Board/Authority Authorized Course Framework Template

School District/Independent School Authority Name: Chilliwack School District	**School District/Independent School Authority Number (e.g. SD43, Authority #432):** SD33
Developed by: Curtis Tieu	**Date Developed:** November 9, 2017
School Name: Chilliwack Secondary School	**Principal's Name:** Brian Fehlauer
Superintendent Approval Date (for School Districts only):	**Superintendent Signature (for School Districts only):**
Board/Authority Approval Date:	**Board/Authority Chair Signature:**
Course Name: Construction Electrical 10	**Grade Level of Course:** 10
Number of Course Credits: 4	**Number of Hours of Instruction:** 120

Board/Authority Prerequisite(s)/Co-requisite(s):

Science 10, math 10 foundations or applied workplace math 11, physics 11,

Special Training, Facilities or Equipment Required:

Access to keyed switch control power outlet (already in place), 4' x 5' mock walls for student labwork (wood studs 16" on center), portable power hand tools, hand tools and electrical diagnostic tools (already in place)

Course Synopsis:

This course is designed to give students the opportunity to explore the field of construction electrician with focus on residential wiring. Students are introduced to the practices, procedures, and safety necessary for success in Electrical Trades. Construction Electricians plan, design, assemble, install, alter, repair, inspect, verify, commission, connect, operate, maintain and decommission electrical systems.

Goals and Rationale:

The primary goal of Construction Electrical 10 is to help students prepare for the transition from secondary school to the world of work and to post-secondary Construction Electrician programs (Partnership with UFV in progress). Students have the opportunity to observe and practice the technical and applied skills relating to electrical occupations. Construction Electrical 10 is a theory course to help students improve their math and physics skills in circuit analysis with Ohm's Laws, improve technical data comprehension skills with site blueprints, improve technical skills in using technology and meters used in troubleshooting, introduce electrical codes and safety in the field, and ultimately prepare students to write exams for certification.

Some benefits the Construction Electrical Program offers include the following:

- Develop skills and knowledge of an occupation for future career choices
- Create local contacts and references through the district secondary school apprenticeship program
- Create possible future employment opportunities, job experience and portfolio
- Safety awareness
- Connect what is learned in the classroom with the skills, knowledge and attitudes needed in the workplace
- Gain the knowledge, skills, and attitudes needed to be successful in the world of work
- Understand the similarities and differences in behaviour standards between the workplace and school

Organizational Structure:

Unit #	Title	Time Hours
Unit 1	Exploring ITA (Industry Trade Authority) and Secondary School Apprenticeship Program	2
Unit 2	Essential Skills (Physics and Math)	16
Unit 3	Blue prints and Schematics	5
Unit 4	Safety, Tools, Materials (cable types & gauges, gang boxes, fasteners, electrical devices, service panels)	16
Unit 5	Circuit Concepts, Residential Wiring labwork, Series and Parallel Circuits	32
Unit 6	Meters and Magnetism	16
Unit 7	DC Circuit Analysis (Series & Parallels)	24

Unit 8	Constructing electrical systems & CEC (Canadian Electrical Codes)	9

Total Hours: 120

Unit/Topic/Module Descriptions:

Unit 1: Exploring ITA (2 hours) Students explore the Industry Training Authority website to learn what apprenticeships are available, how to apply for an apprenticeship, and what the benefits are when you undertake the apprenticeship program. In addition to this, students learn about the responsibilities of an apprenticeship sponsor, the difference between BC Certified Trades and Red Seal trades, as well as the potential tax credits and grants available to those registered in an apprenticeship program. Guest speakers: school district coordinators

Unit 2: Students will be introduced to the math and physics content required to be successful at post-secondary level training in Construction Electrician Apprenticeship programs. Estimated two weeks of content and quiz assessments

Unit 3: Students will be introduced to construction blue prints, and electrical drawings and designation on blue prints. Estimated one week of content and quiz assessments

Unit 4: Students will be introduced to electrical safety, workplace safety, and electrical components associated with the installation of electrical systems in residential wiring. Estimated two week of content and quiz assessments

Unit 5: Students will be performing electrical installations on mock walls to ensure proper and safe practices to code. Students will be working on various room scenarios and electrical wiring to demonstrate series and parallel wiring, wire gauge and breaker loads. Estimated four weeks of lab work.

Unit 6: Students will be introduced to electrical diagnostic meters and measurement tools and relations of electricity and magnetism. Estimated two weeks of content and quiz assessments

Unit 7: Students will be introduced to DC circuit analysis and Ohm's Law to determine corresponding voltage, current, resistance, and power dissipation. Estimated three weeks of content and quiz assessments

Unit 8: Students will be introduced to Canadian Electrical Code book. Assessment through workbook and practice exercises

Aboriginal Worldviews and Perspectives:

Evaluate the personal, social, and environmental impacts, including unintended negative consequences, of the choices they make about technology use

Evaluate how the land, natural resources, and culture influence the development and use of tools and technologies

BIG IDEAS

Social, ethical, and sustainability considerations impact design.	Complex tasks require the sequencing of skills.	Complex tasks require different technologies and tools at different stages.

