



SCIENCE, TECHNOLOGY, ENGINEERING TECH, & MATH

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Science, Technology, Engineering Tech, and Math Division

Mission: To serve by providing an excellent educational experience, with genuine interest in our students' success and personal growth for their entire college career and beyond.

Vision: To be an integral part of NSCC as a recognized leader in the STEM fields, not only in the community but the region and the state.

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

Through the Engineering Technologies Division, 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.

Degree and certificate programs offered through the Engineering Technologies Division include:

Associate of Applied Science

- Computer Science Engineering Technology
- Electro-Mechanical Engineering (pending)
- Electrical Engineering Technology
- Mechanical Engineering Technology
- Project Management Technology

Information Technology

- Computer Programming
- Internet Security
- Network Administration

Mechanical Engineering Technology

- CAD/CAM
- Plastics (pending)

Certificate Programs

- Computer Aided Design
- Computer Technician
- Plastics Manufacturing
- Quality Control

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

ENG113	Speech
ENG210	Technical Communications

Natural Science

CHM101	Principles of Chemistry
CHM201	General Chemistry I
PHY101	Principles of Physical Science
PHY251	Physics: Mechanics & Heat
PHY252	Physics: Electricity & Magnetism

Technical Electives

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

Prerequisites

All students are required to demonstrate proficiencies in reading, writing, and mathematics based on scores on the assessment test or take the recommended classes. If you have not taken these tests, stop by the Admissions Office in C106 or call (419) 267-1320 for information or referral to testing.

Some courses listed in this program have specific prerequisites. See prerequisites required for each course in the Course Description section of this publication.

CAD/CAM

Associate of Applied Science in Mechanical Engineering Technology

Science, Technology, Engineering Tech, and Math Division

The CAD/CAM graduate will earn an Associate of Applied Science degree in the Mechanical Engineering Technology. Students completing the associate degree are qualified to play a support role to the engineering professionals in industry preparing blueprints, layouts, bills of materials, manufacturing and product support documentations. The CAD/CAM major will also prepare the student to interpret designs and to design components and tooling used in manufacturing and to operate production machines and program CNC machines, using G Codes and state-of-the-art CAM software.

Career Outlook

Job seekers who have a two-year degree should have the best prospects for employment. With the shortage of skilled metalworkers in the United States today, the job opportunities are favorable for the CAD/CAM Technician.

Program Learning Outcomes

Students earning an Associate degree from this program will:

1. Interpolate and complete engineered drawings using orthographic projection, isometric views, and proper dimensioning practices, then employ the use of Computer-Aided-Design (CAD) software.
2. Describe the different manufacturing processes and demonstrate proper use of precision measuring devices and instruments.
3. Demonstrate machining projects with an emphasis on safety, fixturing, feeds and speeds, tooling, precision, and accuracy.
4. Employ the use of Computer-Aided-Manufacturing (CAM) software.

See page 31 for a list of Humanities and Social/Behavioral Science Electives.

See page 40 for a list of Communications and Technical Electives.

<u>First Semester</u>		<u>Credits</u>
	CAD111 CAD I.....	4
	ENG111 Composition I.....	3
+	IND140 Principles of Machining	3
	MET100 Intro to Engineering Technology.....	2
+	MET107 Engineering Graphics.....	<u>3</u>
		15

<u>Second Semester</u>		<u>Credits</u>
+	CAD213 CAD III	4
	ENG112 Composition II	3
+	IND241 Tooling & Fixtures	3
+	MET222 Programming CNC.....	3
	MTH109 College Algebra.....	<u>3</u>
		16

<u>Third Semester</u>		<u>Credits</u>
+	MET223 CAM I	4
	MTH112 Trigonometry.....	3
+	QCT100 Quality Concepts.....	3
	Communications Elective	3
	Social/Behavioral Science Elective	<u>3</u>
		16

<u>Fourth Semester</u>		<u>Credits</u>
+	MET260 CAM II	3
+	MET262 CAD/CAM Project	4
	PHY251 Physics: Mechanics & Heat	4
+	CET115 Project Management or	
	MET121 Manufacturing Processes or	
	MET134 Engineering Materials	3
	Humanities Elective	<u>3</u>
		17

Total Program Hours 64

+ Students must attain a minimum grade of “C” in all courses with a ‘+’ to progress in the program and to graduate.

Computer Aided Design Certificate

Science, Technology, Engineering Tech, and Math Division

A Computer Aided Design Certificate prepares the individual to create engineering drawings using CAD software. Typically these individuals will work closely with mechanical engineers, sometimes receiving objectives and technical advice from supervisors and/or engineers (both Electrical and Mechanical), displaying both their knowledge of the software and current knowledge of drafting and design standards. It is expected by employers that individuals demonstrate excellent verbal, written and interpersonal communication skills.

