**Overview of the Electrical Trade**

**Description**

There are two types of electrical trade qualifications people may attain in British Columbia: construction electricians and industrial electricians. Both share a common training for the first two levels of their technical training. For the third and fourth levels of technical training, construction and industrial electrical apprentices must meet different learning outcomes. For both types of apprenticeships, there is also on-the-job electrical training where apprentices develop their workplace competencies.

Typically an apprenticeship is a four-year process. Eighty percent of the training is spent on the job, and 20% is spent conducting technical training in school. Students must register

and become employed with an electrical contractor to become an apprentice, either by direct registration and/or employment with an electrical contractor, or by completing an electrical foundations course and then becoming registered and/or employed. If students cannot connect with an electrical contractor, they will never become an apprentice or journeyperson. For more information, see **How to Become an Electrician**.

Again, construction and industrial apprentices learn different skills. The activities written for Youth Explore Skills Trades will concentrate on the basic skills of all electricians, although much of the material is specifically suited for construction electrician training.

## Lesson Outcomes

The student will be able to:

* Understand the main duties of construction electricians
* Know the difference between construction and industrial electricians
* Be aware of the working conditions of an electrician

## Assumptions

The student will:

* Have little or no knowledge about the electrical trade.
* Have an interest in gaining knowledge about the electrical trade.

## Terminology

**Construction electrician**: an electrician who works on all electrical systems in a wide variety of buildings and facilities—everything from lighting and plugs to electrical panels, power distribution, climate control systems, fire alarms, and communications equipment. An electrician is designated as a construction electrician under the Interprovincial Standards Red Seal Program. An electrician’s work involves assembling, installing, commissioning, testing, maintaining, servicing, and operating electrical systems and equipment.



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**Electrical contractor**: an employer or sponsor of electrical apprentices who provides work- based training for electrical apprentices. An electrical contractor is a business person or firm that performs specialized construction work related to the design, installation, and maintenance of electrical systems.

**Industrial electrician**: an electrician who is typically employed on staff, working at operational large-scale industrial facilities such as pulp mills, hydroelectric dams, and mining and smelting operations maintaining and modifying functioning systems and facilities.

**SkilledTradesBC**: the organization responsible for leading and coordinating the skilled trades training and credentialing system for the province of BC. SkilledTradesBC provides strategic leadership, policy support, and customer services to help apprentices, employers, and industry. SkilledTradesBC sets program standards, maintains credential records, and issues the highly regarded Interprovincial Red Seal (IP) and BC Certificate of Qualification (CofQ) credentials.

**Interprovincial Red Seal and BC Certificate of Qualification**: Through the Red Seal

Program, certified tradespeople can obtain a “Red Seal” endorsement on their BC Certificates of Qualification. The Red Seal allows qualified tradespeople to practise their trade in any province or territory in Canada where the trade is designated, without having to write further examinations. See [www.red-seal.ca](http://www.red-seal.ca/) for additional information on the Red Seal Program. The Certificate of Qualification is only recognized in the province where it is obtained.

**National Occupational Classification (NOC)**: a standardized description of the work performed by Canadians in the labour market. It gives statisticians, labour market analysts, career counsellors, employers, and individual job seekers a consistent way to collect data and describe and understand the nature of work.

**Technical training**: training for the electrical trade that is conducted in school.

**Working conditions**: the conditions in which an individual works, including environment, noise levels, degree of safety, physical environment, wages, and hours of work.

## Estimated Time

1–4 hours

## Recommended Number of Students

20, based on *BC Technology Educators’ Best Practice Guide*

## Facilities

Classroom or computer lab

**Tools**

Projector with computer and speakers, Internet access

## Materials

none

## Recommended

Introducing this activity plan would be a great opportunity to invite an electrical contractor in as a guest speaker to talk about the electrical trade. The person could speak to the students

about duties performed by an electrician and working conditions. The speaker could also share experiential stories about the trade as well as their experiences as an apprentice.

## Resources

#### Skills Canada 2008—Electrical Wiring

Keewatin Career Development Corporation (KCDC) video. Each skill competition video demonstrates a trade in action, performed during the Skills Canada Competition 2008 in Calgary.

