# IRC5 Programming I

Price - $2200.00 + tax, per student

Class starts at 8:30 on Monday ends at noon on Friday

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<th>End Date</th>
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CA-RoboticsTraining@abb.com
### IRC5 Programming II
Price - $2200.00 + tax, per student

**Class starts at 8:30 on Monday ends at noon on Friday**

*Prerequisite - Programming I or Welding*

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### IRC5 Electrical
Price - $2200.00 + tax, per student

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### IRC5 Programming I for Arc/MIG Welding
Price - $2200.00 + tax, per student

**Class starts at 8:30 on Monday ends at 16:30 on Thursday**

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**Price** - $2200.00 + tax, per student

**Class starts at 8:30 on Monday ends at noon on Friday**

**Prerequisite** - Programming I or Welding

### Robot Studio II

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**Price** - $2200.00 + tax, per student

**Class starts at 8:30 on Monday ends at noon on Friday**

**Prerequisite** - Robot Studio I

### SafeMove Pro

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**Price** - $1890.00 + tax, per student

**Start date and times vary**

**Prerequisite** - Programming I or Welding

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CA-RoboticsTraining@abb.com
### Service Canada

#### 2019 / 2020 Robotics Training Schedule

<table>
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### On-site Training

$3000.00 Per day + expenses.

**Robots cannot be in production during training**

**We can train a maximum of 3 students per robot controller**

**Robots available to rent for on-site training.**

### For Training Grant Information

- [https://www.yveslandryfoundation.com/](https://www.yveslandryfoundation.com/)

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## Robotics Course Descriptions

### Programming I

**The course goal is to teach students how to operate and program the robot using the teach pendant and Robot Studio Online**

**Prerequisites:** None

**Topics Include:**
- Safety precautions used while programming
- Operating controls and indicators on the robot controller
- Positioning the robot by use of joystick control
- Program modification techniques

**Course Objectives**
- Practice safety as it pertains to the robot system
- Run the robot system in manual mode and automatic mode
- Interpret and respond to event messages
- Load, create, save, delete, check and edit basic programs
- Verify robot synchronization using a calibration routine
- Create and define a tool center point, using the 4 point method
- Use movement instructions in a basic program
- Use input and output instructions in a basic program
- Create routines, and use routine instructions
- Use decision making instructions in a basic program
- Use registers and math instructions in a basic program
- Use Teach Pendant communication instructions
- Use time instructions in a basic program
- Use offsets for movement instructions
- Use work objects for position reference
- Understand and update revolution counters

**Student Profile**
- For personnel responsible for starting and operating the robot, creating programs and editing programs

### Programming II

**This course is for students who have completed IRC5 Programming I and who need a greater depth of knowledge. This course will lead to instructions in advanced programming features and techniques.**

**Prerequisites:** Programming I or Welding

**Topics Include:**
- Building and configuring robot software
- Online and offline program editing
- Advanced declarations of modules, routines, & data
- Programming with interrupts and traps
- Searching and program displacements
- Error handling, backward handling, and undo handling
- Advanced motion instruction

**Course Objectives**
- Create, configure, and download software
- Create and use Modules, routine, and data
- Create advanced tool center points
- Program search instructions
- Program error handling instructions
- Program interrupt instructions and traps
- Use joint configuration instructions
- Use motion control instructions

**Student Profile**
- This course is intended for students that have completed Programming I course but require greater knowledge of programming features.
- Suitable for system programmers or technicians with existing / developed programming skills
### IRC5 Arc/MIG Welding

**The goal of this course is to train the students to safely use the Flex Pendant to create weld programs, set and change weld data and edit existing programs.**

**Prerequisites:** GMAW training or similar

**Topics Include:**
- Safety precautions while programming the robot
- Operator controls and indicators on the Flex Pendant
- Correct positioning of the robot using the Flex Pendant
- Defining good TCP for Arc Welding application
- RobotWare Arc commands and functions
- Flex Pendant menus and displays for entry of weld data.
- Defining & editing seam data, weld data
- Creating, modifying and executing ArcWeld programs
- Weld error recovery & error handling
- Programming a weave of components of weave data
- Functions when program execution is stopped
- Seam tracking

**Course Objectives**
- Safely operate robot welding cell
- Create routines using proper structure
- Operate and use the “production manager” programs
- Perform and save system parameters
- Use the positioner to properly orient the part for welding
- Recognize and recover from the basic system errors

**Student Profile**
- Weld cell programmers and engineers

### IRC5 Electrical Maintenance

**To teach students how to identify the electrical components, theory of operation, and introduce proper troubleshooting procedures on the IRC5 robot controller. Approximately 50% of course is hands-on troubleshooting.**

