

# School of Welding Engineering Technology

Northern's School of Welding Engineering Technology sets the standard for welding education in Canada. The curriculum is challenging but provides the student with a solid foundation of mathematics, science, metallurgy and welding process technology.

There is more to welding than making arcs and sparks. Welding engineering technologists combine their theoretical education in engineering with their hands-on experience with major welding processes and nondestructive examination equipment to work as knowledge professionals who from time to time get their hands "dirty."

Northern College's School of Welding Engineering Technology is leading the way in welding education with our recent approval as North America's first Authorized Training Body for the International Institute of Welding (IIW). Certification as an International Welding Technologist through the Canadian Welding Bureau (the authorized national body for the IIW) provides our technology graduates with job opportunities in 38 IIW member countries across the globe. Other plans for the School include the continued establishment of an independent applied welding research centre called Materials Joining Innovation Centre (MaJIC) at the Kirkland Lake Campus, which became operational in April 2008.

## Features and Highlights

- Earn certificates for classroom training for Nondestructive Examination methods. (Some restrictions may apply.)
  - Level I Radiography Inspection
  - Level II Magnetic Particle Inspection
  - Level II Liquid Penetrant Inspection
- Graduates of the Welding Engineering Technician program are eligible to qualify to CSA W178.2 as visual welding inspectors.
- Welding Engineering Technician and Technology programs are recognized by the Ontario Association of Certified Engineering Technicians and Technologists (OACETT) for certification.
- A short preparatory course (International Welding Technologist Option – WE6022) is offered to graduating Welding Engineering Technology students during their final semester to prepare them to write the qualifying examination for certification as an International Welding Technologist.
- Optional co-op program allows students to earn while they learn. Students are able to put into practice the theory they have learned while gaining valuable work experience and industrial contacts.

## Programs

- Welder Apprenticeship (See Apprenticeship Section)
- Welding Design – International Certificate
- Welding Engineering Technician – Inspection Diploma
- Welding Engineering Technician – Inspection (Co-op) Diploma
- Welding Engineering Technology Diploma
- Welding Engineering Technology (Co-op) Diploma
- Welding Fitter Certificate



# Welding Design – International Certificate

<b>Length</b>	<b>3 Semesters</b>
<b>Location(s)</b>	<b>(KL) Kirkland Lake</b>
<b>Code(s)</b>	<b>NORT-W208 - KL</b>

## Program of Studies

### Semester I (Fall)

#### Block A

Welding Processes and Equipment I  
Welding Metallurgy I  
Construction and Design I

#### Block B

Welding Processes and Equipment II  
Welding Metallurgy II

### Semester II (Winter)

#### Block C

Welding Processes and Equipment III  
Welding Metallurgy III  
Construction and Design II  
Fabrication and Applications Engineering I

### Semester III (Summer)

#### Block D

Fabrication and Applications Engineering II  
Welding Processes and Equipment IV  
Welding Metallurgy IV  
Welding Practical

The International Welding Design Certificate program prepares graduates to write the qualifying exam for either the International Welding Technologist diploma or the International Welding Engineer diploma, depending on the educational background of the applicant. These credentials are awarded by the International Institute of Welding (IIW). As an Authorized Training Body for the IIW, Northern College will offer this three-semester program through a web-based mode of delivery in conjunction with on-site practical training and laboratory analysis.

Program content will cover four broad areas: welding processes and equipment; materials and their behaviour; fabrication and applications; and construction and design. The program will focus on applying scientific principles to ensure compatibility of product design, materials, process and reliability. The result is a well-integrated, practical program which prepares an internationally recognized engineering professional with a highly developed specialization in welding materials, processes and procedures.

## Employment Opportunities

Graduates of this program will be well-suited to select welding processes, design welding procedures, inspect welds using a variety of methods, troubleshoot welding problems, train and supervise welders, etc. They can find employment in companies making welded structures for global markets as welding supervisors, inspectors, technical sales representatives, quality control supervisors, product designers/developers, trainers, welding procedure (manual, mechanical and robotic) developers, advisors to manufacturing automation teams and welding metallurgists.

Welding is diffused across many industry sectors including fabricating, manufacturing, mining, forestry, maintenance, construction, and sales – and is poised to grow in four key industries: heavy industry, aero-space, petroleum/energy and automotive. All these industries will require the expertise of an International Welding Engineering Technologist or Engineer.