Learning Standards

Curricular Competencies	Content
Students are expected to do the following: Applied Design Understanding context • Engage in a period of research and empathetic observation in order to understand design opportunities Defining • Choose a design opportunity • Identify potential users and relevant contextual factors • Identify criteria for success, intended impact, and any constraints Ideating • Take creative risks in generating ideas and add to others' ideas in ways that enhance them • Screen ideas against criteria and constraints • Critically analyze and prioritize competing factors, including social, ethical, and sustainability considerations, to meet community needs for preferred futures • Choose an idea to pursue, keeping other potentially viable ideas open Prototyping • Identify and use sources of inspiration and information • Choose a form for prototyping and develop a plan that includes key stages and resources • Evaluate a variety of materials for effective use and potential for reuse, recycling, and biodegradability • Prototype, making changes to tools, materials, and procedures as needed	This "course" is made up of one or more of the modules listed below. Modules are chosen and locally developed modules are offered in addition to, or instead of, the modules in the provincial curriculum to be in line with post-secondary programs for appropriate transition. Construction Electrical *Students are expected to know the following:* • Ohm's law • electrical theory using parallel and series circuits • production of simple circuits from schematic drawings • measurement using diagnostic and testing instruments • function and application of components • construction sequences involved in making a working circuit • function and use of hand tools and operation of stationary equipment • cases for enclosing a circuit • drafting technique, including dimensioning and standards • ways of decreasing production costs through training and technological advancement • evolving consumer needs and wants • relationships between technology and social change

• Record iterations of prototyping Testing • Identify sources of feedback • Develop an appropriate test of the prototype • Conduct the test, collect and compile data, evaluate data, and decide on changes • Iterate the prototype or abandon the design idea Making • Identify and use appropriate tools, technologies, materials, and processes for production • Make a step-by-step plan for production and carry it out, making changes as needed • Use materials in ways that minimize waste Sharing • Decide on how and with whom to share their product and processes • Demonstrate their product to potential users, providing a rationale for the selected solution, modifications, and procedures, using appropriate terminology • Critically evaluate the success of their product, and explain how their design ideas contribute to the individual, family, community, and/or environment • Critically reflect on their design thinking and processes, and evaluate their ability to work effectively both as individuals and collaboratively in a group, including their ability to share and maintain an efficient co-operative work space • Identify new design issues Applied Skills • Demonstrate an awareness of precautionary and emergency safety procedures in both physical and digital environments • Identify the skills and skill levels needed, individually or as a group, in relation to specific projects, and develop and refine them as needed Applied Technologies • Choose, adapt, and if necessary learn about appropriate tools and technologies to use for tasks • Evaluate the personal, social, and environmental impacts, including unintended negative consequences, of the choices they make about technology use	• standards compliant technology • ethical, moral, and legal considerations and regulatory issues • recycling and repurposing of materials • energy transmission and applications • alternative energy sources • manuals as information sources • techniques for adjusting plans and drawings

• Evaluate how the land, natural resources, and culture influence the development and use of tools and technologies	

Big Ideas – Elaborations

Curricular Competencies – Elaborations

• research: seeking knowledge from other people as experts (e.g., First Peoples Elders), secondary sources, and collective pools of knowledge in communities and collaborative atmospheres
• empathetic observation: aimed at understanding the values and beliefs of other cultures and the diverse motivations and needs of different people
• Defining: setting parameters
• constraints: limiting factors such as task or user requirements, materials, expense, environmental impact, issues of appropriation, and knowledge that is considered sacred
• Ideating: forming ideas or concepts
• sources of inspiration: may include experiences; traditional cultural knowledge and approaches, including those of First Peoples; places, including the land and its natural resources and analogous settings; and people, including users, experts, and thought leaders
• plan: for example, pictorial drawings, sketches, flow charts
• iterations: repetitions of a process with the aim of approaching a desired result
• sources of feedback: may include peers; users; keepers of traditional cultural knowledge and approaches, including those of First Peoples; and other experts
• appropriate test: consider conditions, number of trials
• technologies: things that extend human capabilities
• share: may include showing to others, use by others, giving away, or marketing and selling
• product: for example, a physical product, a process, a system, a service, or a designed environment

Content – Elaborations

Construction Electrical

• virtual creation: layout and planning of a project, creating plans for a model
• components: power source, conductor, load
• electrical components: for example, switches, receptacles, breakers, service panels, conductors, detectors, sensors, fixtures, contactors, regulators
• Ohm's law: describes how power, voltage, current, and resistance are related: V=IR
• input/output devices: for example, motion, sound, light, infrared

Recommended Instructional Components:

Recommended Assessment Components: Ensure alignment with the Principles of Quality Assessment

Learning Resources: Electrical Apprenticeship program Level 1 workbook, Canadian Electrical Code Reference Book
Electrical wiring residential workbook, Electrical wiring commercial workbook, Electrical wiring industrial workbook, Industrial Motor Control Reference book

Additional Information: Maximum enrolment 24 students per block