<http://www.youtube.com/watch?v=WjwrTAPJ2IY>

#### BCIT construction electrician video

<http://cdl-prod.bcit.ca/ltc/download/media/apprenticeship/electrical_full.wmv>

#### Jennifer Geddes: Electrician

https://[www.youtube.com/watch?v=0Z0av57vgDo](http://www.youtube.com/watch?v=0Z0av57vgDo)

#### SkilledTradesBC Industrial electrician information

See page 8 of the program outline for a graphical representation of the path to become an industrial electrician.

https://skilledtradesbc.ca/electrician-industrial

#### SkilledTradesBC construction electrician information

See the program outline for a graphical representation of the path to become a construction electrician (page 10 of the pdf).

https://skilledtradesbc.ca/electrician-construction

#### National Occupation Classification (NOC)

Search for 7241 (Construction Electrician) and 7242 (Industrial Electrician)<http://noc.esdc.gc.ca/English/home.aspx>

# Activity

### Option 1: Guest Speaker: Electrical Contractor

The following activity would be optimal prior to an electrician coming in to speak to students:

* + The teacher shows video clips listed under the Resources section, including the video of an industrial electrician’s duties so students know the difference between the two different types of electricians.
  + The teacher leads a discussion and provides an overview of the electrical trade, explaining the NOC and main duties of electricians.

### Option 2: No Guest Speaker (Class Discussion)

* + Show one or both video clips as a starting point to the activity.
  + Give an overview of the electrical trade, explaining the NOC and main duties of electricians. Lead a class discussion.
  + Show a video of an industrial electrician’s duties (see Resources section) so students know the difference between the two different types of electricians.

**Note:** This video is from Alberta, where some requirements are different from those in British Columbia, such as educational requirements.

### Option 3: No Guest Speaker (Class Activity)

* + Show one or both video clips as a starting point to the activity.
  + Give an overview of the electrical trade, explaining the NOC and main duties of electricians. Lead a class discussion.

Show a video of an industrial electrician’s duties (see Resources section) so students know the difference between the two different types of electricians.

**Note:** This video is from Alberta, where some requirements are different from those in British Columbia, such as educational requirements.

#### Venn diagram

The following hands-on activity involves students placing slips of paper—each containing details of industrial and construction electrician duties and descriptions—onto chart paper with a pre-drawn Venn diagram (see Figure 1).

Industrial

Electrician

Both

Construction

Electrician

**Figure 1—**Venn diagram

The teacher would have to print off two copies of the duties and descriptions for each student or group of students working on this activity. The teacher or the students could then cut each item into a discrete object.

Hand out the slips of paper with duties and descriptions of industrial and construction electricians (see the resource at the end of this activity plan). Students must decide whether the papers fit construction electricians, industrial electricians, or both. Have them lay the papers down on a table with construction on the left, both in the middle, and industrial on the right (a Venn diagram format with two overlapping circles). The list of duties and descriptions is included at the end of this activity plan.

An alternative activity would be to have students simply indicate which tasks pertain to construction electricians and industrial electricians by filling in the table.

**Background Information**

### NOC # 7241 Construction Electrician

Construction electricians lay out, assemble, install, test, troubleshoot, and repair electrical wiring, fixtures, control devices, and related equipment in buildings and other structures. They construct electrical systems in the following facilities:

* + Residential: single family, townhouse, condominium, and high rise apartments
  + Commercial: office buildings, shopping malls
  + Institutional: schools, hospitals, jails
  + Industrial: manufacturing facilities, sawmills, mines

Construction electricans are employed by electrical contractors and maintenance departments of buildings and other establishments, or they may be self-employed.

### Main duties

Electricians in this unit group perform some or all of the following duties:

* + Read and interpret drawings, circuit diagrams, and electrical code specifications to determine wiring layouts for new or existing installations.
  + Install conduits, tubing, and cable trays for wires and cables.
  + Pull wire through conduits and cables through holes in walls and floors.
  + Install brackets and hangers to support electrical equipment.
  + Install, replace, and repair lighting fixtures and electrical control and distribution equipment, such as switches, relays, and circuit breaker panels.
  + Splice, join, and connect wire to fixtures and components to form circuits.
  + Test continuity of circuits using test equipment to ensure compatibility and safety of the system, following installation, replacement, or repair.
  + Troubleshoot and isolate faults in electrical and electronic systems and remove and replace faulty components.
  + Connect electrical power to audio and visual communication equipment, signalling devices, and heating and cooling systems.
  + Conduct preventive maintenance programs and keep maintenance records.

### NOC # 7242 Industrial Electricians

Industrial electricians install, maintain, test, troubleshoot, modify and repair industrial electrical equipment and associated electrical and electronic controls. They are employed by electrical contractors and maintenance departments of factories, plants, mines, shipyards, and other industrial establishments.

