



INDUSTRIAL TECHNOLOGIES

Contact: Ron Scozzari

419.267.1429

rscozzari@northweststate.edu



Industrial Technologies Division

Northwest State Community College offers a variety of degree and certificate programs in the field of Industrial Technologies. Students enrolled in an Industrial Technologies program will benefit from the small classroom sizes as they learn to analyze problems and, more importantly, how to fix them.

Students will be prepared to enter the workforce immediately after graduation. They will also have the option of transferring into a four-year degree program at a partnering college or university.

Industrial Technologies Degree and certificate programs include:

Applied Science

- Industrial Technology
- Mechatronics

Certificate Programs

- HVACR (Climate Control)
- Industrial Electrical
- Industrial Maintenance
- Machining
- Millwright
- Programmable Controller (PLC)

Course Sequence

The suggested sequence of courses is for full-time students. If you are a part-time student or have transferred courses in from another school, you should generally complete the courses listed under semester 1 before moving on to semester 2, 3, and then 4. Elective courses may be taken at any time. Please meet with your advisor if you need assistance to register. Your advisor can help you make any necessary changes to this recommended sequence.

General Education

For Northwest State Core Requirements for all graduates, See page 31. Unless specified on the program page, Humanities and Social Behavioral Science electives should be selected from the Core Requirements list while Communication and Natural Science electives should be selected from the following elective lists.

Communications:

ENG111	Composition I (General Studies)
ENG113	Speech
ENG210	Technical Communications
ENG214	Discussion & Conference Methods

Natural Science:

See Page 31 for Natural Science Electives

Technical Electives:

Any AET, CAD, EET, IND, INT, MET, PET, PLC or QCT course

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 56 for a list of Communications Electives.

<u>First Semester / 1st 8 weeks</u>		<u>Credits</u>
+	INT120 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>
+	IND220 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 Electrical Certificate

Industrial Technologies Division

This program will focus on learning experiences that will prepare students with the technical skills to work in the industrial electrical field in positions such as Industrial Electrician, Electrical Technician, Industrial Controls Technician or Maintenance Technician. All of these courses apply toward the comparable associate degree. Students in the program will be trained not only in traditional Electrician skills, but also how to operate and troubleshoot state-of-the-art programmable controller systems, solid state motor drives, instrument systems and industrial computer systems used by maintenance personnel in manufacturing and process plants.

Students will receive hands-on training on AC/DC motors, transformers, test equipment, basic hydraulic systems, and industrial wiring practices according to the National Electrical Code. Most of the technical classes will have 50 percent of the learning experience in the classroom, and the other 50 percent in the laboratory with hands-on training. This program focuses on basic fundamentals so that graduates can also adapt to the continuous changes in technology.

Career Outlook

As manufacturers invest in new technology-driven equipment, the need for skilled technicians will remain in high demand.

Program Learning Outcomes

Students earning a certificate from this program should demonstrate:

1. Illustrate knowledge of electrical symbols and abbreviations by applying toward assignments.
2. Illustrate proficiency in basic electrical theory, motor starters, solenoid valves, various control devices, motor circuits, and variable frequency drivers by applying knowledge and skills in individual and group projects.
3. Proficiency in the systematic elimination of the various parts of a system to locate a malfunctioning part safely but properly.
4. Comprehend PLC control systems, analog instrumentation, and Servo Robotics systems through knowledge and hands on based assessments.
5. Apply the physics of fluids, components, troubleshooting and design applications for hydraulic and pneumatic systems using instrumentation and controls systems through individual and group assignments.

See page 56 for a list of Communications Electives.

