastery level necessary to advance to more complex learning and field work; and complete all first year program required to advance and instructor recommendation to advance to next phase of the five year program. *Version 3:* Upon successful completion of this course, the student will be able to demonstrate knowledge, skills, and abilities to apply the principles of basic electricity; apply the principles and practices of health and safety; read engineering drawings; and complete all NJATC examinations (written, demonstration, and field competency) with a passing grade.

**Instruction:** *Versions 1 and 2:* Major topics covered in the course are DC electricity, National Electrical Code, engineering drawing, reading and sketching, units and measurements, geometry, algebraic equations, ratios, powers, roots, basic trigonometry, electrical construction materials and methods, and electrical construction field experience. Methods of instruction include lecture, discussion, demonstration, and audio/visual and field cooperative training. *Version 3:* Major

topics covered in the course are DC electricity, National Electrical Code, labor relations and history, health and safety, engineering drawing, reading and sketching, units and measurements, geometry, algebraic equations, ratios, powers, roots, basic trigonometry, electrical construction materials and methods, and electrical construction field experience. Methods of instruction include lecture, discussion, demonstration, and audio/visual and field cooperative training.

**Credit Recommendation:** *Version 1:* In the lower division baccalaureate/associate degree category, 2 semester hours in Basic Electricity, 1 semester hour in National Electrical Code, 1 semester hour in Blueprint Reading and Sketching, 2 semester hours in Field Experience in Electrical Construction, 1 semester hour in Technical Math for a total of 7 semester hours (12/92). *Version 2:* In the lower division baccalaureate/associate degree category, 1 semester hour in DC Circuits Lab, 1 semester hour in Electrical Construction Lab 1, 1 semester hour in National Electrical Code Theory, 1 semester hour in Electrical Construction Field Experience I for a total of 4 semester hours (11/97). *Version 3:* In the lower division baccalaureate/associate degree category, 2 semester hours in DC Circuits; 1 semester hour in DC Circuits Laboratory; 1 semester hour in Blueprint Reading; 1 semester hour in Electrical Construction Laboratory I; 1 semester hour in National Electrical Code I; 1 semester hour in Labor Relations and History I; 1 semester hour in Industrial Safety I; and 1 semester hour in Electrical Construction Field Experience I, for a total of 9 semester hours (8/00).

## ***NJATC Apprentice Inside Wiremen 2nd Year Course***

**ACE Transcript Data:** 0002 NJAT

**Location:** Various locations throughout the U.S.

**Length:** *Version 1:* 160 hours (minimum) and 2,000 hours field cooperative experience (1 year); *Version 2:* 180 hours (minimum) and 2,000 hours field cooperative experience (1 year); *Version 3:* 200 hours (minimum) and 1,500 hours (1 year) field cooperative experience.

**Dates:** *Version 1:* December 1982-October 1997; *Version 2:* November 1997-July 2000; *Version 3:* August 2000-Present.

**Objective:** *Versions 1, 2, and 3:* Second year of apprentice development for Journeyman Inside Wireman status in the electrical construction (inside) industry.

**Learning Outcome: Versions 1 and 2:** Upon successful completion of this course, the student will be able to further mastery of knowledge, skills, and abilities to apply the principles of basic electricity, National Electrical Codes, engineering drawing, reading and sketching, Mathematics, and electrical construction materials and methods in classroom instruction, demonstration, and supervised field experience; and complete all NJATC examinations (written, demonstration, and field competency) with a passing grade. All field and classroom performance tests must be completed to the mastery level necessary to advance to more complex learning and field work; and complete all second year program requirements and instructor recommendation to advance to next phase of the five year program. *Version 3:* Upon successful completion of this course, the student will be able to further apply the principles of basic electricity; apply the principles and practices of health and safety; read engineering drawings; and complete all NJATC examinations (written, demonstration, and field competency) with a passing grade.

**Instruction: Versions 1 and 2:** Major topics covered in the course are AC resistive, inductive, capacitive, and 3 phase circuits; introduction to oscilloscopes and multimeters; R-C, R-L, and R-L-C circuits; single and 3 phase transformer circuits; vector algebra; engineering drawing; reading and sketching; electrical construction materials and methods; and electrical construction field experience. Methods of instruction include lecture, discussion, demonstration, audio/visual material, laboratory, and field cooperative training. *Version 3:* Major topics covered in the course are AC resistive, inductive, capacitive, and 3 phase circuits; introduction to oscilloscopes and multimeters; R-C, R-L, and R-L-C circuits; single and 3 phase transformer circuits; vector algebra; engineering drawing; reading and sketching; electrical construction materials and methods; labor relations and history, health and safety, and electrical construction field experience. Methods of instruction include lecture, discussion, demonstration, audio/visual material, laboratory, and field cooperative training.

