

HVAC-R (Climate Control) Certificate

Industrial Technologies Division

Heating, Ventilating, Air Conditioning, and Refrigeration, as a technical discipline, has made its transition to the "high-tech" field. Modern environmental control equipment use advanced controls involving pneumatic, electro-mechanical and direct digital control technologies. Today, common HVAC-R applications include the use of computers and computer network interfaces to facilitate building/space climate control and monitoring. Presently, manpower shortages exist for qualified personnel (see <http://www.mepatwork.com> for additional information). Men and women wanting to enter this field must understand these advanced technologies, their controls and communications networks if they are to be successful in this changing field.

Career Outlook

A wide variety of employment possibilities exist for those individuals who have training in the Climate Control field. HVAC-R Installers and Service Technicians are always needed to support companies involved in product sales and service. These skilled tradespersons work in residential, commercial and industrial settings keeping related equipment operational throughout the climate seasons. refrigeration journeymen work in commercial and industrial settings providing support for the food industry. Air balance specialists work with environmental engineers to test and adjust newly installed and existing HVAC-R systems. Systems integrators unify various sub-systems involving the HVAC-R and fire control-life safety technologies under one common control.

Program Learning Outcomes

Students earning a certificate from this program should demonstrate:

1. Comprehend relevant electrical symbols and abbreviations within projects.
2. Apply basic knowledge of operating systems, networking, and computer hardware in projects.
3. Illustrate proficiency in design concepts, orthographic projection, dimensioning practices, and blueprint reading through hands on projects and assignments.
4. Apply physics of fluids, components, troubleshooting and design applications for hydraulic and pneumatic systems.

See page 69 for a list of Communications Electives.

<u>First Semester / 1st 8 weeks</u>			<u>Credits</u>
+	IND120	Industrial Electricity I	3
	IND105	Industrial Safety.....	2
+	AET110	Energy Audit.....	<u>3</u>
			8

<u>First Semester / 2nd 8 weeks</u>			<u>Credits</u>
+	INT120	HVACR I.....	3
+	INT220	Electrical Prints and Troubleshooting ..	3
+	IND131	Industrial Pipefitting.....	<u>3</u>
			9

<u>Second Semester / 1st 8 weeks</u>			<u>Credits</u>
+	IND223	Motors & Motor Controls	3
+	IND121	Industrial Electricity II.....	3
		Communications Elective.....	<u>3</u>
			9

<u>Second Semester / 2nd 8 weeks</u>			<u>Credits</u>
+	INT220	HVACR II.....	3
+	INT221	HVACR III.....	<u>3</u>
			6

Total Program Hours **32**

Gainful employment information for NSCC's certificate programs can be found online at:

<https://northweststate.edu/gedt/hvac/>

Gainful employment information includes: estimated cost of the program, average student loan debt and types of jobs available.

Must be proficient in MTH080.

- + Students must attain a minimum grade of "C" in all courses with a '+' to progress in the program and to graduate.

Industrial Maintenance Certificate

Industrial Technologies Division

The industrial maintenance technician not only troubleshoots and repairs advanced industrial equipment, but is responsible for the layout and installation. This individual will be versed in electrical, hydraulics, pneumatics, pipefitting, welding, machine repair and installation as well as motor control systems and PLC control systems.

Coursework (100 level or higher) completed in this certificate directly applies toward the associate degree in maintenance technician/mechatronics.

Career Outlook

Many manufacturing companies across the country no longer employ segregated trades (electrician, millwright, machinist, etc.) Instead, they are moving to a multi-craft classification that will perform electrical, mechanics, machining, welding, etc. Therefore, positions for general maintenance and industrial maintenance are currently in great demand.

Program Learning Outcomes

Students earning a certificate from this program should demonstrate:

1. Distinguish electrical symbols and abbreviations and apply uses in assignments.
2. Illustrate proficiency in basic electrical theory, motor starters, solenoid valves, various control devices, motor circuits, and variable frequency drivers through practical lab exercises.
3. Illustrate proficiency in the systematic elimination of the various parts of a system to locate a malfunctioning part safely but promptly, through lab exercises.
4. Apply basic knowledge of PLC control systems through lectures, readings, exercises.
5. Apply mechanical knowledge of hydraulic and pneumatic systems through individual or group projects and assignments.