Coursework (100 level or higher) completed in this certificate directly applies toward the associate degree in mechanical engineering technology with a CAD/CAM major.

Career Outlook

Graduates of this program may find employment as an entry-level CAD operator/technician or as a detailer working under the direction of a design engineer. Some of the typical duties of a CAD operator/technician will include: compiling and computing a variety of engineering data; developing and preparing schematics from designs made by you and/or others; making preliminary designs from rough specifications and/or verbal directions; generating and revising current engineering prints and three-dimensional patterns for parts and products; designing and modifying equipment used for manufacturing; building a bill of material for new or revised designs, revising drawings and checking prints for accuracy.

Job opportunities for CAD technicians will remain stable through the next several years, with most of the positions occurring from replacing workers who leave the profession or retire.

Program Learning Outcomes

Students earning a certificate from this program should demonstrate:

1. Demonstrate file handling and management
2. Demonstrate familiarity with computer software, CAD, computer hardware, and component terminologies
3. Interpret and apply the Cartesian coordinate system
4. Demonstrate setup, display, drawing, inquiry, and modify commands
5. Develop, modify, and manipulate symbols, crosshatching, and various types of dimensioning
6. Demonstrate inquiry commands and develop industrial-type detail and assembly drawings as well as produce finished projects

<u>First Semester</u>		<u>Credits</u>
+ CAD111	CAD I.....	4
IND103	Applied Geometry & Trigonometry	3
+ IND140	Principles of Machining.....	3
MET100	Into to Engineering Tech.....	2
+ MET110	Print Reading & Sketching.....	<u>3</u>
		15
<u>Second Semester</u>		<u>Credits</u>
+ CAD112	CAD II or	
+ CAD213	CAD III.....	4
ENG111	Composition I.....	3
+ IND241	Tooling & Fixtures.....	3
+ MET121	Manufacturing Processes or	
+ MET222	Programming CNC.....	3
+ QCT141	Precision Measurement.....	<u>3</u>
		16
	Total Program Hours	31

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

Computer Programming

Associate of Applied Business in Information Technology

Science, Technology, Engineering Tech, and Math Division

Computers play a part in nearly all phases of our life today. Businesses and governmental agencies, large and small, require trained computer specialists. The computer programming degree prepares computer programmers and computer operators to work with a wide variety of computers and languages used by area employers. Emphasis is placed upon business-oriented computer languages. Programming and practical applications of business data are stressed. In the laboratory, hands-on experience is provided using the Internet and PC compatible computers.

Graduates may find employment in entry-level positions with typical titles such as Computer Operator, Application Programmer, Maintenance Programmer, Software Developer or in Technical Support. A career path may include Lead or Senior Programmer and Data Processing Manager.

Career Outlook

Employment of computer programmers is expected to be quite good. Opportunities should be especially favorable for those programmers who know several programming languages.

Program Learning Outcomes

Student will be able to:

1. Demonstrate the ability to apply structured programming concepts.
2. Install and troubleshoot current Personal Computer hardware and current Operating System software.
3. Demonstrate software skills.
4. Write and debug programs.

Mathematics Electives:

- MTH105 Quantitative Reasoning
- MTH109 College Algebra
- STA120 Introduction to Statistics
- STA222 Business Statistics

See page 31 for Natural Science, Humanities and Social Behavioral Science Electives.

<u>First Semester</u>	<u>Credits</u>
BUS101 Introduction to Business.....	3
+ CIS111 Visual Basic Programming.....	4
+ CIS191 Computer Operations	3
ENG111 Composition I.....	3
Mathematics Elective	<u>3</u>
	16

<u>Second Semester</u>	<u>Credits</u>
+ CIS108 Internet Scripting.....	4
+ CIS109 Database Management	4
CIS114 Microsoft Applications.....	3
ENG112 Composition II	3
Humanities Elective	<u>3</u>
	17

<u>Third Semester</u>	<u>Credits</u>
ACC111 Financial Accounting	3
+ CIS150 Programming C++.....	4
+ CIS165 Java Programming.....	4
Natural Science Elective	<u>3</u>
	14

<u>Fourth Semester</u>	<u>Credits</u>
BUS211 Business Communications	3
+ CIS161 C#.....	4
+ CIS265 Java Programming II.....	4
Social Behavioral Science Elective	<u>3</u>
	14

Total Program Credit Hours 61

+ Students must attain a 2.00 grade point average in these technical courses to graduate.

Computer Science Engineering Technology

Associate of Applied Science

Science, Technology, Engineering Tech, and Math Division

The Computer Science Engineering Technology program prepares graduates for the field of computer science with a comprehensive understanding of computer hardware and software at the machine and system level. The program combines curriculum in electronics and computer programming addressing both hardware and software aspects of computer design and applications. The design aspect places emphasis on computer structures, computer architectures, microcomputer systems, digital design, and computational applications. The applications part of the program includes a general knowledge of computer operating systems, utilization of software in engineering technologies, low- and hi-level programming techniques, and the use of mathematical algorithms.

