

Construction Technology 12

At a Glance

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Construction Technology 12

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Overview

Construction Technology 12 introduces learners to building materials, processes, and tools typical of the Construction Industry, while providing opportunities for critical thinking and skill development through designing and building various construction projects. This course provides learners with a safe environment to gain technical knowledge and develop skills related to carpentry, electrical, heating, cooling, and plumbing systems for residential construction. Reading construction drawings, learning construction terminology, interpret building codes and regulations, and apply mathematical skills in both imperial and metric will strengthen literacy and numeracy skills in other subject areas while demonstrating practical applications of these skills. Learners will develop safe work habits as they gain hands-on experience using a variety of materials, processes, tools, and equipment constructing projects. Exposure to economic, environmental, and societal issues related to construction technology, including modern perspectives on energy efficient materials and design will benefit all learners. Exploration of post-secondary pathways and career pathways, including entrepreneurship opportunities, will help learners make informed decisions about their future.

The six modules in this course have been designed to help learners develop practical knowledge and skills in relation to construction technology. There is flexibility as to how the modules can be explored based on the materials and space available at school sites, as well as the specific interests of learners. Although each module is required to be completed over the course of the semester there is flexibility with how teachers can select, combine, and organize the outcomes and related indicators. Teachers will be able to identify how to best scaffold skill development with their learners while also engaging in an authentic order for construction as found in industry

Orientation: Learners will implement safety practices in the construction technology lab

Orientation

Rationale

The safety indicators in this Module are intended to introduce learners to techniques that increase their ability to work safely by improving their ability to identify unsafe situations and practices.

Development of conscious safety awareness requires specific instruction and practice to naturalize safety sense and therefore safety programs with specific focus will be explored and, in some cases, certification will be available upon successful completion. Careers related to safety as well as workers' rights related to safety will be explored. SafetyNet training will be completed, and the proper use of construction tools will be practiced while performing system assembly.

Competencies

- Citizenship (CZ)
- Communication (COM)
- Critical Thinking (CT)
- Personal Career Development (PCD)
- Technological Fluency (TF)

Indicators

- **Select** safety related certification programs to complete (COM, CT)
- **Investigate** the safe use of measuring and layout tools (COM, CT, TF)
- **Apply** safe practices for self, others, and the learning environment (COM, CT, PCD)
- **Analyse** the impact of safety regulations on the rights of workers (COM, CT)

Concepts (and Guiding Questions)

Safety Certification

- How do I enroll in First aid or WHMIS?
- How do I select an appropriate fall protection course provider?
- Where do scaffolding courses take place?
- How can I complete a ladder safety course?

Measuring and Layout Tools

- How does accurate use of layout and measuring tools help me be safe in my work?
- How do I select the best measuring and layout tools for a specific job?

Using Hand and Power Tools

- How am I using hand and power tools during a project?
- How can I use SafetyNet training to learn more about lab and tool safety?
- How can following SafetyNet help keep me safe?
- What are some ways to help me improve my ability to use tools safely and accurately?
- How do I select the best tool for the job?

Safe Practices

- How am I using hand and power tools during a project?
- How can I use SafetyNet training to learn more about lab and tool safety?
- How can following SafetyNet help keep me safe?
- What are some ways to help me improve my ability to use tools safely and accurately?
- How do I select the best tool for the job?

Safety Regulations

- Where can I find information about construction related safety regulations?
- How are safety regulations enforced?
- What construction related safety careers might interest me?
- How does the Occupational Health and Safety act protect me?

Skills

Implement

Select- Locate several relevant and dependable details to support an answer

Plan- Identify a topic of interest; brainstorm ideas; choose, prioritize, and refine ideas; evaluate choices. Devise a process to solve the problem. Execute the steps, modifying as necessary.

Evaluate- Review processes and results from an inquiry. Critically examine and communicate varying perspectives and alternative solutions or findings. Identify potential new problems and/or issues. Justify decisions and/or findings.

Apply- Carry out, use, or complete a procedure/ technique

Select

Locate several relevant and dependable details to support an answer

Investigate

Ask and revise questions; locate several relevant and dependable details to support an answer; organize and compare details; identify relationships, recognize represented perspectives, and communicate findings.

Apply

Carry out, use, or complete a procedure/ technique

Analyse

Gather and select appropriate information; determine accuracy, validity, and relevance of the information; consider the implications of the information from multiple perspectives; communicate findings.