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

<u>Second Semester</u>		<u>Credits</u>
+	IND121 Industrial Electricity II	3
+	IND134 Industrial Fluid Power	3
+	IND122 Industrial Wiring (NEC)	<u>3</u>
		9

<u>Third Semester</u>		<u>Credits</u>
+	IND220 Electrical Prints & Troubleshooting	3
+	IND223 Motors and Motor Controls	3
+	PLC200 Programmable Controller I	<u>3</u>
		9

<u>Fourth Semester</u>		<u>Credits</u>
+	IND221 Instrumentation & Controls I	3
+	PLC230 Servo/Robotics Systems	3
	Communications Elective	<u>3</u>
		9

Total Program Hours **35**

*Gainful employment information for NSCC's certificate programs can be found online at:
<https://northweststate.edu/gedt/indust-elec/>
 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 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 56 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 <u>2</u>
		8

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

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

<u>Fourth Semester</u>		Credits
+	IND131	Industrial Pipefitting 3
+	WLD110	Intro to Applied Welding Techniques 3
+	IND223	Motors & Motor Controls <u>3</u>
		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 31 for a list of Humanities and Social/Behavioral Science Electives.

See page 56 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**	2
		14
<u>Second Semester</u>		<u>Credits</u>
ENG112	Composition II	3
IND103	Applied Geometry & Trig	3
+	Technical Electives**.....	2
		15
<u>Third Semester</u>		<u>Credits</u>
	Humanities Elective	3
	Natural Science Elective	3
+	Technical Electives**.....	2
		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
 QCT141 Precision Measurement
 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 56 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	Precision Measurement 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 31 for a list of Humanities and Social/Behavioral Science Electives.

See page 56 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.....	<u>3</u>
	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.....	<u>3</u>
	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	<u>3</u>
	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	<u>3</u>
	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 reconitioner.

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 56 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 Pipefitting	3
	PHY101 Principles of Physical Science	3
+	IND100 Precision Measurement	<u>3</u>
		9

Total Program Hours **33**

*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.

Programmable Controller (PLC) Certificate

Industrial Technologies Division

A Programmable Logic Controller (PLC) Certificate prepares the individual to install, maintain and troubleshoot industrial grade PLC systems. Technicians will work closely with maintenance supervisors and electrical engineers. Extensive self study (reading, research and practice) may be required on the job to improve and maintain technical proficiency of new and improved electrical control devices.

Typically, technicians work on assignments and tasks with minimum supervision and guidance, often requiring the technician to interface and pass down information between cross function personnel of incoming and outgoing shifts. It is expected by employers that technicians demonstrate excellent verbal, written and interpersonal communication skills.

Career Outlook

Graduates of this program may find employment as entry-level control technicians, electrical technicians or as service technicians working under the direction of the maintenance or engineering department. Some of the typical duties of these technicians will include: troubleshooting and programming of PLC control systems; variable frequency drives; 480 volt 3 phase motor wiring; reading blueprints and electrical schematics; installing conduit and wiring; testing wiring connections; working closely with electrical engineers and / or general contractors.

Program Learning Outcomes

Students earning a certificate from this program should demonstrate:

1. Illustrate knowledge of electrical symbols and abbreviations through knowledge and hands on assignments.
2. Demonstrate basic knowledge of operating systems, networking, and computer hardware through various assessment instruments.
3. Demonstrate proficiency in design concepts, orthographic projection, dimensioning practices, and blueprint reading through knowledge and hands on based assessments.
4. Illustrate basic ladder logic programming, addressing, editing, and troubleshooting by applying concepts to PLC design and demonstration projects.

See page 56 for a list of Communications Electives.

<u>First Semester / 1st 8 weeks</u>		<u>Credits</u>
+	IND120 Industrial Electricity I	3
	IND110* Industrial Computing I	3
	IND105 Industrial Safety	<u>2</u>
		8

<u>First Semester / 2nd 8 weeks</u>		<u>Credits</u>
+	IND121 Industrial Electricity II	3
+	PLC200 Programmable Controller I	3
	Communications Elective	<u>3</u>
		9

<u>Second Semester / 1st 8 weeks</u>		<u>Credits</u>
+	IND223 Motors & Motor Controls	3
+	IND221 Instrumentation & Controls.....	<u>3</u>
		6

<u>Second Semester / 2nd 8 weeks</u>		<u>Credits</u>
+	PLC210 Programmable Controller II	3
+	PLC220 Programmable Controller III.....	3
+	PLC230 Servo/Robotics Systems.....	<u>3</u>
		9

Total Program Hours 32

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

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.