See page 69 for a list of Communications Electives.

<u>First Semester</u>		<u>Credits</u>
+ IND120	Industrial Electricity I	3
IND110*	Industrial Computing	3
IND105	Industrial Safety.....	2
		8

<u>Second Semester</u>		<u>Credits</u>
IND103	Applied Geometry & Trigonometry ..	3
+ IND232	Machine Repair	3
+ IND132	Benchwork	2
+ PLC200	Programmable Controller I.....	3
		11

<u>Third Semester</u>		<u>Credits</u>
+ IND121	Industrial Electricity II	3
+ IND134	Industrial Fluid Power	3
	Communication Elective	3
		9

<u>Fourth Semester</u>		<u>Credits</u>
+ IND131	Industrial Pipefitting	3
+ WLD110	Intro to Applied Welding Techniques	3
+ IND223	Motors & Motor Controls	3
		9

Total Program Hours **37**

Gainful employment information for NSCC's certificate programs can be found online at:
<https://northweststate.edu/gedt/indust-maintenance/>
 Gainful employment information includes: estimated cost of the program, average student loan debt and types of jobs available.

- * Prior to taking IND110, students should have basic computer literacy in Windows and at least one Windows application.
- + Students must attain a minimum grade of "C" in all courses with a '+' to progress in the program and to graduate.

Industrial Technologies

Associate of Applied Science in Industrial Technology

Industrial Technologies Division

This degree will focus on learning experiences that will prepare students with the technical skills to work within diverse technological fields within manufacturing and industrial environments.

Students will be able to obtain a generalist degree as well as have the opportunity to specialize in areas such as Industrial Electrical, Machining/CNC Programming, and Maintenance/Mechatronics. Courses consist of theory and practical, hands on applications. Students work collaboratively with each other and with the instructor to achieve competencies of each discipline, observing and practicing safety at all times. The technical classes will have 50 percent of the learning experiences in the classroom, and the remaining 50 percent in the laboratory environment applying hands-on learning. The courses comprising the generalist and specialist degree areas incorporate fundamentals critical in allowing students to adapt to the continuous changes in technology.

Career Outlook

As manufacturers invest in new, technology-driven equipment, the demand for skilled graduates in diverse technical areas will remain in high demand.

Program Learning Outcomes

Students earning an Associate degree from this program should:

1. Identify common industrial symbols and abbreviations and demonstrate their use (Industrial Electrical, PLC, HVACR)
2. Interpret and develop basic prints including dimensioning, calculations, and sketching, orthographic, isometric, sectional and auxiliary views (Machining, PLC)
3. Apply principles of electrical controls and fluid power applications to industrial situations (Maintenance Tech/ Mechatronics)
4. Basic knowledge of PLC control systems (Industrial Maintenance)
5. Knowledge of basic machining principles using lathes, mills, drills, band saw, and various hand tools (Millwright)
6. Basic knowledge of operating systems, networking, and computer hardware (PLC)
7. Knowledge of physics of fluids, components, troubleshooting and design applications for hydraulic and pneumatic systems (HVACR, Millwright, Industrial Maintenance, Machining CNC, Industrial Electrical)

See page 40 for a list of Humanities and Social/Behavioral Science Electives.

See page 69 for a list of Communications, Natural Science and Technical Electives.

<u>First Semester</u>		<u>Credits</u>
ENG111	Composition I.....	3
IND105	Industrial Safety.....	2
IND110*	Industrial Computing I.....	3
	Or	
CIS114	Microsoft Applications.....	3
MTH109	College Algebra.....	3
+	Technical Elective**.....	3
		14

<u>Second Semester</u>		<u>Credits</u>
ENG112	Composition II.....	3
IND103	Applied Geometry & Trig	3
+	Technical Electives**.....	9
		15

<u>Third Semester</u>		<u>Credits</u>
	Humanities Elective	3
	Natural Science Elective	3
+	Technical Electives**.....	9
		15

<u>Fourth Semester</u>		<u>Credits</u>
	Natural Science Elective (Including a Lab).....	4
	Social/Behavioral Science Elective.....	3
+	Technical Electives**.....	10
		17

Total Program Hours 61

* Prior to taking IND110, students should have basic computer literacy in Windows and at least one Windows application.

