# Table of Contents

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>What We Offer</td>
<td>1</td>
</tr>
<tr>
<td>Maintenance &amp; Development Courses</td>
<td>2</td>
</tr>
<tr>
<td>Usage &amp; Maintenance</td>
<td>2</td>
</tr>
<tr>
<td>Intensive Maintenance</td>
<td>3</td>
</tr>
<tr>
<td>PMC &amp; Ladder Maintenance</td>
<td>4</td>
</tr>
<tr>
<td>FANUC CO₂ Laser</td>
<td>4</td>
</tr>
<tr>
<td>FANUC αi Servo</td>
<td>5</td>
</tr>
<tr>
<td>Advanced PMC Maintenance &amp; Programming</td>
<td>6</td>
</tr>
<tr>
<td>FANUC Picture Development</td>
<td>7</td>
</tr>
<tr>
<td>Programming Courses</td>
<td>8</td>
</tr>
<tr>
<td>G-Code Programming &amp; Operations</td>
<td>8</td>
</tr>
<tr>
<td>MANUAL GUIDE i Programming</td>
<td>9</td>
</tr>
<tr>
<td>Custom Macro B Programming</td>
<td>10</td>
</tr>
<tr>
<td>Online Training Courses</td>
<td>11</td>
</tr>
<tr>
<td>Usage &amp; Maintenance</td>
<td>12</td>
</tr>
<tr>
<td>Mill &amp; Lathe Programming, Setup &amp; Operation</td>
<td>12</td>
</tr>
<tr>
<td>Parametric Programming</td>
<td>13</td>
</tr>
<tr>
<td>CNC System Integrator Basic Training</td>
<td>13</td>
</tr>
<tr>
<td>Dual Check Safety Principles</td>
<td>13</td>
</tr>
<tr>
<td>FANUC Maintenance Certification</td>
<td>14</td>
</tr>
<tr>
<td>FANUC Robotics Training</td>
<td>15</td>
</tr>
</tbody>
</table>
FANUC CNC Maintenance and Development courses are broken down into three levels. The Level I course, FANUC Usage & Maintenance, is ideal for people new to CNC operations or experienced professionals looking to enhance and expand existing troubleshooting skills with current technologies and capabilities. The Level II courses focus on maintenance features of the newest controls, troubleshooting on PMC and ladders, and lasers. The Level III courses are highly advanced and geared toward students who may need to develop new, or make major modifications to existing, applications.

FANUC offers two levels of programming courses. The Level I courses cover fundamentals of G-code programming, as well as conversational programming with courses on MANUAL GUIDE i for milling or turning. In the Level II course students learn to develop and troubleshoot custom macro programs that go beyond the limitations of G-code.

FANUC Maintenance Certification
FANUC America is launching the FANUC Maintenance Certificate Program. Students can earn two levels of certification by successfully completing courses covering a range of maintenance topics. More information on the FANUC Maintenance Certification Program can be found on page 14.

Hands-On Learning
Small class sizes allow for hands-on learning and individualized attention. Courses include customized training manuals and the use of simulation equipment to enhance the learning experience. Our expert instructors are highly experienced in technical instruction, the CNC industry and field service, and have received factory training at the FANUC Corporation headquarters in Japan.

Convenient Training Center Locations
Classes are offered at several FANUC locations across North America. Visit www.fanucamerica.com/cnctraining to see our training schedule and find out which courses will be held in your area. Each training center features comfortable modern classrooms, Wi-Fi availability and a complimentary lunch provided each day.

What We Offer

Courses can be customized & held at YOUR location
- Save on time and travel expenses
- Convenient and flexible training schedules available
- Content customization


Online Training
FANUC also offers a growing number of online training courses so students can learn at their own pace and on their own schedule. New courses will be added throughout the year so visit fanucamerica.com/cnctraining for the latest information.
Usage & Maintenance  
COURSE # TRCNC40-501 - 4 days  

Description:
The FANUC Usage and Maintenance course focuses on the essentials of CNCs and factory automation. This introduction will benefit students of all experience levels who work with FANUC CNCs in a variety of roles, including operators, maintenance professionals, supervisors and engineers.