**Credit Recommendation: Version 1:** In the lower division baccalaureate/associate degree category, 2 semester hours in Basic Electricity, 1 semester hour in National Electrical Code, 1 semester hour in Blueprint Reading and Sketch-

ing, 2 semester hours in Field Experience II in Electrical Construction, 1 semester hour in Electrical Construction Materials and Methods, 2 semester hour in Technical Math for a total of 9 semester hours (12/92). *Version 2:* In the lower division baccalaureate/associate degree category, 4 semester hours in AC-DC Circuits (cumulative of years 1 & 2), 2 semester hours in Engineering Drawing (cumulative of years 1 & 2), 1 semester hour in Electrical Construction Lab II, 1 semester hour in A-C Circuits Lab, 1 semester hours in Electrical Construction Field Experience II for a total of 9 hours (11/97). *Version 3:* In the lower division baccalaureate/associate degree category, 2 semester hours in AC Circuits; 1 semester hour in Blueprint Reading; 1 semester hour in National Electrical Code II; 1 semester hour in Electrical Construction Laboratory II; 1 semester hour in AC Circuits Laboratory; 1 semester hour in Electrical Instrumentation; 1 semester hour in Labor Relations and History II; 1 semester hour in Industrial Safety II; and 1 semester hour in Electrical Construction Field Experience II, for a total of 10 hours (8/00).

### **NJATC Apprentice Inside Wiremen 3rd Year Course**

**ACE Transcript Data:** 0003 NJAT

**Location:** Various locations throughout the U.S.

**Length: Version 1:** 160 hours (minimum) and 2,000 hours field cooperative experience (1 year); *Version 2:* 180 hours (minimum) and 2,000 hours field cooperative experience (1 year); *Version 3:* 180 hours (minimum) and 1,500 hours (1 year) field cooperative experience.

**Dates: Version 1:** December 1982-October 1997; *Version 2:* November 1997-July 2000; *Version 3:* August 2000-Present.

**Objective: Versions 1, 2, and 3:** Third year of apprentice development for Journeyman Inside Wireman status in the electrical construction (inside) industry.

**Learning Outcome: Versions 1 and 2:** Upon successful completion of this course, the student will be able to demonstrate mastery of principles of electronic devices, National Electrical Codes, engineering drawing, reading and sketching, and mathematics in classroom, demonstration and supervised field experience; demonstrate competency in skills and abilities in motor controls, electrical machinery, and industrial safety practices in classroom and field experience environment; and

complete all NJATC examinations (written, demonstration, and field competency) with a passing grade. All field and classroom performance tests must be completed to the mastery level necessary to advance to more complex learning and field work; and complete all third year program requirements and instructor recommendation to advance to next phase of the five year program. *Version 3:* Upon successful completion of this course, the student will be able to demonstrate mastery of principles of electronic devices; read industrial blueprints; apply the principles and practices of health and safety; demonstrate competency in skills for power system protection; and complete all NJATC examinations (written, demonstration, and competency) with a passing grade.

**Instruction: Versions 1 and 2:** Major topics covered in the course are diodes, transistors, timers and grounding systems, overcurrent protection and load calculations, National Electrical Code, and field experience in electrical construction. Methods of instruction include lecture, discussion, demonstration, audio/visual material, laboratory, and field cooperative training. *Version 3:* Major topics covered in the course are diodes, transistors, timers and grounding systems, overcurrent protection and load calculations, National Electrical Code, labor relations and history, health and safety, and field experience in electrical construction. Methods of instruction include lecture, discussion, demonstration, audio/visual material, laboratory, and field cooperative training.