** See next page for listing of technical elective concentration areas.

+ Students must attain a minimum grade of "C" in all courses with a '+' to progress in the program and to graduate.

Industrial Technologies

Associate of Applied Science in Industrial Technology

Industrial Technologies Division

Technical Electives

AET110 Energy Audit
IND100 Precision Measurement
IND120 Industrial Electricity I
IND121 Industrial Electricity II
IND122 Industrial Wiring (NEC)
IND130 Rigging & Erecting
IND131 Industrial Pipefitting
IND132 Bench Work
IND134 Industrial Fluid Power I
IND140 Principles of Machining
IND141 Metallurgy & Heat Treatment
IND220 Electrical Prints & Troubleshooting
IND221 Instrumentation & Controls I
IND223 Motors & Motor Controls
IND232 Machine Repair
IND234 Industrial Fluid Power II
IND240 Machining Processes II
IND241 Tooling & Fixtures – Lubricants & Coolants
INT120 HVACR I
INT220 HVACR II
INT221 HVAC III Heating Systems
MET107 Engineering Graphics
MET222 Programming CNC
MET223 CAM I
QCT100 Quality Concepts
PLC200 Programmable Controllers I
PLC210 Programmable Controllers II (AB)
PLC220 Programmable Controller III
PLC230 Servo/Robotic Systems
WLD100 Blue Print Reading and Welding Symbols
WLD110 Intro. to Applied Welding Techniques
WLD120 Gas Metal Arc Welding
WLD130 Flat & Horizontal Shield Metal Arc Welding
WLD140 Gas Tungsten Arc Welding
WLD150 Advanced Gas Metal Arc Welding
WLD210 Vertical and Overhead SMAW
WLD220 Advanced GTAW
WLD250 Pipe Welding
WLD260 Pre-Pipe Certification

Machining Certificate

Industrial Technologies Division

This program is designed to prepare the student for a career path as a skilled tradesman. Designed to meet the needs of a diverse vocational audience, the machining certificate is for students interested in career fields such as computer numerical control programming (CNC), or tool and die maker pattern maker.

Career Outlook

The U.S. Department of Labor projects employment of machinists and tool and die makers to grow by 6 percent in the next decade. Employees with computer software application skills and the ability to perform multiple tasks have a greater chance for advancement.

Program Learning Outcomes

Students earning a certificate from this program should demonstrate:

1. Demonstrate knowledge of basic print reading skills including dimensioning practices and calculations, sketching, including orthographic, isometric, sectional, and auxiliary views through individual and group projects, and written assessments.
2. Apply basic machining principles using lathes, mills, drills, band saw, and various hand tools through lectures, study, and assessments.
3. Illustrate proficiency in machining and fabricating projects with an emphasis on safety, fixturing, feeds and speeds, tooling, precision, and accuracy through assignments and projects.
4. Illustrate proficiency in welding with an emphasis on shielded metal arc (stick), oxy-acetylene, gas metal (MIG) and gas tungsten (TIG), through assignments and projects.

See page 69 for a list of Communications Electives.