Topics covered this course include:
- CNC screens and their purpose
- Memory backup and restore
- CNC, servo and spindle system hardware
- Troubleshooting CNC and servo alarms and general system failures
- Ladder logic and troubleshooting machine alarms and M-codes
- Introduction to G-code, part program structure and alarms

Course Benefits
FANUC America’s maintenance and development courses build upon the knowledge acquired in the Usage and Maintenance course. This course provides an excellent foundation so that students have the necessary knowledge and understanding to take higher-level courses. FANUC recommends that anyone who has not attended the Usage and Maintenance course or a similar introduction/refresher course in the past two years attend this course prior to taking any higher-level courses.

Prerequisites
None.

Who Should Attend
Students of all experience levels who work with FANUC CNCs in a variety of roles, including operators, maintenance professionals, supervisors and engineers.

Online Class Available!
Usage & Maintenance  
COURSE # TRCOLM-195
Intensive Maintenance
COURSE # TRCNC40-601 - 4 days

Description:
The Intensive Maintenance course was developed for maintenance professionals who are highly experienced with FANUC CNCs. This course will improve knowledge of system features and enhance existing troubleshooting skills while demonstrating the latest maintenance features of FANUC’s controls.

Topics covered in these courses include:
- In-depth CNC parameter and diagnostic explanation
- Setup of DNC, Ethernet networking and remote access to the CNC
- Advanced CNC memory backup and recovery
- Servo Guide Mate, Maintenance Monitor, PMC Trace and many more built-in utilities
- Dual Check Safety, FANUC Serial Servo Bus, and several other system features
- Innovative alarm troubleshooting with the Failure Diagnosis Monitor and Smart Troubleshooting function

Course Benefits
This course offers extensive opportunities for independent hands-on exercises with simulation equipment. At the conclusion of the course, students will possess expanded troubleshooting skills and increased confidence in performing maintenance duties.

Prerequisites
Successful completion of the FANUC Usage & Maintenance course.

Who Should Attend
Maintenance, application and support professionals.

Contact Us
For questions call FANUC America technical training at 888-FANUC-US (888-326-8287) select 2→4, or go to www.fanucamerica.com/cnctraining.

Student Feedback:
“This class clearly advanced my knowledge of solving actual problems that I will encounter on my control.”
- Ryan M.
Level II Maintenance Course
PMC & Ladder Maintenance  
COURSE # TRCNC40-298 - 4 days  
Description:  
The Programmable Machine Control (PMC) system is the interface between the FANUC CNC and the machine tool. This course covers the hardware components, software screens, troubleshooting tools and maintenance procedures to help students understand and effectively troubleshoot machine-side electrical interface failures. The course also provide an introduction to ladder editing and development. Suitable for maintenance, application and support professionals, this course provides a brief review of basic to intermediate operations and technology before focusing on more advanced technical instruction.  
Topics covered in this course include:  
- PMC screen navigation  
- Ladder and PMC parameter back-up and restoration  
- Advanced contact and coil logic  
- Complete sub-function explanations  
- Comparison of PMC software types and hardware models  
- Machine tool builder alarm/message and PMC system alarm troubleshooting  
- Introduction to ladder editing and development

FANUC CO₂ Laser  
COURSE # TRLAS50-202 - 5 days  
Description:  
The FANUC CO₂ Laser maintenance course is developed for industry maintenance personnel to complete their understanding of FANUC CO₂ laser maintenance issues.  
Topics covered in this course include:  
- Theory and safety  
- Daily inspection: laser gas specification, exhaust pump oil, turbo blower oil, laser output, cooling water  
- Periodic maintenance: mirror cleaning, change and alignment; filter change; O-ring change; oil change  
- Maintaining laser gas and laser cooling system  
- Conducting an oscillator vacuum leakage test  
- Performing laser oscillation to achieve discharge aging  
- Checking the laser beam mode, optical axis adjustment and the oscillation characteristics and output  
- Setting and adjustment: laser power supply, output coupler, rear and fold mirrors  
- Troubleshooting: error messages and countermeasures; laser power supply; internal gas leakage; indication of state by means of self-diagnostic function

Course Benefits  
This course provides extensive hands-on exercises with simulation equipment. At the conclusion of this course, students will process an expert level of application and maintenance knowledge.  