**Credit Recommendation: Version 1:** In the lower division baccalaureate/associate degree category, 2 semester hours in Basic Electricity; 1 semester hour in Blueprint Reading and Sketching; 2 semester hours in Field Experience in Electrical Construction; 2 semester hours in Motor Controls; 3 semester hours in Electrical Machinery; and 1 semester hour in Industrial Safety Practices, for a total of 11 semester hours (12/92). *Version 2:* In the lower division baccalaureate/associate degree category, 3 semester hours in Industrial Electronics; 1 semester hour in Basic Electronics Lab; 1 semester hour in Electrical Circuit Fault Analysis; 2 semester hours in Industrial Safety (cumulative of years 1, 2 & 3); 3 semester hours in College Algebra (cumulative of years 1,2, & 3); and 2 semester hours in Electrical Construction Field Experience III, for a total of 12 semester hours (11/97). *Version 3:* In the lower division

baccalaureate/associate degree category, 3 semester hours in Industrial Electronics; 1 semester hour in Basic Electronics Laboratory; 1 semester hour in Construction Blueprint Reading; 2 semester hours in Power System Protection; 1 semester hour in Labor Relations and History III; 1 semester hour in National Electrical Code III; 1 semester hour in Industrial Safety III; and 1 semester hour in Electrical Construction Field Experience III, for a total of 11 semester hours (8/00).

### **NJATC Apprentice Inside Wiremen 4th Year Course**

**ACE Transcript Data:** 0004 NJAT

**Location:** Various locations throughout the U.S.

**Length:** *Version 1:* 160 hours (minimum) and 2,000 hours field cooperative experience (1 year); *Version 2:* 180 hours (minimum) and 2,000 hours field cooperative experience (1 year); *Version 3:* 180 hours (minimum) and 1,500 hours (1 year) field cooperative experience.

**Dates:** *Version 1:* December 1982–October 1997; *Version 2:* November 1997–July 2000; *Version 3:* August 2000–Present.

**Objective:** *Versions 1, 2, and 3:* Fourth year of apprentice development for Journeyman Inside Wireman status in the electrical construction (inside) industry.

**Learning Outcome:** *Versions 1 and 2:* Upon successful completion of this course, the student will be able to demonstrate mastery of knowledge, skills, and abilities in motor controls, electronics and industrial electronics in classroom demonstration and supervised field experience; and complete all NJATC examinations (written, demonstration, and field competency) with a passing grade. All field and classroom performance tests must be completed to the mastery level to advance to more complex learning and field work; and complete all fourth year program requirements and instructor recommendation to advance to next phase of the five year program. *Version 3:* Upon successful completion of this course, the student will be able to demonstrate mastery of knowledge, skills, and abilities in motor controls, electronics and industrial electronics in classroom demonstration and supervised field experience; and complete all NJATC examinations (written, demonstration, and field competency) with a passing grade.

**Instruction:** *Versions 1 and 2:* Major topics covered in the course are AC and DC motors, starters, motor controllers, AC

and DC drives, control transformers, resonance, filters, power factor correction, basic digital logic circuits, fiber optic and optoelectronic theory and applications, and field experience in electrical construction. Methods of instruction include lecture, discussion, demonstration, audio/visual material, laboratory, and field cooperative training. *Version 3:* Major topics covered in the course are AC and DC motors, starters, motor controllers, AC and DC drives, control transformers, resonance, filters, power factor correction, lightning protection systems, basic digital logic circuits, fiber optic theory, and field experience in electrical construction. Methods of instruction include lecture, discussion, demonstration, audio/visual material, laboratory, and field cooperative training.

**Credit Recommendation:** *Version 1:* In the lower division baccalaureate/associate degree category, 3 semester hours in Electronics, 3 semester hours in Industrial Electronics, 2 semester hours in Motor Controls, 2 semester hours in Field Experience in Electrical Construction, 1 semester hour in HVAC for a total of 11 semester hours (12/92). *Version 2:* In the lower division baccalaureate/associate degree category, 4 semester hours in AC and DC Motors, 1 semester hour in Motor Control Lab, 2 semester hours in Motor Control Circuits, 3 semester hours in Digital Electronic Fundamentals, 2 semester hours in Electrical Construction Field Experience IV, 1 semester hour in Digital Electronic Lab for a total of 13 semester hours (11/97). *Version 3:* In the lower division baccalaureate/associate degree category, 1 semester hour in AC Motors; 2 semester hours in AC Circuits II; 1 semester hour in Motor Controls Laboratory; 3 semester hours in Motor Control Circuits; 1 semester hour in Digital Electronic Fundamentals and Laboratory; 1 semester hour in Electrical Construction Field Experience IV; and 1 semester hour in National Electrical Code IV, for a total of 10 semester hours (8/00).

### **NJATC Apprentice Inside Wiremen 5th Year Course**

**ACE Transcript Data:** 0005 NJAT

**Location:** Various locations throughout the U.S.

**Length:** *Version 1:* 160 hours (minimum) and 2,000 hours field cooperative experience (1 year); *Version 2:* 180 hours (minimum) and 2,000 hours field cooperative

experience (1 year); *Version 3:* 180 hours (minimum) and 1,500 hours (1 year) field cooperative experience.