Learners will construct a wood frame system safely and accurately using appropriate construction materials, tools, and processes

Construction

Rationale

Most homes in Nova Scotia are built using standard wood frame platform construction materials and methods and introducing learners to these will help them gain an appreciation for the built environment they interact with every day. The historical evolution, complexity of design, materials, fasteners, tools, and assembly methods used in modern framing will be put into practice. Distinction between load bearing and non-load bearing, sheathing material, insulation, and vapour barriers will be incorporated into finished framing projects to gain an understanding of complete assembly system design.

Competencies

- Communication (COM)
- Creativity and Innovation (CI)
- Critical Thinking (CT)
- Technological Fluency (TF)

Indicators

- **Formulate** a framing detail plan to support a built project (COM, CI, CT)
- **Evaluate** the impact of construction choices on project costs (CT, CI)
- **Apply** construction techniques and tools to carry out a plan (CT, TF)
- **Apply** related finishing techniques for a construction project (CT, TF)

Concepts (and Guiding Questions)

Framing Detail Plan

- How do I use a plan to support a built project?
- How can I interpret meaning from a plan drawing in order to produce one of my own?
- How can I create a plan that communicates floor layout and framing details?
- What construction systems will we use to build our projects?
- What are the essential elements of construction plan drawings?
- What is the best type of drawing to represent the details of my project?

Construction Choices

- How can I create an estimate for a project?
- How can I prepare for a difference in estimated and actual costs?
- What is the effect on projects costs by selecting various window types and sizes, doors, and flooring?
- How can accurately reading plans save money?
- What are some cost benefits in using a complete construction system?

Construction Techniques and Tools

- What are safety requirements for metal roofing vs. asphalt shingles?
- How do I use construction tools to perform various techniques?
- How do I know what tools to choose?
- What are the advantages and disadvantages of various tools (e.g., battery vs corded tools, electric vs air tools, etc.)?
- How do I install various materials (e.g., insulation, moisture barriers, wooden shingles, vinyl siding, rafters, trusses, flashings, etc.)?

Finishing Techniques

- How is drywall installed and repaired?
- What methods are used for painting?
- How can I apply caulking?
- How is trim and molding cut and installed?
- How is flooring installed?

Skills

Construct

Identify a purpose; brainstorm ideas; gather and select information to support a plan; identify and choose options within the plan; offer reasons to support choices; build a model; test and revise, modify as necessary; evaluate the results at each stage of the process; consider alternative options

Formulate

Identify a topic of interest; brainstorm ideas; choose, prioritize, and refine ideas; evaluate choices.

Evaluate

Review processes and results from an inquiry. Critically examine and communicate varying perspectives and alternative solutions or findings. Identify potential new problems and/or issues. Justify decisions and/or findings.

Apply

Carry out, use, or complete a procedure/ technique

Learners will evaluate the possible success of building sites

Site Prep and Excavation

Rationale

Evaluating the success of possible construction sites is done in consideration of a variety of factors including impact on the local community and overall cost of the project. Following meaningful consultation, learners explore factors which may influence the ultimate success of a building project including identifying, prioritizing, and analysing factors such as zoning, drainage, purchase price, water and sewer service availability, orientation, access, subgrade material and climate.

Competencies

- Citizenship (CZ)
- Communication (COM)
- Creativity and Innovation (CI)
- Critical Thinking (CT)

Indicators

- **Investigate** the impact of zoning bylaws (COM, CT)
- **Compare** possible materials and types of foundations for a given construction site (CT, CI)
- **Investigate** the process of building approval (COM, CT)
- **Analyse** how future building projects will impact the community (CZ, COM, CT)

Concepts (and Guiding Questions)

Zoning Bylaws

- How do I use a zoning bylaw to inform a build?
- Why are zoning bylaws in effect?
- How could I modify a plan to be in compliance with zoning bylaws?
- How do zoning bylaws impact site use such as drainage, orientation of lot, distance from property line, driveway, waterways, power lines, etc.?

Materials and Foundations

- How does the construction site ground inform the types of foundations possible?
- How could I determine the most effective foundation type to mitigate future problems (i.e.- radon, ground and surface water, erosion, uneven elevation, etc.)?
- How does the site environment and drainage inform the types of materials to be used?

Building Approval

- What information is necessary to apply for a building permit?
- How do I know if a building permit might be successful?
- How do I determine if a building permit is required for a specific project?
- How do I know if a site needs engineering approval or has property covenants?