Prerequisites  
Successful completion of the FANUC Usage & Maintenance course.  

Who Should Attend  
Maintenance, application and support professionals.

Course Benefits  
At the conclusion of the course, students will have a complete understanding of the laser internal structure, operation and maintenance.  

Prerequisites  
Successful completion of the FANUC Usage & Maintenance course.  

Who Should Attend  
Factory maintenance professionals and laser machine operators.
Level III

FANUC αi Servo
COURSE # TRCNC40-295 - 4 days

Description:
This course explains in detail the hardware components that comprise the servo system, the parameters that control it, and how to troubleshoot and resolve issues with motor vibrations, part shape deviations and surface finish quality. Suitable for maintenance, application and support professionals, this course provides a brief review of basic to intermediate operations and technology before focusing on advanced technical instruction.

Topics covered in this course include:
- Review of current and previous amplifiers, motors and pulse coder technology
- Servo software configuration and parameter interaction
- Setting of positioning parameters
- Backlash and pitch error compensation
- Parameter adjustment to improve part quality
- Machine vibration elimination functions
- Servo tuning

Course Benefits
This course provides extensive hands-on exercises with simulation equipment. At the conclusion of this course, students will process an expert level of application and maintenance knowledge.

Prerequisites
Successful completion of the FANUC Intensive Maintenance course.

Who Should Attend
Maintenance, application and support professionals.

Student Feedback:
“Training cleared up many questions and provided a better understanding of the servo systems and the parameters associated with it.”
- David L.
Level III Servo Course

Contact Us
For questions call FANUC America technical training at 888-FANUC-US (888-326-8287) select 2, or go to www.fanucamerica.com/cnctraining.
Advanced PMC Maintenance & Programming

COURSE # TRCNC30-490 - 3 days

Description:
Building on knowledge acquired in the PMC & Ladder Maintenance course, students in this Advanced PMC class will utilize FANUC’s development software to create a fully-functional ladder from scratch. Maintenance professionals and ladder developers/integrators alike will benefit from the advanced topics covered. Using NCGuide and Ladder III, a sequence program controlling a machine’s operator panel, motors, and miscellaneous functions will be created while demonstrating nearly all of Ladder III’s functionality.

Topics covered in this course:
- Complete explanation and usage of FANUC Ladder III
- Demonstration of advanced functional instructions not covered in our PMC & Ladder course
- Multi-path programming and conversion of ladders to different CNC types
- Utilization of NCGuide as a rapid testing and development tool
- Introduction to function block and step sequence programming

Course Benefits
This course provides extensive hands-on usage of FANUC Ladder III. At the conclusion of the course, students will possess expert-level application and maintenance knowledge in the areas of controlling PMC logic flow, subprograms, function block programming and Ladder III.

Prerequisites
Successful completion of the PMC & Ladder Maintenance course.

Who Should Attend
Maintenance, support and application professionals.

Student Feedback:
I learned a lot. I’m confident I can do anything I need to with FANUC Ladder III now.
- John T.
Level III Maintenance Course

Contact Us
For questions call FANUC America technical training at 888-FANUC-US (888-326-8287) select 2►4, or go to www.fanucamerica.com/cnctraining.
FANUC Maintenance & Development Courses

Level III

FANUC Picture Development
COURSE # TRCNC30-491 - 3 days

Description:
This course will expose students to the features of FANUC’s custom CNC screen design software: FANUC Picture. Whether you need to create or modify a single CNC screen, or develop an entire Human-Machine Interface (HMI), this course is what you’ve been looking for. Using NCGuide as a testing environment, each student will create several custom screens that utilize each of FANUC Picture’s many tools, culminating in the creation of an HMI that replaces the physical operator panel with on-screen functions.