**Dates:** *Version 1:* December 1982–October 1997; *Version 2:* November 1997–July 2000; *Version 3:* August 2000–Present.

**Objective:** *Versions 1, 2, and 3:* Fifth and final year of apprentice development for Journeyman Inside Wireman status in the electrical construction (inside) industry.

**Learning Outcome:** *Versions 1 and 2:* Upon successful completion of this course, the student will be able to demonstrate complete mastery of knowledge, skills, and abilities in the use of National Electrical Codes, instrumentation and testing techniques and equipment, and industrial electronics in classroom instruction, demonstration, and supervised field experience; and complete all NJATC examinations (written, demonstration, and field competency) with a passing grade. All field and classroom performance tests must be completed to the mastery level to complete program requirements for Journeyman Inside Wireman; and complete all fifth year program requirements and instructor recommendation to achieve the designation as Journeyman Inside Wireman in the electrical construction (inside) industry. *Version 3:* Upon successful completion of this course, the student will be able to apply instrumentation and testing techniques; and complete all NJATC examinations (written, demonstration, and field competency) with a passing grade.

**Instruction:** *Versions 1 and 2:* Major topics covered in the course are security and fire alarm systems, sensors, instrumentation setup and calibration, theory of flow, pressure, level, temperature, pneumatics, telephone wiring, high voltage safety and testing, heating, ventilating, air conditioning (HVAC) theory, programmable controllers, controls and troubleshooting, and uninterruptible power supplies. Methods of instruction include lecture, discussion, demonstration, audio/visual material, laboratory, and field cooperative training. *Version 3:* Major topics covered in the course are National Electrical Code, security and fire alarm systems, sensors, instrumentation setup and calibration, theory of flow, pressure, level, temperature, pneumatics, telephone wiring, high voltage safety and testing, heating, ventilating, air conditioning (HVAC) theory, programmable logic controllers, controls and troubleshooting, and uninterruptible power supplies. Methods of instruction include lecture,

discussion, demonstration, audio/visual material, laboratory, and field cooperative training.

**Credit Recommendation:** *Version 1:* In the lower division baccalaureate/associate degree category, 1 semester hour in National Electrical Code; 3 semester hours in Instrumentation and Testing; 3 semester hours in Industrial Electronics; and 2 semester hours in Field Experience in Electrical Construction, for a total of 9 semester hours (12/92). *Version 2:* In the lower division baccalaureate/associate degree category, 3 semester hours in Instrumentation and Testing; 3 semester hours in Industrial Electronics II; 1 semester hour in Electronic Instrumentation Lab; 1 semester hour in Electro-mechanical Troubleshooting; and 4 semester hours in Basic Physics (cumulative of years 1-5), for a total of 12 semester hours (11/97). *Version 3:* In the lower division baccalaureate/associate degree category, 3 semester hours in Instrumentation and Testing; 3 semester hours in Industrial Electronics II; 2 semester hours in Programmable Logic Controllers; 1 semester hour in Electro-mechanical Troubleshooting; 4 semester hours in Physics of Electricity and Magnetism (cumulative of year 1-5); 1 semester hour in National Electrical Code V; and 1 semester hour in Electrical Construction Field Experience V, for a total of 15 semester hours (8/00).

### ***NJATC Apprentice Installer/ Technician 1st Year Course***

**ACE Transcript Data:** 0009 NJAT

**Location:** Various IBEW locals throughout the U.S.

**Length:** 160 hours (9 months) and 1,600 hours (1 year) field cooperative experience.

**Dates:** February 1998–Present.

**Objective:** To provide the first year first year of a three-year program of study and field experience for the Installer Technician program in the electrical construction industry with emphasis on telecommunications and low voltage systems.

**Learning Outcome:** Upon successful completion of this course, the student will be able to apply the principles of basic electricity (Telecommunications Industry Association/Electrical Industry Association (TIA/EIA) Standards and National Electrical Codes) including engineering reading, drawing and sketching, labor studies/history, industrial safety, mathematics in classroom instruction, demonstration, and supervised field experience

related to low voltage installations in classroom instruction, demonstration, and supervised field experience; and complete all NJATC examinations (written, demonstration, and field competency) with a passing grade.