<u>First Semester</u>			<u>Credits</u>
+	IND107	Print Reading & Sketching.....	3
	IND110*	Industrial Computing.....	3
	IND105	Industrial Safety.....	2
+	IND132	Benchwork	<u>2</u>
			10

<u>Second Semester</u>			<u>Credits</u>
	IND103	Applied Geometry & Trigonometry	3
+	WLD110	Intro to Applied Welding Techniques...	3
+	IND140	Principles of Machining	<u>3</u>
			9

<u>Third Semester</u>			<u>Credits</u>
+	IND100	Quality Concepts	3
+	IND240	Machining Processes II.....	3
		Communications Elective.....	<u>3</u>
			9

<u>Fourth Semester</u>			<u>Credits</u>
+	IND241	Tooling & Fixtures.....	3
+	IND141	Metallurgy & Heat Treatment	2
+	MET222	Programming Computer Numerical Control	<u>3</u>
			8

Total Program Hours **36**

Gainful employment information for NSCC's certificate programs can be found online at:
<https://northweststate.edu/gedt/machining/>
 Gainful employment information includes: estimated cost of the program, average student loan debt and types of jobs available.

- * Prior to taking IND110, students should have basic computer literacy in Windows and at least one Windows application.
- + Students must attain a minimum grade of "C" in all courses with a '+' to progress in the program and to graduate.

Maintenance Technician/Mechatronics

Associate of Applied Science in Industrial Technology

Industrial Technologies Division

This program prepares students for positions responsible for layout and installation of advanced industrial equipment. Graduates will also be able to troubleshoot and repair equipment to ensure the manufacturing lines keep running. Skills learned include electrical, hydraulics, pneumatics, pipefitting, welding, machine repair and installation as well as motor control systems, PLC control systems and instrumentation control networking.

Career Outlook

Employers trying to stay competitive with an international marketplace are hard pressed to find a multi-crafted maintenance employee who can accomplish a multitude of vocational qualities (electrician, plumber, pipefitter, hydraulics and pneumatics specialists, HVACR, machine set-up, machine installer, welder, systems troubleshooter and control systems programming). This program will provide those employers with such a skilled professional.

Program Learning Outcomes

Students earning an Associate degree from this program should:

1. Demonstrate a knowledge of fluid power and electrical symbols per ISO and JIC standards.
2. Read and interpret fluid power schematics.
3. Analyze electrical and PLC controls within fluid power circuits and systems.
4. Specify components, hoses, pipes and tubing, in the design, construction, and sizing of fluid power systems.
5. Apply principles of electrical controls and fluid power applications to industrial situations.

See page 40 for a list of Humanities and Social/Behavioral Science Electives.

See page 69 for a list of Communications, Natural Science and Technical Electives.

<u>First Semester</u>		<u>Credits</u>
ENG111	Composition I.....	3
IND105	Industrial Safety.....	2
IND110*	Industrial Computing I.....	3
+ IND120	Industrial Electricity I.....	3
+ IND132	Benchwork	2
MTH109	College Algebra.....	3
		16

<u>Second Semester</u>		<u>Credits</u>
ENG112	Composition II.....	3
IND103	Applied Geometry & Trig	3
+ IND121	Industrial Electricity II.....	3
+ IND107	Blue Print Reading and Sketching	3
	Humanities Electives	3
		15

<u>Third Semester</u>		<u>Credits</u>
+ IND134	Industrial Fluid Power I	3
+ IND223	Motors & Motor Controls	3
+ IND232	Machine Repair.....	3
+ PLC200	Programmable Controller I.....	3
	Natural Science Elective	3
		15

<u>Fourth Semester</u>		<u>Credits</u>
+ IND221	Instrumentation & Controls I.....	3
+ IND234	Industrial Fluid Power II.....	3
+ PLC230	Servo/Robotic Systems	3
	Natural Science Elective (Including a lab)	4
	Social/Behavioral Science Elective.....	3
		16

Total Program Hours **62**

* Prior to taking IND110, students should have basic computer literacy in Windows and at least one Windows application.

+ Students must attain a minimum grade of "C" in all courses with a '+' to progress in the program and to graduate.

Millwright Certificate

Industrial Technologies Division

The millwright is trained to install, dismantle or move machinery and heavy equipment according to engineered plans, blueprints or other drawings. The skill level of the millwright ranges from rigger, welder and machine repairman to fabricator, pipefitter and machine reconditioner.

Career Outlook

Openings for millwrights will be found in areas where manufacturing is high. Related vocations are also a possibility with pipefitters and riggers, machine repairmen, structural iron and steel workers being in high demand.