Topics covered in this course include:
- Setting up NCGuide to work with FANUC Picture
- Explanation and usage of each FANUC Picture screen design tool
- Introduction to FANUC Picture Scripting (similar to custom macro)
- Design guidance on duplicating the CNC’s soft key layouts
- How to reverse-engineer a previously completed FANUC Picture project

Course Benefits
At the conclusion of this course, students will be able to design and develop custom CNC screens to meet individual machine and process requirements.

Prerequisites
Completion of FANUC CNC Usage & Maintenance course is required; completion of the PMC & Ladder Maintenance course is preferred.

Who Should Attend
Machine tool builders, OEMs, retrofitters and integrators who want to enhance their machine tool applications.

Student Feedback:
“Instructor kept the class interesting and provided insight into real-world situations.”
- Scott W.
Level III Maintenance Course

Level III Maintenance Courses
FANUC Programming Courses

Level I

G-Code Programming & Operation
COURSE # TRCNC40-396 - 4 days

Description:
The FANUC G-code Programming & Operation course explores the fundamentals of G-code programming for milling and turning applications. After learning the purpose of various G-codes, students will create several programs to test their understanding.

Topics covered in this course include:
- Navigation and control features
- Basic positioning and cutting commands
- Work and tool offsets
- Canned cycles including multiple repetitive cycle commands

Course Benefits
At the conclusion of the course, students will be able to write part programs and have an understanding of machine setup.

Prerequisites
Successful completion of the FANUC Usage & Maintenance course.

Who Should Attend
Programmers of any experience level who wish to develop a better understanding of G-code programming.

Online Class Available!
Mill & Lathe Programming, Setup & Operation
Mill Programming COURSE # TRCOLP-312
Lathe Programming COURSE # TRCOLP-313
Level I

MANUAL GUIDE i Programming

Mill COURSE # TRCNC20-312 - 2 days
Lathe COURSE # TRCNC20-313 - 2 days

Description:
MANUAL GUIDE i is an on-screen programming tool for machining centers and lathes that allows the skilled machinist to easily create, edit and simulate the part program through a single integrated display. With MANUAL GUIDE i, the user can perform most operations from one screen that allows them to develop anything from a simple bolt hole pattern to a complex machined part. Two courses are offered - milling and turning. Each course will cover basic MANUAL GUIDE i configuration and part program development.

Topics covered in this course include:
- Screen navigation
- Conversational part program development
- Development and use of fixed form sentences and tool data
- Machining simulation (animated drawing)

Course Benefits
At the conclusion of each course, students will be able to develop entire part programs and configure tool data within MANUAL GUIDE i.

Prerequisites
Basic G-code programming and knowledge of materials and tooling.

Who Should Attend
Experienced programmers and machinists who wish to learn how to use MANUAL GUIDE i conversational programming or develop a better understanding of conversational programming software.

Student Feedback:
“Great class and instructor. I can’t wait to come back”
- Michael A.
Level II Programming Course

Contact Us
For questions call FANUC America technical training at 888-FANUC-US (888-326-8287) select 2•4, or go to www.fanucamerica.com/cnctraining.
Level II

Custom Macro B Programming

COURSE # TRCNC40-391 - 4 days

Description:
The Custom Macro B programming course provides practical instruction in the development and troubleshooting of macro programs. The fourth day provides enhanced troubleshooting scenarios and programming exercises.

Topics covered in this course include:
- Macro programming features of new control models
- Local, common and system variables
- Macro arithmetic commands
- Decisions and loops
- External output commands
- Interfacing macro commands with physical I/O

Course Benefits
At the conclusion of the course, students will be able to develop Custom Macro B programs to reduce cycle times, increase automation and improve efficiency of programming. They will also be able to read, troubleshoot and simplify existing programs.

Prerequisites
Successful completion of FANUC G- Code Programming & Operation course.

Who Should Attend
Experienced G-code programmers who wish to learn how to write programs that accomplish tasks beyond the limitations of G-code.