## Admission Requirements:

Admission requirements for the Welding Design – International Certificate program are:

Ontario College Advanced Diploma from an Engineering Technology program (e.g. Mechanical, Manufacturing, Civil, Structural, Electrical)

## For program information:

Joshua Fuller  
Program Coordinator  
705-567-9291 ext. 750  
fullerj@northern.on.ca



# Welding Engineering Technician – Inspection

The School of Welding Engineering Technology provides a very unique blend of practical skills and theoretical knowledge which permit graduates to perform exceptionally well as active members of the engineering team. Their background in science and technology related to welding allows them to interact with engineers and scientists while maintaining the practical skills necessary to supervise trade personnel. Technicians often select components, create or interpret drawings and supervise welding personnel.

Welding professionals are concerned with all activities related to the design, production, performance and maintenance of welded products. To adequately design a weldment, the welding professional must not only understand the material being joined, but also the effect of welding variables of many welding processes on the final product. To achieve this, lab time is intertwined with a curriculum of metallurgical science and engineering theory. In developing the skills required in becoming a welding inspector, students complement their knowledge of nondestructive examination with a working knowledge of codes, standards and stress analysis.

Nondestructive examination (NDE) is an essential component of the welding engineering technician/technology programs. Students will learn the principles and acquire some practical experience with visual, liquid penetrant, magnetic particle, ultrasonic and radiographic testing methods. Emphasis is placed on the evaluation of weldments with reference to applicable codes and standards.

Students who obtain 70% or greater in liquid penetrant, magnetic particle, or radiography will receive a certificate representing classroom training to CGSB standards for each of those methods. To obtain certification, graduates must obtain the required work experience before completing government examinations. Graduates are also eligible to qualify to CSA W178.2 as visual welding inspectors.

## Employment Opportunities

Welding engineering technicians may be employed in a variety of industries including manufacturing, resource sector, education and retail. Graduates of this program fill positions such as NDE operators, weld inspectors, quality control and quality assurance technicians, welding supervisors, technical sales representatives, welding robot programmers and welding educators.

Two years after graduation, individuals may apply to the Ontario Association of Certified Engineering Technician and Technologists (OACETT) to become a Certified Engineering Technician that allows the use of the suffix "C. Tech." following an individual's name.

## Admission Requirements

Ontario Secondary School Diploma (OSSD)  
Grade 12 English (C, M, U)  
Grade 12 Math (C, M, U) (MCT4C preferred; MAP4C is accepted with a minimum GPA of 60%)  
Grade 12 Physics (C, M, U) strongly recommended

Or equivalent.

Or mature student status (an applicant who does not have a high school diploma or equivalent, and will have reached the age of 19 years on or before the start of the program). Mature students must undergo academic testing prior to admission into a program. Call the Admissions Office at 705-235-7222 for more details.

Note: Academic prerequisites for this program may be obtained free of charge through Academic Upgrading. Refer to the Post-Secondary Preparation section in this calendar for more details.

<b>Length</b>	<b>4 Semesters</b>
<b>Location(s)</b>	<b>(KL) Kirkland Lake</b>
<b>Code(s)</b>	<b>NORT-W010 - KL NORT-W138 - KL Co-op</b>

## Program of Studies

### Semester I (Fall)

CM1903-A	Communications I
GN1082	College Success
GN2013	Co-op Studies
IN1013	Computer Applications I
MA1100	Mathematics I
WE1064	Welding Drafting
WE1082	Welding Electrical Fundamentals
WE1404	Materials Joining

### Semester II (Winter)

BU2003	Human Resources Management
CM2903-A	Communications II
MA2104	Mathematics II
WE2084	Mechanic/Statics
WE2164	CAD and Fixture Design
WE3014	Materials Preparation
WE2024	Engineering Materials I

### Semester III (Summer)

Co-op Option Only	
WE3010	Work Term I

### Semester IV (Fall)

BU1133	Introduction to Business Management and Organizational Behaviour
WE3044	Strength of Materials I
MA3064	Mathematics III
WE3009	Nondestructive Examination I
WE3104	Engineering Materials II
WE3204	Welding Processes I

### Semester V (Winter)

Co-op Option Only	
WE5010	Work Term II

### Semester VI (Summer)

MA4204	Calculus I
WE4004	Welding Processes II
WE4024	Welding Metallurgy I
WE4074	Nondestructive Examination II
WE4093	Codes and Standards

## For program information:

Joshua Fuller  
Program Coordinator  
705-567-9291 ext. 750  
fullerj@northern.on.ca

**Program of Studies****Semester I (Fall)**

CM1903-A	Communications I
GN1082	College Success
GN2013	Co-op Studies
IN1013	Computer Applications I
MA1100	Mathematics I
WE1064	Welding Drafting
WE1082	Welding Electrical Fundamentals
WE1404	Materials Joining