Program Learning Outcomes

Students earning a certificate from this program should demonstrate:

1. Illustrate knowledge of basic print reading skills including dimensioning practices and calculations, sketching including orthographic, isometric, sectional and auxiliary views through drawing projects and other practical and knowledge based assessment methods.
2. Demonstrate knowledge of basic machining principles using lathes, mills, drills, band saw, and various hand tools through practical exercises and knowledge assessment methods.
3. Demonstrate proficiency in machining and fabricating projects with an emphasis on safety, fixturing, feeds and speeds, tooling, precision, and accuracy through individual and group hands on projects.
4. Demonstrate proficiency in welding with an emphasis on shielded metal arc (stick), oxy-acetylene, gas metal (MIG) and gas tungsten (TIG) through hands on projects and assignments.
5. Illustrate knowledge of the physics of fluids, components, troubleshooting and design by applying principles in hands on projects and assignments.
6. Identify appropriate rigging tools necessary for various needs.
7. Employ mobile crane safety, inspection, hand signals and proper crane usage methods.

See page 69 for a list of Communications Electives.

<u>First Semester / 1st 8 weeks</u>			<u>Credits</u>
+	IND132	Benchwork	2
	IND105	Industrial Safety.....	2
+	IND107	Print reading & Sketching.....	<u>3</u>
			7

<u>First Semester / 2nd 8 weeks</u>			<u>Credits</u>
		Communications Elective.....	3
+	IND140	Principles of Machining	3
+	WLD110	Intro to Applied Welding Techniques...	<u>3</u>
			9

<u>Second Semester / 1st 8 weeks</u>			<u>Credits</u>
+	IND232	Machine Repair	3
+	IND134	Industrial Fluid Power I	3
+	IND130	Rigging & Erecting.....	<u>2</u>
			8

<u>Second Semester / 2nd 8 weeks</u>			<u>Credits</u>
+	IND131	Industrial Fluid Power I	3
	PHY101	Principles of Physical Science.....	4
+	IND100	Precision Measurement.....	<u>3</u>
			10

Total Program Hours **34**

Gainful employment information for NSCC's certificate programs can be found online at:

<https://northweststate.edu/gedt/millwright/>

Gainful employment information includes: estimated cost of the program, average student loan debt and types of jobs available.

- + Students must attain a minimum grade of "C" in all courses with a '+' to progress in the program and to graduate.

CNC Operations Certificate (Short-Term Technical Certificate)

The Computer Numerical Control (CNC) Operations program focuses on the operation and setup of production CNC equipment. Students in this program will develop their skills in machining processes, including operation of the drill press, lathe, vertical and horizontal milling machine, surface grinder, CNC vertical machining center and turning center. Students learn the basics of transforming raw material into finished parts in a production environment.

Career Outlook

Contact with several regional machine shops has indicated a strong desire to bring jobs back which had been outsourced. Additionally, area industries have both expressed need for and provided input on training content making up the CNC Operations certificate program.

Program Learning Outcomes

1. Demonstrate the safe use of electric and manual hand tools.
2. Analyze technical data.
3. Set-up and operate manual machine tools including the mill, lathe, drill press, band saw, surface grinder and hand tools.
4. Set-up and operate CNC vertical milling machine.
5. Set-up and operate CNC metal machining lathe.
6. Interpret the 2D and 3D mechanical prints used in Machining.
7. Create a CNC program from a machine sequence pattern.
8. Weld various metals used in molds and fixtures.
9. Write part programs for CNC machine tools.
10. Demonstrate the ability to interpret and apply technical information from mechanical blueprints.
11. Measure machined parts with manual and automated measuring devices.

