

FIRST Instructor Robotics Shop Orientation and Safety Course

The purpose of this Safety Course is to build capacity in teachers and students that participate FIRST Instructional Learning Spaces. Teachers will become familiar with the safety procedures and safe use of a variety of tools and equipment normally found in a FIRST FRC team build space. Teachers will have access to relevant safety instruction materials, assessment and evaluation tools to track student participation.

Course development occurred through collaboration with school board offices, including Safety and Health, a College partner and FIRST Robotics Canada. Recipients conclude the course with receipt of a signed Certificate from all parties.

Purpose of sessions - building capacity and enabling teacher/coaches to lead FRC teams.

All participants of the Orientation / Safety Course will gain confidence, knowledge and understanding of Safe Operation and Protocols surrounding common equipment, processes and machinery found in an **FRC learning environment**.

Two Day Training Agenda

Day 1 Morning Session

- Role of **School Board** and **FIRST**
- Learning Goals - School Board Safety Protocols & Teacher Responsibilities - **FIRST** Safety Manual Hand Tools - Hand Cutting Tools

Day 1 Afternoon Session

- Band Saw, Drill Press, Intro to Lathe and Milling Machines
- Project introduction, and demonstrations, Project Material Preparation

Day 2 Morning Session

- Robots - Lathe and Mill review - Project Machining

Day 2 Afternoon Session

- Continued Project Machining - verification of “Look Fors”
- Clean up and Reflection

Participants will make connections with Guidelines, **FIRST**Robotics, [FIRSTSafety manual](#)

Overall & Specific Expectations that will be covered in this course

- applying knowledge and skills to create and maintain a safe learning environment required by FIRST Robotics teams: curriculum, material handling and selection, tool and equipment storage, supervision, safety standards, and practices that are respectful of the environment
 - creating and sustaining safe, healthy, equitable, and inclusive learning environments that honour and respect diversity
 - integrating environmentally respectful perspectives and practices
 - identifying and fabricating with various processes, types of materials
 - understanding the safe use of tools and equipment
 - promoting the safe, ethical and legal use of technology
 - developing and fostering student attitudes that ensure safe, ethical and legal practices in the use of technology
 - implementing safety strategies appropriate for the student
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- B3.3 demonstrate the safe and proper use of appropriate hand tools, machine tools, and equipment (e.g., files, wrenches, hack saws, electric drills, engine lathe, milling machine, planer, jointer, drill press, welder, soldering circuits and electrical components, 3D printer, electronic measuring devices; multimeter, autonomous control devices, batteries) during a manufacturing process or in the assembly or fabrication of a product;
 - D1. demonstrate an understanding of and compliance with the health and safety legislation, standards, and practices that are essential to the safe operation of a manufacturing facility;
 - D1.2 demonstrate good housekeeping practices in the work environment (e.g., cleaning up spills and leaks, keeping areas clean and clear of obstructions, properly organizing tools and equipment, properly marking component parts for assembly, inventory and storage);
 - D1.3 handle materials safely and appropriately in compliance with the information included in the Material Safety Data Sheets (MSDS) from the Workplace Hazardous Materials Information System (WHMIS);
 - D1.4 demonstrate an understanding of procedures to ensure safe and productive work practices in the manufacturing workplace (e.g., following procurement and installation guidelines and compliance, perform safety inspections and audits that include ergonomic considerations related to workshop layout and set-up, material handling, ease of movement, lighting, workstation set-up, handling, transportation and operation of robots, handling automated devices and components with stored energy; catapult, or robot projection device, pressurized pneumatic cylinders);

- D1.5 demonstrate the safe use of tools and equipment in compliance with safety manuals, instructions, and institutional requirements;
- D1.6 use proper ventilation and/or filtration systems to control air quality (e.g., to minimize the effects of welding fumes, plastic off-gassing, cutting-fluid misting, heat treating of metal, and high heat/energy related fumes from sources such as lasers, 3D printers);

Equipment Safety Areas of Focus

Student Conduct Agreement Form

Air Compressor

Arbor Press

Band Saw (1)

Band Saw (2)

Band Saw - Horizontal

Belt and Disk Sander

CNC Machines

Drill Press

Radial Arm Drill Press

Facility Emergency Procedures

General Housekeeping

Hand Tools

Lifting

Metal Lathe

Robotics

Vertical Milling Machine

Horizontal Milling Machine 1

Material Handling

Housekeeping and Storage

Safety Assignment # 1 – Room Inventory And Safety Identification

Safety Assignment # 2 – General Safety

Manufacturing Facilities Health And Safety Inspection Checklist

Sample Student Safety Record Card

Successful candidates will be able to demonstrate proficiency in the safe and proper use of:

- selecting appropriate materials for a manufacturing project
- selecting and using various hand and power tools appropriate to a manufacturing project
- selecting and using appropriate basic manufacturing equipment including: engine lathes, vertical and horizontal mills, drill presses, arbor presses, vertical and horizontal band-saws and Computer Numerical Control (for example, CNC Mill /Lathe, Routers, 3D Printers)

- selecting and becoming familiar with safety guidelines around the use of welding and cutting equipment including: oxy-fuel, plasma cutting, arc welding, MIG welding soldering equipment
- selecting and using appropriate sheet metal equipment including: shears, brake, rollers, formers and benders
- selecting and using tools which operate using compressed air
- understanding safety procedures when using robotics systems, drive trains and operation of robots, lifting robots, battery use