Community impact

- What must be considered in site selection for a construction project?
- How will people in the area be impacted by the future build?
- How do I know who to consult with before building at a specific site?
- Why is community consultation necessary when in the process of site selection?
- How do I know when I have a duty to consult with local indigenous communities?
- How do I meaningfully consult with individuals, communities, and stakeholders?

Skills

Evaluate

Review processes and results from an inquiry.
Critically examine and communicate varying perspectives and alternative solutions or findings.
Identify potential new problems and/or issues.
Justify decisions and/or findings.

Investigate

Ask and revise questions; locate several relevant and dependable details to support an answer; organize and compare details; identify relationships, recognize represented perspectives, and communicate findings.

Compare

Make observations; identify similarities and differences; identify relationships and offer an interpretation; communicate the findings

Analyse

Gather and select appropriate information; determine accuracy, validity, and relevance of the information; consider the implications of the information from multiple perspectives; communicate findings

Learners will create simple residential electrical circuits according to the electrical code

Electrical Systems

Rationale

In a society that relies so heavily on electricity learners need a basic understanding of how electricity is generated, distributed, and used to help them become more responsible consumers. The wiring of residential switches, plugs, panels, and devices such as smoke detectors and fans will help learners understand the design and planning required to safely install them into a building system. Safety practices must be followed and reinforced when checking circuits for continuity. Creating electrical drawings and troubleshooting electrical problems will reinforce learner knowledge and problem-solving skills. The safe use and typical maintenance of tools of the electrical trade will reinforce learning in a meaningful way. Exploration of electrical circuits must be done with safety checks in place.

Competencies

- Communication (COM)
- Creativity and Innovation (CI)
- Critical Thinking (CT)
- Personal Career Development (PCD)
- Technological Fluency (TF)

Indicators

- **Investigate** processes used for residential wiring (CI, CT)
- **Analyse** how electrical drawings are used in planning for electrical requirement (COM, CI, CT)
- **Problem Solve** ways to make electrical circuits work (CT, TF)
- **Investigate** employment opportunities in relation to electrical work (COM, PCD)

Concepts (and Guiding Questions)

Residential Wiring

- How is the electrical code used to inform practice?
- How do I wire a two-way switch vs a three-way switch?
- How do I determine the appropriate wire gauge needed?
- How can I safely wire devices with specific requirements like smoke detectors, carbon monoxide detectors?

Electrical Drawings

- How do I calculate electrical loads in relation to circuit requirements?
- How can I use an electrical drawing to troubleshoot potential problems?
- How do I incorporate location requirements for safety devices?

Electrical Circuit Solutions

- What questions can I ask to help me understand problems in an electrical circuit?
- What information can I gather from an electrical circuit to help determine a problem?
- How can I modify a circuit to fix a problem?
- How do I know if my modifications worked?

Electrical Employment Opportunities

- How do I become certified to do electrical work?
- What are different types of electrical specialties and careers (i.e.- Utility line worker, industrial, construction, etc.)
- What are the apprenticeship paths to becoming a Journeyman in Nova Scotia?
- What are entrepreneurship opportunities for electrical work?

Skills

Create

Develop an idea; communicate a representation for a process and/or a product; produce a product; modify as necessary; evaluate results and/or modifications.

Investigate

Ask and revise questions; locate several relevant and dependable details to support an answer; organize and compare details; identify relationships, recognize represented perspectives, and communicate findings.

Problem Solve

Question-Independently and collaboratively generate questions in response to complex problems and/or issues. Choose and develop a specific question to investigate.

Analyse- Gather and select appropriate information; determine accuracy, validity, and relevance of the information; consider the implications of the information from multiple perspectives; communicate findings

Plan- Identify a topic of interest; brainstorm ideas; choose, prioritize, and refine ideas; evaluate choices. Devise a process to solve the problem. Execute the steps, modifying as necessary.

Evaluate- Review processes and results from an inquiry. Critically examine and communicate varying perspectives and alternative solutions or findings. Identify potential new problems and/or issues. Justify decisions and/or findings.

Learners will create a residential plumbing system according to the plumbing code

Plumbing Systems

Rationale

Healthy societies require efficient and safe water supply systems and wastewater disposal systems. Residential plumbing fixtures are familiar to all learners but how they are installed or how they function may not be. Creating plumbing drawings using proper symbols and terminology will support learning in literacy, mathematics, and the physics of fluid dynamics. Learners will learn to safely use plumbing trade tools and materials while creating functional residential plumbing systems.