**Semester II (Winter)**

BU2003	Human Resources Management
CM2903-A	Communications II
MA2104	Mathematics II
WE2084	Mechanic/Statics
WE2164	CAD and Fixture Design
WE3014	Materials Preparation
WE2024	Engineering Materials I

**Semester III (Summer)**

Co-op Option Only	
WE3010	Work Term I

**Semester IV (Fall)**

BU1133	Introduction to Business Management and Organizational Behaviour
WE3044	Strength of Materials I
MA3064	Mathematics III
WE3009	Nondestructive Examination I
WE3104	Engineering Materials II
WE3204	Welding Processes I

**Semester V (Winter)**

Co-op Option Only	
WE5010	Work Term II

**Semester VI (Summer)**

MA4204	Calculus I
WE4004	Welding Processes II
WE4024	Welding Metallurgy I
WE4074	Nondestructive Examination II
WE4093	Codes and Standards

**Semester VII (Fall)**

Co-op Option Only	
WE7010	Workterm III

**Semester VIII (Winter)**

WE5014	Welding Processes III
WE5024	Welding Metallurgy II
WE5043	Technical Project I
WE5044	Strength of Materials II
WE5064	Welding Physics
WE5102	Statistical Process Control
WE5122	Robotic Welding and Automation

**Semester IX (Summer)**

MA5204	Calculus II
WE6022	International Welding Technologist Option
WE6024	Welding Metallurgy III
WE6034	Technical Project II
WE6074	Welding Processes IV
WE6084	Fracture and Fatigue
WE6094	Welding Circuits

<b>Length</b>	<b>6 Semesters</b>
<b>Location(s)</b>	<b>(KL) Kirkland Lake (KL) Co-op Kirkland Lake</b>
<b>Code(s)</b>	<b>NORT-W009 - KL NORT-W139 - KL - co-op</b>

The first two years (4 semesters) of the two year welding engineering technician program is identical to that of the three year welding engineering technology program. However, students specializing in welding technology continue their studies for one more year and receive greater depth of training and knowledge in welding processes, welding metallurgy, welding physics, failure analysis and welding circuits.

Welding Engineering Technologists have the same skill set as welding engineering technicians however, with their greater knowledge of metallurgy, processes and engineering principles; they are best suited for the development of welding procedures. In the development of welding procedures, technologist will often select appropriate materials and welding processes in conjunction with selection of welding variable to ensure a cost effective weld with adequate structural integrity and adherence to applicable code requirements.

**Employment Opportunities**

Welding engineering technologists because of the broad knowledge of welding processes, nondestructive examination, welding metallurgy, welding procedure design and failure analysis affords them many opportunities in the welding industry including manufacturing, resource sector, education and retail.

Graduates of this program may fill positions similar to those of the welding engineering technician but also welding metallurgist, designers, analysts (cost/failure) and consultants.

After two years of relevant work experience, technologists can apply to the Ontario Association of Certified Engineering Technicians and Technologists (OACETT) to become a Certified Engineering Technologist

that allows the use of the suffix "CET" following the individual's name.

Northern College has recently been approved as North America's first Authorized Training Body (ATB) of the International Institute of Welding (IIW) by the Canadian Authorized National Body (ANB). Being the ATB permits us to deliver the curriculum of the International Welding Technologist (IWT) which will provide the opportunity for graduates of the three year Welding Engineering Technology program to write an examination with the ANB. Candidates who successfully complete the exam will be awarded the credentials of International Welding Technologist. These credentials are recognizable in 38 IIW member countries worldwide, giving graduates global employment opportunities.

**Admission Requirements**

Ontario Secondary School Diploma (OSSD)  
Grade 12 English (C, M, U)  
Grade 12 Math (C, M, U) (MCT4C preferred; MAP4C is accepted with a minimum GPA of 60%)  
Grade 12 Physics (C, M, U) strongly recommended

Or equivalent.

Or mature student status (an applicant who does not have a high school diploma or equivalent, and will have reached the age of 19 years on or before the start of the program). Mature students must undergo academic testing prior to admission into a program. Call the Admissions Office at 705-235-7222 for more details.

Note: Academic prerequisites for this program may be obtained free of charge through Academic Upgrading. Refer to the Post-Secondary Preparation section in this calendar for more details.

**For program information:**

Joshua Fuller  
Program Coordinator  
705-567-9291 ext. 750  
fullerj@northern.on.ca



# Welding Fitter

A welding fitter is someone who can interpret blueprint drawings and then use these blueprint drawings to cut, fit, assemble and weld metal components in a manner that meets code requirements.

This two semester practical skills program is offered in a block format. Upon completion of this program, students will gain both practical and theoretical experience using many of the common welding and cutting processes used by industry. Students develop an ability to interpret blueprint drawings and construct structural layouts for fabrication.