Student Feedback:
“I learned a good deal of new or more detailed information even though I have macro programming experience.”
- Glenn H.
Level II Programming Course

Contact Us
For questions call FANUC America technical training at 888-FANUC-US (888-326-8287) select 2•4, or go to www.fanucamerica.com/cnctraining.
Learn FANUC CNC programming, operation and maintenance at your own pace and on your own schedule. FANUC online courses include presentations, extensive documentation, quizzes and exercises, as well as support from an online instructor. Exercises are performed on NCGuide – FANUC CNC simulation software running on a PC. Most courses include a one-year NCGuide license, except CNC System Integrators Basic Training (full versions of NCGuide and Ladder III are required) and Dual Check Safety Principles (no software required).

For more information and complete list of course descriptions and prerequisites visit www.fanucamerica.com/cnctraining.
Usage & Maintenance
COURSE # TRCOLM-195

Description:
This online course focuses on the fundamentals of CNCs and factory automation. This course provides an excellent foundation and ensures students will have the necessary background knowledge before they take higher level courses. We recommend that anyone who has not attended Usage and Maintenance or a similar introduction/refresher course in the past two years complete this course prior to taking any higher-level courses.

Topics covered in this course include:
- CNC screens and their purpose
- Memory backup and restore
- CNC, servo and spindle system hardware
- Common alarms and troubleshooting
- Troubleshooting CNC alarms and general system failures
- Ladder logic and troubleshooting machine alarms and M-codes
- Introduction to G-code, part program structure and alarms

Prerequisites
None.

Requirements
Internet connection and a PC or tablet device.

Who Should Attend
The course material is suitable for students of all experience levels who work with FANUC CNCs in a variety of roles, including operators, maintenance professionals, supervisors and engineers.

Classroom Available!
Usage & Maintenance
COURSE # TRCNC40-501

Mill & Lathe Programming, Setup & Operation

Mill Programming
COURSE # TRCOLP-312
Lathe Programming
COURSE # TRCOLP-313

Description:
Learn what it takes to program, setup, and run a machining or turning center with a FANUC CNC. Each lesson builds upon prior material. Upon completion, graduates will be fully capable of operating a turning or milling CNC center.

Prerequisites
Basic understanding of machining practices.

Requirements
Internet connection and a PC or tablet device.

Who Should Attend
Mill or lathe operators with a basic understanding of machining practices as well as a familiarity with various cutting tools.

Classroom Available!
G-Code Programming & Operation
COURSE # TRCNC40-396

Contact Us
For questions call FANUC America technical training at 888-FANUC-US (888-326-8287) select 2, 4, or go to www.fanucamerica.com/cnctraining.
Parametric Programming  
COURSE # TRCOLP-391  
Description:  
Master custom macro programming for CNC machining and turning centers. Custom macro provides users countless benefits. Just about every facet of a CNC environment can be enhanced by incorporating methods afforded by custom macro. Students learn the benefits of custom macro application, and how to implement improvements when applications are found.

Prerequisites  
Basic understanding of machining practices and a general understanding of G-code programming.

Requirements  
Internet connection and a PC or tablet device.

Who Should Attend  
Machine operators with a general understanding of G-code level programming as it applies to CNC machining centers and turning centers.

CNC System Integrator Basic Training  
COURSE # TRCOLI-412  
Description:  
This 20-hour online course is for machine tool builders and integrators who want to learn how to get the most out of FANUC CNCs and improve their knowledge and skills when it comes to setting up and programming CNCs and servo motors. This course covers basic CNC; NCGuide and Ladder III software; servo and spindle set up; and system backup and restore.

Prerequisites  
Students should have some experience and familiarity with integrating FANUC CNCs and access to a CNC system for some sections of the course.

Requirements  
Internet connection and a PC or tablet device with access to the full versions of NCGuide and Ladder III software.

Who Should Attend  
Machine tool builders and integrators.