<u>First Semester</u>		<u>Credits</u>
+	IND 103 Applied Geometry & Trig	3
+	IND 132 Benchwork	2
+	IND 107 Print Reading and Sketching	3
+	IND 140 Principles of Machining	3
+	IND 240 Machining Processes II.....	<u>3</u>
		14

<u>Second Semester</u>		<u>Credits</u>
+	IND 241 Tooling & Fixtures.....	3
+	IND 100 Precision Management	3
+	MET222 Programming of Computer Numerical Control.....	3
+	WLD 110 Introduction to Applied Welding Tech.....	<u>3</u>
		12

Total Program Hours **26**

Gainful employment information for NSCC's certificate programs can be found online at:
<https://northweststate.edu/gedt/cnc-operations/>
 Gainful employment information includes: estimated cost of the program, average student loan debt and types of jobs available.

- + Refers to technical course work. Students must maintain a minimum grade of "C" in these courses to progress in the program and graduate.

CyberSecurity

(Short-Term Technical Certificate)

Cybersecurity is the next logical evolution for IT professionals. Specifically, the Ohio Attorney General launched the CyberOhio Initiative in 2016; two of the goals of CyberOhio are to provide cybersecurity training opportunities for Ohio businesses and to create collaborative opportunities for colleges to partner with businesses for internships.

<u>Course</u>		<u>Credits</u>
+ EET107	Python Programming.....	3
+ CIS194	IT Security.....	3
+ CIS195	Networking Essentials.....	3
+ CYB210	Cyber Programming	3
+ CYB220	Security Audits.....	3
+ CYB230	Network Security	3
		18

Career Outlook

The career outlook for cyber security is very good. There is currently 0% unemployment in the field. According to current reports and statistics, there will be 6 million cyber security jobs by 2019. There will be a shortage of trained workforce and 1.5 million of those jobs will go unfilled. (Source: "One Million Cybersecurity Job Openings in 2016," Forbes.com)

Possible career titles are security operations center analyst, information security analyst, cyber security analyst, penetration tester, information assurance analyst, and cyber operations analyst.

Total Program Hours

18

Program Learning Outcomes

1. Demonstrate the ability to work with various operating systems.
2. Analyze an organization's assets and develop an appropriate risk management framework.
3. Conduct security audits and provide appropriate reporting to stakeholders.
4. Demonstrate the ability to create and deploy software that improves an organization's security posture.
5. Select the appropriate cybersecurity controls for an organization to be compliant with governance and regulations.
6. Demonstrate the ability to design and secure small to medium sized networks.
7. Create appropriate security policies and procedures based upon business processes.

Gainful employment information for NSCC's certificate programs can be found online at:

<https://northweststate.edu/gedt/it-specialist/>

Gainful employment information includes: estimated cost of the program, average student loan debt and types of jobs available.

- + Refers to technical course work. Students must maintain a minimum grade of "C" in these courses to progress in the program and graduate.

IT Specialist (Short-Term Technical Certificate)

The IT Specialist short-term certificate program develops skills in database management and reporting as well as foundations of computer programming. Students will work with industry-recognized databases (such as Oracle) and related tools for pulling data (SQL). Students will also develop skills with object-oriented programming languages that will enable them to create both windows- and web-based solutions for end-users.

Career Outlook

Increased financial regulations, privacy rules and security guidelines are causing more companies to handle data analysis and processing within national markets. But with the high cost of information technology service in larger urban areas, provider companies are being drawn to less populated locales, prompting the demand for highly-trained employees living in these areas. The market is eager for a local option in the IT outsourcing sector for data report writing, electronic forms development and applications development.

Program Learning Outcomes

1. Use the applications found in the Microsoft Office suite and apply them in a business setting.
2. Develop data analysis and project management skills and be able to apply them in a business setting.
3. Utilize structured programming concepts to develop applications using programming languages such as VBA, VB, and C#, to meet end user requirements.
4. Identify basic networking infrastructure components and list items that comprise a secure network.
5. Set up a basic webpage with HTML/CSS technology.
6. Utilize a Relational Database Management System and be able to query data from various databases (Access, Oracle, SQL).
7. Present database data in a user friendly format using reporting and dashboarding tools.
8. Develop communication skills for both technician-to-technician as well as technician-to-end user interactions.