Welding processes include:

- Shielded Metal Arc Welding (SMAW)
- Gas Metal Arc Welding (GMAW)
- Flux Cored Arc Welding (FCAW)
- Gas Tungsten Arc Welding (GTAW)
- Oxyfuel Welding (OFW)
- Submerged Arc Welding (SAW)

Cutting processes include:

- Oxyacetylene Cutting (OAC)
- Plasma Arc Cutting (PAC)
- Air Carbon Arc Cutting (CAC-A)

At the end of the program, graduating students are given the opportunity to test for their all position Canadian Welding Bureau (CWB) welding tickets for SMAW, GMAW and FCAW at a significantly discounted rate.

Other value-added training may be available at an additional cost from Northern College's Contract Training & Workforce Development, such as:

- Fall Arrest
- Confined Space Awareness
- Rigging
- WHMIS
- Contractor General Orientation
- Contractor Underground Orientation
- Transportation of Dangerous Goods
- Forklift Training
- Aerial Platform Training
- Overhead Crane Training

## Employment Opportunities

The welding fitter assembles structural forms, such as machinery frames, pressure vessels, tanks, and buildings by fitting and welding them together. Employment opportunities exist in the areas of welding and fabrication in the forest products and mining industries, as well as the manufacturing and repair industry.

Welding fitters may find employment as a welder or fitter in the following areas, among others:

- Process piping fabrication
- Repair welding (resource, manufacturing)
- Structural welding (buildings/bridges)
- Manufacturing industry (Steel and Aluminum)
- Supervisory

## Admission Requirements

Ontario Secondary School Diploma (OSSD)

Grade 12 English (C, M, U)

Grade 10 Math (C, M, U) (MFM2P or equivalent)

Or equivalent.

Or mature student status (an applicant who does not have a high school diploma or equivalent, and will have reached the age of 19 years on or before the start of the program). Mature students must undergo academic testing prior to admission into a program. Call the Admissions Office at 705-235-7222 for more details.

Note: Academic prerequisites for this program may be obtained free of charge through Academic Upgrading. Refer to the Post-Secondary Preparation section in this calendar for more details.

Students having successfully completed Level I Welding Apprenticeship training from another institution (including those who complete Level I through the Ontario Youth Apprenticeship Program) are required to write a challenge exam for Trade Mathematics (WA1023) in order to be exempt from Semester 1 courses. Call the program coordinator at (705) 567-9291 ext. 750 for more information regarding this challenge exam.

<b>Length</b>	<b>2 Semesters</b>
<b>Location(s)</b>	<b>(KL) Kirkland Lake</b>
<b>Code(s)</b>	<b>NORT-W012 - KL ( 5 blocks (38 weeks) NORT-W012B - KL (Entry Level at Block B (28 weeks))</b>

## Program of Studies

### Semester I (Fall) Block A (10 weeks)

WA1003	Blueprint Reading – Block A
WA1010	Welding and Cutting – Block A
WA1002	Welding Quality – Block A
WA1013	Welding Theory – Block A
WA1012	Trade Practices – Block A
WA1023	Trade Mathematics – Block A

### Semester II (Fall) Block B (6 weeks)

MF2012	Trade Practices – Block B
MF2002	Materials and Process Quality – Block B
MF2005	Layout and Fabrication – Block B
MF2022	Gas Tungsten Arc Welding – Block B
MF2021	Trade Mathematics – Block B

### Semester III (Winter) Block C (6 weeks)

WA3003	Blueprint Reading & Fitting – Block C
WA3013	Shielded Metal Arc Welding – Block C
WA3002	Welding Theory – Block C
WA3023	Semi-Automatic Welding – Block C
WA3012	Gas Tungsten Arc Welding – Block C
WE3021	Trade Mathematics – Block C

### Semester IV (Winter) Block D (8 weeks)

MF4003	Pattern and Template Development – Block D
MF4013	Project Planning and Shipping – Block D
MF4002	Installation – Block D
MF4006	Fabrication – Block D
CM1233	Trade Communications – Block D
MF4021	Trade Mathematics – Block D

### Semester V (Winter) Block E (8 weeks)

WA5003	Weld Quality – Block E
WA5006	Fitting – Block E
WA5013	Shielded Metal Arc Welding – Block E
WA5002	Automatic & Semiautomatic Welding Processes – Block E
WA5023	Gas Tungsten Arc Welding and Plasma Arc Welding – Block E
WA5021	Trade Mathematics – Block E

## For program information:

Joshua Fuller  
Program Coordinator  
705-567-9291 ext. 750  
fullerj@northern.on.ca