Dual Check Safety Principles  
COURSE # TRCOLM-421  
Description:  
Dual Check Safety is FANUC’s implementation of a Category 3 safety system and offers a high level of safety through redundant monitoring and duplicate paths of breaking power to the servo/spindle amplifier. This online presentation provides an overview of the four main safety principles that Dual Check Safety operates by, including dual channels of safe I/O; redundant cut-off of motor power; dual monitoring of safe I/O; and dual monitoring of servo and spindle motors.

Prerequisites  
None.

Requirements  
No additional software is required for this course, just an Internet connection and a PC or tablet device.

Who Should Attend  
Engineers who are designing with Dual Check Safety in mind and maintenance professionals who need to understand how it is implemented.
FANUC America now offers two CNC certification programs so that students can clearly communicate their accomplishments and employers can have confidence in their employees’ knowledge and abilities. Each level of certification affirms the student has successfully completed rigorous instruction in the operation, troubleshooting and maintenance of FANUC CNC systems.

FANUC Maintenance Professional Certification
This certification identifies individuals who are prepared to successfully mitigate a wide range of CNC operating challenges, including system failures. Students who have completed FANUC Usage and Maintenance, Intensive Maintenance and PMC Maintenance courses can receive certification as a FANUC Maintenance Professional. Students will receive a special certificate and are authorized to use the FANUC Maintenance Professional designation.

FANUC Maintenance Master Certification
Students with FANUC Maintenance Professional certification can continue their studies and earn FANUC Maintenance Master Certification. To achieve this advanced-level recognition, students must complete the Servo Maintenance, Advanced PMC Maintenance and Custom Macro B Programming courses. Students must complete FANUC Maintenance Professional Certification in order to receive FANUC Maintenance Master Certification.

Special packages are available if the required courses are purchased at the same time and completed in a two-year time frame.

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**The Professional Certification Package**

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<tr>
<td>FANUC Usage &amp; Maintenance (4 days)</td>
<td>$1800</td>
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<td>FANUC Intensive Maintenance (4 days)</td>
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<td>FANUC PMC &amp; Ladder Maintenance (4 days)</td>
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**The Master Certification Package**

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<tbody>
<tr>
<td>FANUC Alpha i Servo Maintenance (4 days)</td>
<td>$2400</td>
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<tr>
<td>FANUC Advanced PMC Maintenance &amp; Programming (3 days)</td>
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<td>FANUC Custom Macro B Programming (4 days)</td>
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For courses purchased as a package, if all courses are not completed within the two-year time frame, refunds are available for the purchase price less the full cost of the completed courses. All registered courses are subject to the standard FANUC CNC Training terms and conditions.
FANUC also provides robotics training courses covering a wide range of topics including Setup and Functionality, Operations and Programming, Electrical Maintenance and Disassembly and Reassembly. Over 25 professional instructors train more than 4,500 students per year, supported by instructional designers, technical writers, and computer-based training designers.

The state-of-the-art training facility in Rochester Hills includes:
- Eight classrooms and 22,000 square feet of training laboratory
- More than 45 robots for hands-on training
- Low student-to-robot ratio (the maximum recommended ratio of students to robot is 4:1)

Training sessions are also offered at FANUC regional offices, including: Cincinnati and Holland, Ohio; Charlotte, North Carolina; Chicago, Illinois; Decatur, Alabama; Lake Forest, California and Toronto, Canada. Students are provided with all necessary equipment and tools for use during hands-on training.

FANUC Robotics Training is an authorized provider of International Association for Continuing Education (IACET) and can issue CEU credit to students attending robot training classes. FANUC is committed to improving training, from developing web-based courses (eLearn) to improving training manuals to using robot software simulation during class for a better learning experience. For more information on Robotics training, visit www.fanucamerica.com/training.

FANUC Robot Training
PHONE: 888-FANUC-US Select 1, then 4
EMAIL: training.group@fanucamerica.com
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If any customer intends to, or shall, export (or re-export), directly or indirectly, any portion of the products, technology or software relating thereto, it is the responsibility of customer to assure compliance with United States and other export control laws and regulations and if appropriate, to secure any required export licenses or approvals in its own name.

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