Competencies

- Communication (COM)
- Creativity and Innovation (CI)
- Critical Thinking (CT)
- Personal Career Development (PCD)
- Technological Fluency (TF)

Indicators

- **Investigate** processes used for residential plumbing (CI, CT)
- **Analyse** how plumbing requirements impact the development of schematic diagrams (COM, CI, CT)
- **Apply** a pressure test to a plumbing system (COM, TF)
- **Investigate** employment opportunities in relation to plumbing work (COM, PCD)

Concepts (and Guiding Questions)

Residential Plumbing

- How is the plumbing code used to inform practice?
- How and when can we use science principles with the flow of liquid?
- How can I determine the difference between supply and waste systems?
- What factors should be considered when selecting the appropriate type of piping for a job?
- How do you prevent water hammer?

Plumbing Drawings

- What is the advantage of using plumbing symbols when drawing plumbing systems?
- How is the plumbing code used to inform practice?
- How can I modify my drawings to account for new information?

Pressure tests

- How do I pressure test a system?
- How do I troubleshoot a problem?
- How can I use calculations to predict possible issues with a plumbing system?
- Why is pressure testing performed after installation of a plumbing system?

Plumbing Employment Opportunities

- Why does society need plumbers?
- How do we create green plumbing systems?
- How has plumbing changed through the years?
- How is the environment affected by plumbing?

Skills

Create

Develop an idea; communicate a representation for a process and/or a product; produce a product; modify as necessary; evaluate results and/or modifications.

Investigate

Ask and revise questions; locate several relevant and dependable details to support an answer; organize and compare details; identify relationships, recognize represented perspectives, and communicate findings.

Apply

Carry out, use, or complete a procedure/ technique

Learners will evaluate the use of modern or alternative construction practices related to energy efficiency

Energy Efficiency

Rationale

Energy efficient housing design is not only important from a construction and maintenance cost perspective but also from an environmental and ergonomic comfort. Building designs and building materials are constantly being improved and exposure to current trends will help make our learners more creative and better-informed consumers. Balancing and analysing the pros and cons of various products and designs will help reinforce critical thinking skills in our learners.

Competencies

- Communication (COM)
- Creativity and Innovation (CI)
- Critical Thinking (CT)
- Personal Career Development (PCD)

Indicators

- **Compare** efficiency in a variety of building products and materials (CI, CT)
- **Investigate** the installation processes for various energy efficient products (COM, PCD)
- **Analyse** the impact of choices made during site prep and planning (COM, CT)
- **Compare** employment opportunities in relation to energy efficiency (COM, PCD)

Concepts (and Guiding Questions)

Product and Material Efficiency

- How do window and door choices impact the cost of selection and operation?
- Where can I find information about grant programs that support the use of energy efficient products and materials?
- How does ventilation layout and design influence efficiency and overall environmental health?
- How do I select an efficient insulation?

- How can I test and calculate the energy efficiency of a system?
- What are the financial and environmental impacts of various heating and cooling systems?

Installation Processes

- What factors must be considered when determining what energy efficient building materials can be used?
- How can I determine the minimum requirements for specific applications?
- How do the installation methods for similar products vary?

Site Prep and Planning

- How does glazing impact active and passive solar gain in a construction build?
- How does site orientation affect solar gain?
- How are residential energy efficiency and comfort linked?
- How can I determine the long-term health impacts of material choices?
- How can design choices remediate or prevent long term health impacts (i.e. Radon gas, allergens, etc.)?

Energy Efficiency Employment Opportunities

- What employment options are there for energy efficiency in Nova Scotia?
- How do jobs relating to energy efficiency interact with the various stages of construction?
- What opportunities could result from working to improve the energy efficiency of a construction build or renovation?

Skills

Evaluate

Review processes and results from an inquiry. Critically examine and communicate varying perspectives and alternative solutions or findings. Identify potential new problems and/or issues. Justify decisions and/or findings.

Compare

Make observations; identify similarities and differences; identify relationships and offer an interpretation; communicate the findings

Investigate

Ask and revise questions; locate several relevant and dependable details to support an answer; organize and compare details; identify relationships, recognize represented perspectives, and communicate findings.

Analyse

Gather and select appropriate information; determine accuracy, validity, and relevance of the information; consider the implications of the information from multiple perspectives; communicate findings