**Instruction:** Major topics covered in the course are electrical circuit theory; care and use of trade tools; proper use and installation of materials; codes and standards including TIA/EIA Standards and National Electrical Codes; structured cabling systems, fiber optic cabling systems, and blueprint reading and drawing; and labor studies and history, and industrial safety. Methods of instruction include lecture, discussion, audio/visual materials, and classroom and laboratory exercises. All field and classroom performance tests must be successfully completed to advance to the next phase of the three-year program.

**Credit Recommendation:** In the vocational certificate or lower division baccalaureate/associate degree category, 3 semester hours in Basic Electricity, 3 semester hours in Construction Blueprint Reading, 2 semester hours in Electronic Assembly Techniques, 1 semester hour in Industrial Safety, 1 semester hour in Labor Relations and History for a total of 10 semester hours (8/00).

### ***NJATC Apprentice Installer/ Technician 2nd Year Course***

**ACE Transcript Data:** 0010 NJAT

**Location:** Various IBEW locals throughout the U.S.

**Length:** 160 hours (9 months) and 1,600 hours (1 year) field cooperative experience.

**Dates:** February 1998–Present.

**Objective:** To provide the second year of a three-year program of study and field experience for the Installer Technician program in the electrical construction industry, with emphasis on telecommunications and low voltage systems.

**Learning Outcome:** Upon successful completion of this course, the student will be able to apply circuit theory toward use in low voltage installations, basic telephone systems, basic alarm systems, life safety systems, local area networks (LAN), paging systems, labor standards/history, industrial safety, and remote control and signaling systems in classroom instruction, demonstration, and supervised field experience; and complete all NJATC examinations (written, demonstration, and field competency) with a passing grade.

**Instruction:** Major topics covered in the course are electrical theory, telephone systems, security systems, electrical and telecommunications standards and codes, local area networks, sound distribution systems, labor studies and history, industrial safety, and low voltage system installation methods. Methods of instruction include lecture, discussion, audio/visual materials, and classroom and laboratory exercises. All field and classroom performance tests must be successfully completed to advance to the next phase of the three-year program.

**Credit Recommendation:** In the vocational certificate or lower division baccalaureate/associate degree category, 1 semester hour in Industry Safety; 1 semester hour in Labor Relations and History; 2 semester hours in Electronic Assembly Techniques; 4 semester hours in Automatic Control and Feedback Systems; 2 semester hours in AC Circuit Analysis; 2 semester hours in DC Circuit Analysis; and 2 semester hours in Residential or Light Commercial Wiring for a total of 14 semester hours (8/00).

### ***NJATC Apprentice Installer/ Technician 3rd Year Course***

**ACE Transcript Data:** 0011 NJAT

**Location:** Various IBEW locals throughout the U.S.

**Length:** 160 hours (9 months) and 1,600 hours (1 year) field cooperative experience.

**Dates:** February 1998–Present.

**Objective:** To provide the third year of a three-year program of study and field experience for the Installer Technician program in the electrical construction industry with emphasis on telecommunications and low voltage systems.

**Learning Outcome:** Upon successful completion of this course, the student will be able to apply the principles electronic based low voltage systems to include CCTV, video distribution systems, access control systems, nurse call systems, home automation and other low voltage systems, labor studies/history, and industrial safety in classroom instruction, demonstration, and supervised field experience; and complete all NJATC examinations (written, demonstration, and field competency) with a passing grade.

**Instruction:** Major topics covered in the course are industry safety, residential/light commercial wiring, low voltage systems, telecommunications networking, solid state circuits, and labor studies and

history and industrial safety. Methods of instruction include lecture, discussion, audio/visual materials, and classroom and laboratory exercises. All field and classroom performance tests must be successfully completed for the first two years as a prerequisite, with instructor recommendation, to advance to this phase of the three-year program.

**Credit Recommendation:** In the vocational certificate or lower division baccalaureate/associate degree category, 1 semester hour in Industrial Safety, 2 semester hours in Residential/Light Commercial Wiring, 3 semester hours in Low Voltage Systems, 3 semester hours in Telecommunications Networking, 3 semester hours in Solid State Circuits, and 1 semester hour in Labor Relations and History for a total of 13 semester hours (8/00).

### **NJATC Apprentice Lineman 1st Year Course**

**ACE Transcript Data:** 0006 NJAT

**Location:** Various IBEW locals throughout the U.S.

**Length:** *Version 1:* 160 hours (9 months) classroom and 2,000 hours (1 year) field cooperative experience; *Version 2:* 200 hours (9 months) classroom and 2,000 hours (1 year) field cooperative experience.