### Main duties

Industrial electricians perform some or all of the following duties:

* Read and interpret drawings, blueprints, schematics, and electrical code specifications to determine layout of industrial electrical equipment installations.
* Install, examine, replace, or repair electrical wiring, receptacles, switch boxes, conduits, feeders, fibre-optic and coaxial cable assemblies, lighting fixtures, and other electrical components.
* Test electrical and electronic equipment and components for continuity, current, voltage, and resistance.
* Maintain, repair, install, and test switchgear, transformers, switchboard meters, regulators, and reactors.
* Maintain, repair, test, and install electrical motors, generators, alternators, industrial storage batteries, and hydraulic and pneumatic electrical control systems.
* Troubleshoot, maintain, and repair industrial, electrical, and electronic control systems, and other related devices.
* Operate and program PLCs ( programmable logic computers).
* Conduct preventive maintenance programs and keep maintenance records.
* May install, maintain, and calibrate industrial instrumentation and related devices.

## Evaluation Guidelines

The student:

* + Participates in class discussion
  + Understands the difference between construction and industrial electricians
  + Displays an understanding of the main duties of a construction electrician

### Duties and Descriptions of Construction and Industrial Electricians for Class Activity

|  |  |  |
| --- | --- | --- |
| **Duty** | **Construction Electrician** | **Industrial Electrician** |
| Includes occupational titles such as mill electrician or mine electrician |  |  |
| Maintain, repair, test, and install electrical motors, generators, alternators, industrial storage batteries, and hydraulic and pneumatic electrical control systems |  |  |
| Read and interpret drawings, circuit diagrams, and electrical code specifications to determine wiring layouts for new or existing installations |  |  |
| Troubleshoot, maintain, and repair industrial, electrical, and electronic control systems and other related devices |  |  |
| Operate and program PLCs (programmable logic computers) |  |  |
| Install, examine, replace, or repair electrical wiring, receptacles, switch boxes, conduits, feeders, fibre-optic and coaxial cable assemblies, lighting fixtures, and other electrical components |  |  |
| Conduct preventive maintenance programs and keep maintenance records |  |  |
| May install, maintain, and calibrate industrial instrument- ation and related devices |  |  |
| Install conduits, tubing, and cable trays for wires and cables |  |  |
| Maintain, repair, install, and test switchgear, transformers,  switchboard meters, regulators, and reactors |  |  |

|  |  |  |
| --- | --- | --- |
| **Duty** | **Construction Electrician** | **Industrial Electrician** |
| Install brackets and hangers to support electrical equipment |  |  |
| Install, replace, and repair lighting fixtures and electrical control and distribution equipment, such as switches, relays, and circuit breaker panels |  |  |
| Splice, join, and connect wire to fixtures and components to form circuits |  |  |
| Troubleshoot and isolate faults in electrical and electronic systems and remove and replace faulty components |  |  |
| Connect electrical power to audio and visual communication equipment, signalling devices, and heating and cooling systems |  |  |

## Answer Key

### Duties and Descriptions of Construction and Industrial Electricians for Class Activity

|  |  |  |
| --- | --- | --- |
| **Duty** | **Construction Electrician** | **Industrial Electrician** |
| Includes occupational titles such as mill electrician or mine electrician | **X** | **X** |
| Maintain, repair, test, and install electrical motors, generators, alternators, industrial storage batteries, and hydraulic and pneumatic electrical control systems |  | **X** |
| Read and interpret drawings, circuit diagrams, and electrical code specifications to determine wiring layouts for new or existing installations | **X** | **X** |
| Troubleshoot, maintain, and repair industrial, electrical, and electronic control systems and other related devices |  | **X** |
| Operate and program PLCs (programmable logic computers) |  | **X** |
| Install, examine, replace, or repair electrical wiring, receptacles, switch boxes, conduits, feeders, fibre-optic and coaxial cable assemblies, lighting fixtures, and other electrical components | **X** | **X** |
| Conduct preventive maintenance programs and keep maintenance records | **X** | **X** |
| May install, maintain, and calibrate industrial instrument- ation and related devices |  | **X** |
| Install conduits, tubing, and cable trays for wires and cables | **X** | **X** |
| Maintain, repair, install, and test switchgear, transformers,  switchboard meters, regulators, and reactors |  | **X** |

|  |  |  |
| --- | --- | --- |
| **Duty** | **Construction Electrician** | **Industrial Electrician** |
| Install brackets and hangers to support electrical equipment | **X** | **X** |
| Install, replace, and repair lighting fixtures and electrical control and distribution equipment, such as switches, relays, and circuit breaker panels | **X** | **X** |
| Splice, join, and connect wire to fixtures and components to form circuits | **X** | **X** |
| Troubleshoot and isolate faults in electrical and electronic systems and remove and replace faulty components | **X** | **X** |
| Connect electrical power to audio and visual communication equipment, signalling devices, and heating and cooling systems | **X** | **X** |