Michigan State University On-Line Electrical Apprenticeship Training

Sample Course Descriptions
(Each course 30 hours in length)

ET010  Technical Mathematics -

ET011  Electrical Fundamentals I -
Application of Ohm's law, power law and Kirchoff's laws. The study of series and parallel circuits. Analyzing the operation and installation of the single-phase power systems. Introduction to magnetism and electromagnets.

ET012  Electrical Code I -

ET013  Electrical Circuitry -
Branch circuit installations. Techniques and procedures are examined. The wiring of common switches and receptacles utilizing cables and conduit systems. The wiring of GFCI and AFCI devices and an understanding of the electrical code requirements for their installation. Apprentices work on numerous hands-on activities for skill enhancement.

ET014  Electrical Wiring I -
National Electrical Code requirements for the common cables, conduits, and tubing systems used in the electrical trade. Also, installation techniques will be examined for the common electrical cables conduit and tubing. Underground and overhead service, feeder and branch circuit conductors will also be examined.

ET020  Electrical Fundamentals II -
Application of Ohm's law, power law and Kirchoff's laws. Analyzing the operation and installation of the three-phase power systems. Inductive, capacitive and resistive circuit analysis. Voltage drop, magnetism, power factor, power generation and distribution will be studied.
ET021 Electrical Applications -
Fundamentals and applications of light sources, lighting design. Examination of electric lamps including incandescent, fluorescent, induction, light emitting diodes, mercury vapor, metal halide, high pressure sodium, and low pressure sodium. Special focus on determining efficiencies and luminaire selection.

ET022 Electrical Code II -
Determining conductor sizes and allowable amperages for electrical conductors for branch circuits, feeders and service entrances. Installation and the sizing of enclosures including device, junction and pull boxes, auxiliary gutters, wireways, surface metal raceways and conduit bodies. Installation of service entrances where there could be: no single main; operating over 800 amperes; or multiple panelboards. More advanced study of system grounding, bonding and equipment grounding of electrical circuits and systems.

ET023 AC & DC Machines -
Operating characteristics of the common types of ac and dc electric motors that are found in residential, commercial, industrial and agricultural applications. Proper connection of motor leads, reversing shaft rotation and controlling rotation speed of AC and DC motors. Interpret the information provided on an induction motor nameplate to the point of finding a suitable replacement motor.

ET024 Electrical Wiring II -
Sizing branch equipment for a single-motor branch circuit. Sizing and installing branch circuits for electrical appliances, heating equipment, air conditioners and electrical vehicle chargers. Branch circuit and outlet requirements for single-family dwellings.

ET030 Automation & Controls I -
Introduction to motor controls systems and motor protection techniques. Standard symbols, line diagraming, wire diagrams for control systems will be introduced. Study of manual motor starters and magnetic motor starters, two- and three-wire control circuits. Analyze the operation of jog circuits, plugging circuits, reversing motors starters. Control system development will be introduced.

ET031 Transformers -
Transformer fundamentals, wiring, selection, and installation. Sizing overcurrent protection and conductors for transformers is discussed for a wide range of applications. Equipment grounding for transformers and Grounding of transformer secondary circuits that consist of a separately derived system.

ET032 Pools & Agricultural Grounding -
Grounding and bonding of swimming pools, hot tubs, man made bodies of water, fountains and livestock confinement areas. Understanding sources of neutral-to-earth voltage and mitigation techniques.
ET033  Electrical Code III -
Wiring in Class I, II, and III hazardous locations, health care facilities and other special occupancy facilities or locations.

ET034  Electrical Occupations -
Job site safety, OSHA and MIOSHA rules and regulations. NPFA standards and requirements for the protection of personnel.

ET040 Automation & Controls II -
Reversing motors, speed control, timer applications control system design and troubleshooting. Variable frequency drive systems.

ET041  Electrical Systems Planning -
Basic electrical calculations and wiring layout. Circuit requirements, outlet location, branch circuits and services sizing, blueprint reading and cost estimation.

ET042  Electrical Code IV -
Commercial agricultural and industrial wiring, planning and installation, including transformers, poly-phase systems, standby power systems. Solar, wind and fuel cell power systems. Grid connecting renewable power systems. Analyzing the economic and carbon impact. Fiber optic cable installation, fire alarm systems and other forms of communication and data transmission circuits.

ET043  Automation Systems -
Installation, wiring programming and troubleshooting programmable logic control systems. The use of electronic sensors in control systems is also covered.

ET044  Journey Examination Preparation -