**Dates:** *Version 1:* November 1984–July 2000; *Version 2:* August 2000–Present.

**Objective:** *Versions 1 and 2:* First year of a three year program of study and field experience for Journeyman Lineman status in the electrical construction (outside) industry.

**Learning Outcome:** *Version 1:* Upon successful completion of this course, the student will be able to apply the principles of technical mathematics, basic electricity, electrical safety, and first aid; perform outside electrical construction activities under supervision; and meet OSHA safety and CPR certification requirements. *Version 2:* Upon successful completion of this course, the student will be able to apply the principles of basic electricity; perform outside electrical construction activities under supervision; meet OSHA safety and CPR certification requirements; and understand the principles of labor relations and history and industrial safety.

**Instruction:** *Version 1:* Major topics covered in the course are technical mathematics, basic AC/DC electricity, electrical safety, OSHA safety program, CPR, and field

experience in electrical construction with heavy equipment. Methods of instruction include lecture, discussion, audio/visual materials, and classroom and laboratory exercises. *Version 2:* Major topics covered in the course are basic AC/DC electricity, electrical safety, OSHA safety program, CPR, field experience in electrical construction with heavy equipment, and labor relations and history. Methods of instruction include lecture, discussion, audio/visual materials, and classroom and laboratory exercises.

**Credit Recommendation:** *Version 1:* In the lower division baccalaureate/associate degree category, 3 semester hours in Technical Math, 2 semester hours in Industrial Safety and First Aid, 3 semester hours in Basic (AC/DC) Electricity, and 2 semester hours in Electrical Construction Laboratory for a total of 10 semester hours (12/94). *Version 2:* In the vocational certificate or lower division baccalaureate/associate degree category, 1 semester hour in Industrial Safety I, 3 semester hours in Basic (AC/DC) Electricity, 1 semester hour in Labor Relations and History I, and 2 semester hours in Electrical Construction Laboratory I for a total of 8 semester hours (8/00).

### **NJATC Apprentice Lineman 2nd Year Course**

**ACE Transcript Data:** 0007 NJAT

**Location:** Various IBEW locals throughout the U.S.

**Length:** *Version 1:* 160 hours (9 months) classroom and 2,000 hours (1 year) field cooperative experience; *Version 2:* 200 hours (9 months) classroom and 2,000 hours (1 year) field cooperative experience.

**Dates:** *Version 1:* November 1984–July 2000; *Version 2:* August 2000–Present.

**Objective:** *Versions 1 and 2:* Second year of a three year program of study and field experience for Journeyman Lineman status in the electrical construction (outside) industry.

**Learning Outcome:** *Version 1:* Upon successful completion of this course, the student will be able to apply the principles of AC electrical circuitry to the use of transformers in single phase and three phase circuits; read power/electrical schematics and construction plans; follow high voltage safety procedures; and perform high voltage installation of electrical components. *Version 2:* Upon successful completion of this course, the student will be able to apply the principles of AC electri-

cal circuitry to the use of transformers in single phase and three phase circuits; read power/electrical schematics and construction plans; follow high voltage safety procedures; perform high voltage installation of electrical components; and understand the principles of labor relations and history.

**Instruction:** *Version 1:* Major topics covered in the course are AC circuits, including inductance, three phase connections, polarity, and distribution circuits; electrical schematics and site plan drawing reading; high voltage safety; and high voltage installation procedures. Methods of instruction include lecture, discussion, audio/visual materials, and classroom and laboratory exercises. *Version 2:* Major topics covered in the course are AC circuits including inductance, three phase connections, polarity, and distribution circuits; electrical schematics and site plan drawing reading; high voltage safety; high voltage installation procedures, and labor relations and history and industrial safety. Methods of instruction include lecture, discussion, audio/visual materials, and classroom and laboratory exercises.

**Credit Recommendation:** *Version 1:* In the lower division baccalaureate/associate degree category, 3 semester hours in AC Circuits, 2 semester hours in High Voltage Circuits Laboratory, 2 semester hours in Industrial High Voltage Safety, 2 semester hours in Construction/Electrical Reading, and 2 semester hours in Technical Math for a total of 11 semester hours (12/94). *Version 2:* In the vocational certificate or lower division baccalaureate/associate degree category, 1 semester hour in Industrial Safety II, 3 semester hours in Basic (AC/DC) Electricity, 2 semester hours in Electrical Construction Laboratory II, and 1 semester hour in Labor Relations and History II for a total of 7 semester hours (8/00).