Admission Requirements for the Program:

- Basic computer application literacy. Be able to pass 4-part diagnostic exam on Concepts of Information and Communication Technology, Using the Computer and Managing Files, Databases/Access and Spreadsheets/Excel.
- ACCUPLACER testing. Complete any developmental courses needed.
- Course placement Algebra score at the MTH080 level or successful completion of MTH080.
- GPA 2.0 or higher.

Course		Credits
+ DBP110	ICDL Computer Technologies.....	1
+ DBP121	Computer Systems II.....	3
+ DBP130	IT Customer Service and Communication	3
+ DBP150	Database Basics.....	3
+ DBP205	Discrete Structures Applications.....	3
+ DBP210	Computer Programming I.....	3
+ DBP220	Database Reporting.....	3
+ DBP225	Computer Programming II	3
+ CIS195	Networking Essentials.....	3
		25

Total Program Hours **25**

*Gainful employment information for NSCC's certificate programs can be found online at:
<https://northweststate.edu/gedt/it-specialist/>
Gainful employment information includes: estimated cost of the program, average student loan debt and types of jobs available.*

- + Refers to technical course work. Students must maintain a minimum grade of "C" in these courses to progress in the program and graduate.

Welding (Short-Term Technical Certificate)

This welding program provides the students with the technical skills and knowledge to work in the industrial welding field. Such positions as Welder/Fabricator, Production Welder, Millwright, Welding Technician and Welder/Pipe Fitter all utilize multiple welding and fabricating skills. Students are trained in many welding processes which include Shield Metal Arc Welding, Gas Metal Arc Welding, Gas Tungsten Arc Welding, Flux Core Arc Welding, Oxy Fuel Gas Welding /Cutting and Plasma Arc Cutting. Various kinds of metals and thicknesses will be used including mild steel, aluminum and stainless steel. Graduates are eligible to take the American Welding Society certification tests.

Career Outlook

Welding is a career choice that is in high demand. It offers you the flexibility to switch industries without changing careers. With the increase of manufacturing, the building and repairing of major infrastructure, nuclear power plants, windmills, or drilling of oil, welding has endless opportunities that keep fueling the demand for this skilled technology.

Program Learning Outcomes

1. Demonstrate safe workplace practices by identifying potential hazards.
2. Accurately follow shop drawings and demonstrate describing, recognizing, and interpreting weld symbols to complete weld jobs.
3. Fabricate and assemble a given project according to prints and within specified tolerances.
4. Identify and demonstrate basic welding terminology and safety in the workplace.
5. Demonstrate accurate working knowledge of GMAW, GTAW, and SMAW welding principles and practices.
6. Demonstrate proper and safe operation of related cutting/beveling equipment
7. Correct and safe setup and shut down of all welding machines and torch equipment
8. Demonstrate proper selection of appropriate electrode, polarity, amperage setting, and electrode manipulation for each specific application.

First Semester		Credits
+	WLD 100 Blue Print Reading and Welding Symbols	2
+	WLD 110 Introduction of Applied Welding Techniques	3
+	WLD 120 Gas Metal Arc Welding	<u>3</u>
		8

Second Semester		Credits
+	WLD 130 Flat & Horizontal Shield Metal Arc Welding	3
+	WLD 140 Gas Tungsten Arc Welding	3
+	WLD 150 Advance Gas Metal Arc Welding	<u>3</u>
		9

Total Program Hours **17**

Gainful employment information for NSCC's certificate programs can be found online at <https://northweststate.edu/gedt/welding>
Gainful employment information includes: estimated cost of the program, average student loan debt and types of jobs available.

- + Refers to technical course work. Students must maintain a minimum grade of "C" in these courses to progress in the program and graduate.

Industrial Automation Maintenance Certificate (Short-Term Technical Certificate)

The Industrial Automation Maintenance program focuses on the maintenance of electrical, mechanical and fluid power equipment. Students of this program will develop their skills in maintenance and troubleshooting of electrical, pneumatic, mechanical, programmable logic controllers, variable frequency drives and more.