**Prerequisites:** Familiarity of electronic test equipment

**Topics Include:**
- Theory of operation of the IRC5 robot controller
- Safety precautions used while troubleshooting
- Description of components in the IRC5 robot controller
- Principles of logical troubleshooting from power up through emergency stop loop and servo system
- Input / Output interfacing between the controller and peripheral equipment

**Course Objectives**
- Practice safety as it pertains to the robot system
- Identify and use the Flex Pendant
- Run the robot system in manual mode and automatic mode
- Interpret and respond to event messages
- Identify different parts of the robot modules and arm
- Load system software
- Troubleshoot Power ON circuits
- Troubleshoot computer and drive system to a board level
- Troubleshoot Motors ON / Run Chains circuits
- Troubleshoot the Motors, brakes, and resolvers
- Configure an input device and an output device to the robot

**Student Profile**
- Industrial electricians
- Electrical service technicians
- Supervisory personnel
## SafeMove I

*Students learn how to configure a high safety level in the robot system using the advanced features of SafeMove.*

*The certification exam (both written and practical) is administered by a certified ABB SafeMove Instructor*

### Prerequisites: Programming I

### Topics Include:
- System architecture
- Levels of supervision
- Hardware & software installation
- Proper configuration
- Testing the safety interlocks
- Verifying limit switch override & operation
- Verifying sync switch operation

### Course Objectives
- Observe the placement of the hardware
- Review the block diagram
- Review the capabilities and limitations
- Describe active supervision
- Describe passive supervision
- Describe wiring procedures for a relay
- Describe wiring procedures for a safety I/O block
- Describe wiring procedures for the panel unit inputs
- Install safety controller PCB
- Install SMB and command harnesses
- Use SafeMove wizard
- Create a safety group and user
- Create a password for the safety user
- Activate a configuration
- Verify the operation of a safety output
- Confirm the proper operation of the configuration

## SafeMove Pro

*Students learn how to configure a high safety level in the PLC.*

*The certification exam (both written and practical) is administered by a certified ABB SafeMove Instructor*

### Prerequisites: Programming I

### Topics Include:
- UAS Settings (Safety User)
- System description
- Software installation
- Software configuration
- Communication setup
- Safety signal configuration
- Safety functions Configuring
- Creating, modifying, downloading & uploading configuration file
- Safety configuration verification and validation
- Review the capabilities and limitations

### Course Objectives
- Install safety module in the main computer
- Install harness
- Navigate and use Visual SafeMove tool in RobotStudio efficiently
- Create a safety group and user
- Create a password for the safety user
- Add SafeMove Pro option into existing/new system
- Setup through CIP Safety or ProfiSAFE protocol
- Configure safe IO signals
- Configure function mappings
- Configure Stops (Auto, General and Emergency stops)
- Configure with geometries and speed supervision points
- Configure Safety Functions in Safe Ranges and Safe Zones
- Synchronize using both software and hardware option
# Robotics Course Descriptions

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<th>Course</th>
<th>Description</th>
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<tr>
<td><strong>Robot Studio I</strong></td>
<td>Students learn how to use the ABB Robot Studio 6 software for use with IRC5 Controllers. This class will cover everything the general user would need to know</td>
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<tr>
<td><strong>Prerequisites:</strong></td>
<td>Programming I</td>
</tr>
<tr>
<td><strong>Topics Include:</strong></td>
<td>Basic controls, Building a station, robot moves, Robot programs, Local origin, Tools, Task Frames, Auto path features</td>
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<tr>
<td><strong>Course Objectives</strong></td>
<td>Start and utilize RobotStudio 6 Software, Create a simulation station, Create and attach tooling to robot simulation, Create robot motion &amp; programs, Create basic geometry modeling, Import external graphic files, Use the I/O simulator, Create work objects, Set local origin Set task frames, Use Auto Path feature, Use Signal Analyzer, Record simulations, Edit RAPID code using RAPID editor, <strong>Watch data values while simulation executes</strong>, Set-up and use Event Manager, Create simulation of real robot</td>
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| **Robot Studio II**  | Students learn how to use more advanced features of ABB Robot Studio 6 software for use the IRC5 Controllers. This course is an extension of the Robot Studio I course |
| **Prerequisites:**   | Robot Studio I                                                                                   |
| **Topics Include:**  | Smart Components, Multi Move, Conveyor Tracking, Screen Maker, Graphic Tools, Advanced Modeling, Mechanisms, Non-ABB external axis, System Builder, Code Snippets, Rapid Profiler |
| **Course Objectives**| Create simulations with interactive objects such as conveyors, in-feeders, grippers, and more, Create simulations and program multiple robot applications, Setup and program conveyor tracking, Use graphic tools to change lighting, textures, and the look of objects, Create complex 3 dimensional objects, Create objects that move in simulations other than robots, Create external axis that are not standard ABB axes, Use System Builder to create virtual robot systems, Advanced RAPID editing techniques |