### **NJATC Apprentice Lineman 3rd Year Course**

**ACE Transcript Data:** 0008 NJAT

**Location:** Various IBEW locals throughout the U.S.

**Length:** *Version 1:* 160 hours (9 months) classroom and 2,000 hours (1 year) field cooperative experience; *Version 2:* 160 hours (9 months) classroom and 3,000 hours (1 1/2 years) field cooperative experience.

**Dates:** *Version 1:* November 1984–July 2000; *Version 2:* August 2000–Present.

**Objective:** *Versions 1 and 2:* Third year of a three year program of study and field

experience for Journeyman Lineman status in the electrical construction (outside) industry.

**Learning Outcome:** *Version 1:* Upon successful completion of this course, the student will be able to apply AC circuit theory toward use in power AC installations; use metering to troubleshoot power electrical circuits; exhibit knowledge of power switching circuits; understand residential circuits; and perform live wire maintenance. *Version 2:* Upon successful completion of this course, the student will be able to apply AC circuit theory toward use in power AC installations; use metering to troubleshoot power electrical circuits; exhibit knowledge of power switching circuits; understand residential circuits; perform live wire maintenance; and understand the principles of labor relations and history and industrial safety.

**Instruction:** *Version 1:* Major topics covered in the course are advanced transformer connections, high voltage testing, fault currents, live line maintenance, cable splicing, oil circuit breakers, circuit metering, watt-hour meter use, fusing, and substations. Methods of instruction include lecture, discussion, audio/visual materials, and classroom and laboratory exercises. *Version 2:* Major topics covered in the course are advanced transformer connections, high voltage testing, fault currents, live line maintenance, cable splicing, oil circuit breakers, circuit metering, watt-hour meter use, fusing, substations, and labor relations and history and industrial safety. Methods of instruction include lecture, discussion, audio/visual materials, and classroom and laboratory exercises.

**Credit Recommendation:** *Version 1:* In the lower division baccalaureate/associate degree category, 2 semester hours in Power Electrical Measurements Methods, 3 semester hours in Electrical Troubleshooting (Power) Theory; 2 semester hours in Electrical Troubleshooting (Power) Laboratory, and 2 semester hours in AC Circuits (Power) Laboratory for a total of 9 semester hours (12/94). *Version 2:* In the lower division baccalaureate/associate degree category, 2 semester hours in Power Electrical Measurements Methods, 3 semester hours in Electrical Troubleshooting (Power) Theory; 2 semester hours in Electrical Troubleshooting (Power) Laboratory, 2 semester hours in AC Circuits (Power) Laboratory, and 1 semester hour in Labor Studies/History III for a total of 10 semester hours (8/00).

### ***NJATC Apprentice Residential Wireman 1st Year Course***

**ACE Transcript Data:** 0012 NJAT

**Location:** Various IBEW locals throughout the U.S.

**Length:** 180 hours (9 months) classroom and 1,600 hours (1 year) field cooperative experience.

**Dates:** April 1998-Present.

**Objective:** First year of a three-year program of study and field experience for Journeyman Residential Wireman status in the electrical construction (residential) industry.

**Learning Outcome:** Upon successful completion of this course, the student will be able to demonstrate knowledge, skills, and abilities to apply the principles of basic electricity; apply principle and practices of health and safety; read engineering drawings; layout circuits; and complete all NJATC examinations (written, demonstration, and competency) with a passing grade.

**Instruction:** Major topics covered in the course are DC electricity, National Electrical Code, labor relations and history, health and safety, reading engineering drawings, units and measurements, the use of electrical construction tools, electrical construction materials and methods, and residential electrical construction field experience. Methods of instruction include lecture, discussion, live demonstrations, and audio/visual and field cooperative training.

**Credit Recommendation:** In the lower division baccalaureate/associate degree category, 2 semester hours in DC Circuits and Laboratory; 1 semester hour in National Electrical Code I; 1 semester hour in Blueprint Reading; 1 semester hour in Labor Relations and History I; 1 semester hour in Industrial Safety I; and 1 semester hour in Electrical Construction Field Experience I, for a total of 7 semester hours. In the vocational certificate category, 2 semester hours in Residential Wiring I (8/00).