Career Outlook

Many manufacturing companies across the country no longer employ segregated trades (electrician, millwright, machinist, etc.) Instead, they are moving to a multi-craft classification that will perform electrical, mechanics, machining, welding, etc. Therefore, positions for general maintenance and industrial maintenance are currently in great demand.

Program Learning Outcomes

1. Install, maintain and troubleshoot industrial electrical systems.
2. Analyze technical data.
3. Install, maintain and troubleshoot electric motors and transformers.
4. Fabricate and weld structural components.
5. Install, maintain and troubleshoot a fluid power system.
6. Install and maintain industrial plumbing and piping components & systems.
7. Install, maintain and troubleshoot Programmable Logic Controller systems.
8. Troubleshoot servo and robotic systems.
9. Troubleshoot mechanical system components.

<u>First Semester</u>		<u>Credits</u>
+	IND 120 Industrial Electricity I	3
+	IND 121 Industrial Electricity II	3
+	WLD 110 Introduction to Applied Welding Tech	3
+	IND 132 Benchwork	2
+	IND 131 Industrial Pipefitting	3
		14

<u>Second Semester</u>		<u>Credits</u>
+	IND 223 Motors & Controls	3
+	IND 134 Industrial Fluid Power	3
+	PLC 200 Programmable Controller I	3
+	PLC 230 Servo and Robots	3
+	IND 232 Machine Repair	3
		15

Total Program Hours 29

Gainful employment information for NSCC's certificate programs can be found online at:
<https://northweststate.edu/gedt/indust-automation/>
 Gainful employment information includes: estimated cost of the program, average student loan debt and types of jobs available.

- + Refers to technical course work. Students must maintain a minimum grade of "C" in these courses to progress in the program and graduate.

Manufacturing Foundations (Pending) (Short-Term Technical Certificate)

There is a critical need for more students to go into manufacturing and Engineering professions. Because of that need OhioTechNet and Ohio Higher ED worked with the Ohio Engineering Technology Educators, and the Ohio Manufacturers Association to develop the Manufacturing Foundations Certificate.

This program was designed by the ODHE and OhioTechNet and endorsed by the Ohio Engineering Technology Educators Association and the Ohio Manufactures Association.

Career Outlook

The Occupations that these students can go into are: Manufacturing, Engineering, Design, Drafting, Maintenance, Machining, Associate's Degrees in Engineering and Manufacturing, along with Bachelor's Degrees in Engineering and MANufacturing. The program was designed to be stackable. Students can get the certificate and go straight to work or they can continue on with an Associate's Degree and then get a Bachelor's Degree if they choose.

Program Learning Outcomes

1. Use a commercially available CAD system to create meaningful engineering drawings including: dimensions and tolerances, multiple views and projections; assemblies and bill of materials; and 3D models.
2. Apply fundamental knowledge of engineering materials and why they are utilized in a particular application. Students will demonstrate an understanding of material composition; processes for manufacturing of steels and alloying; cold and hot working processes; and material hardness, modulus of elasticity, tensile strength, yield strength, and shear strength.
3. Apply their knowledge of materials to manufacturing processes and demonstrate an understanding of: processes such as material removing, forging, casting, forming, finishing; fabrication processes such as welding, adhesives, and fasteners; production efficiencies (e.g., speed and feeds); and safety procedures and methods.
4. Work as a member of a team to communicate effectively, solve problems, and improve productivity.

First Semester			Credits
	ENG111	Composition I.....	3
	MTH109	College Algebra.....	3
+	MET121	Manufacturing Processes.....	<u>3</u>
			9
Second Semester			Credits
+	MET134	Engineering Materials.....	3
+	CAD213	CAD III.....	4
+	MET290	Engineering Technology	
		Co-op/Internship or.....	3
		Work Experience.....	<u>1-3</u>
			8-10
Total Program Hours			17-19

Gainful employment information for NSCC's certificate programs can be found online at <https://northweststate.edu/gedt/manufacturing-foundations/>

Gainful employment information includes: estimated cost of the program, average student loan debt and types of jobs available.

- + Refers to technical course work. Students must maintain a minimum grade of "C" in these courses to progress in the program and graduate.