### ***NJATC Apprentice Residential Wireman 2nd Year Course***

**ACE Transcript Data:** 0013 NJAT

**Location:** Various IBEW locals throughout the U.S.

**Length:** 180 hours (9 months) classroom and 1,600 hours (1 year) field cooperative experience.

**Dates:** April 1998-Present.

**Objective:** Second year of a three-year program of study and field experience for

Journeyman Residential Wireman status in the electrical construction (residential) industry.

**Learning Outcome:** Upon successful completion of this course, the student will be able to apply the principles of basic DC and AC electricity; apply principles and practices of health and safety; read engineering drawings; apply residential circuit load calculations; and complete all NJATC examinations (written, demonstration, and field competency) with a passing grade.

**Instruction:** Major topics covered in the course are AC theory, transformer connections, circuit and conductor load and sizing calculations, fault currents, National Electrical Code, labor relations and history, health and safety, residential circuit and service installations, residential motor, and heating and air conditioning circuits and systems. Methods of instruction include lecture, discussion, audio/visual materials, demonstration, and classroom and laboratory exercises.

**Credit Recommendation:** In the lower division baccalaureate/associate degree category, 1 semester hour in National Electrical Code II, 2 semester hours in AC Circuits and Laboratory, 1 semester hour in Labor Relations and History II, 1 semester hour in Industrial Safety II, and 1 semester hour in Electrical Construction Field Experience II, for a total of 6 semester hours. In the vocational certificate category, 2 semester hours in Residential Wiring II, for a total of 2 semester hours in the vocational certificate category (8/00).

### ***NJATC Apprentice Residential Wireman 3rd Year Course***

**ACE Transcript Data:** 0014 NJAT

**Location:** Various IBEW locals throughout the U.S.

**Length:** 180 hours (9 months) classroom and 1,600 hours (1 year) field cooperative experience.

**Dates:** April 1998-Present.

**Objective:** Third year of a three-year program of study and field experience for Journeyman Residential Wireman status in the electrical construction (residential) industry.

**Learning Outcome:** Upon successful completion of this course, the student will be able to calculate single-family residential and multifamily residential loads; install residential telephone and sound distribution circuits and systems; install motors and other components for residential

heating and air conditioning systems; install home automation devices; apply principles and practices of health and safety; install basic security systems; install photo-voltaic power sources; install and maintain residential fire alarm systems; install residential computer network systems; and complete all NJATC examinations (written, demonstration, and field competency) with a passing grade.

**Instruction:** Major topics covered in the course are advanced AC circuits; power quality and power factor; residential electrical loads; residential low voltage systems including telephone, sound distribution, energy management, home automation, security systems and fire alarm systems, and residential computer networks; alternate power sources such as solarphoto-voltaics; National Electrical Code; labor relations and history; and health and safety. Methods of instruction include lecture, discussion, audio/visual materials, demonstration, and classroom and laboratory exercises.

**Credit Recommendation:** In the lower division baccalaureate/associate degree category, 1 semester hour in National Electrical Code III, 1 semester hour in Labor Relations and History III, 1 semester hour in Industrial Safety III, and 1 semester hour in Electrical Construction Field Experience III, for a total of 4 semester hours. In the vocational certificate category, 2 semester hours in Residential Wiring Layout, and 2 semester hours in Residential Wiring Power and Controls, for a total of 4 semester hours (8/00).

### ***NJATC Tech Math Course***

**ACE Transcript Data:** 0015 NJAT

**Location:** Various IBEW locals throughout the U.S.

**Length:** 40 hours .

**Dates:** August 1996–Present.

**Objective:** To present the mathematical concepts necessary to prepare individuals to perform calculations and conversions to successfully complete the electrical inside, outside, residential, or installer/technician apprenticeship programs.

**Learning Outcome:** Upon successful completion of this course, the student will be able to apply mathematical procedures to solve formulas; and perform conversions used in the electrical construction industry.

**Instruction:** Major topics covered in the course are addition, subtraction, multiplication and divisions of whole numbers,

signed numbers, fractions and decimal conversions, powers and roots, units and measurements, algebraic concepts, solving equations, simultaneous equations, ratio and proportion, percentages, geometry, trigonometry fundamentals, vectors, binary, octal and hexadecimal number systems, and Boolean algebra fundamentals. Methods of instruction include lecture, discussion, classroom exercises, audio/visual material, computer-assisted instruction, quizzes, observations, tests, and final examination.

**Credit Recommendation:** In the vocational certificate or lower division baccalaureate/associate degree category, 3 semester hours in Technical Mathematics or Industrial Mathematics (8/00).