Career Outlook

With an increasing utilization of computer systems and programming, demand for technicians with a computer science background is ever increasing. Graduates of this program will have the foundational coursework leading into four year computer science and electrical engineering programs at various universities, as well as being qualified for entry level engineering technicians in product design, engineering support, and other technical support positions. Typical job titles with this degree would include Application Specialist, Computer Systems Specialist, Computer Maintenance Technician, Field Service Representative, Field Engineer, Installation Technician, and Systems Integrator.

Program Learning Outcomes

Students earning an Associate degree from this program will be able to:

1. Apply fundamental electrical and magnetic theory and reduce to practice direct current (DC) circuits.
2. Discuss the foundations of digital logic.
3. Implement logic circuits using electronic and microprocessor hardware.
4. Write and debug software using high- and low-level structured programming techniques.
5. Utilize foundational algorithms and mathematical constructs.
6. Design and manage data network systems, including routers, switches, and data cable installations.

See page 31 for Humanities and Social Behavioral Science Electives.

See page 40 for Communications Electives.

<u>First Semester</u>		<u>Credits</u>
+ CIS191	Computer Operations	3
+ EET121	DC Circuits.....	3
ENG111	Composition I.....	3
MET100	Intro to Engineering Technology.....	2
MTH109	College Algebra.....	3
	Humanities Elective	<u>3</u>
		17

<u>Second Semester</u>		<u>Credits</u>
+ EET122	AC Circuits.....	3
+ EET132	Discrete Structures	3
+ EET240	Engineering Programming	3
ENG112	Composition II	3
MTH112	Trigonometry.....	<u>3</u>
		15

<u>Third Semester</u>		<u>Credits</u>
+ CIS165	Java Programming.....	4
+ EET231	Microprocessors	4
+ EET272	Networking I	3
PHY251	Physics: Mechanics & Heat	<u>4</u>
		15

<u>Fourth Semester</u>		<u>Credits</u>
+ EET221	Digital Circuits	4
PHY252	Physics: Electricity & Magnetism...	4
	Communications Elective	3
+ EET282	Networking II	3
	Social/Behavioral Science Elective.	<u>3</u>
		16

Total Program Hours **64**

+ Students must attain a minimum grade of “C” in all courses with a ‘+’ to progress in the program and to graduate.

Computer Technician Certificate

Science, Technology, Engineering Tech, and Math Division

The computer technician must have experience working on personal computers, experience working on networks and some programming experience. Technicians are acquainted with software packages such as word processors and spreadsheets. The computer technician must be knowledgeable in computer operations and computer systems.

<u>First Semester</u>	<u>Credits</u>
BUS101 Introduction to Business.....	3
+ CIS111 Visual Basic Programming.....	4
+ CIS191 Computer Operations	3
+ CIS193 Microsoft Server Technology.....	3
ENG111 Composition I.....	<u>3</u>
	16

Career Outlook

Students can earn the associate degree by completing one year of full-time study beyond the Computer Technician Certificate. Graduates may find employment in entry-level positions such as computer technician, peripheral equipment operator, help desk technician or technical support.

<u>Second Semester</u>	<u>Credits</u>
BUS211 Business Communications	3
CIS114 Microsoft Applications.....	3
Mathematics Elective	3
+ Programming Elective.....	4
+ Technical Elective	<u>3</u>
	16

Program Learning Outcomes

Students earning a certificate from this program will be able to:

1. Demonstrate the ability to apply structured programming concepts.
2. Install and troubleshoot current Personal Computer hardware and current Operating System software.
3. Demonstrate software skills.
4. Write and debug programs.

Total Program Credit Hours **32**

Mathematics Electives:

- MTH105 Quantitative Reasoning
- MTH109 College Algebra
- STA120 Introduction to Statistics
- STA222 Business Statistics

Technical Electives:

- CAD111 CAD I
- CIS109 Database Management
- CIS155 Linux Networking I
- CIS192 Microsoft Workstation Technology
- CIS195 Networking Essentials
- CIS194 IT Security Fundamentals
- CIS255 Linux Networking II
- CIS284 Microsoft Infrastructure Technology
- CIS285 Microsoft Directory Services Technology
- CIS290 Information Technology Internship
- EET272 Cisco Networking I

Programming Electives:

- CIS108 Internet Scripting
- CIS150 Programming C++
- CIS161 C#
- CIS165 Java Programming

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

+ Students must attain a 2.00 grade point average in these technical courses to graduate.

Electro-Mechanical Engineering Technology (pending) Associate of Applied Science

Science, Technology, Engineering Tech, and Math Division

Graduates of this program will have the foundational coursework leading into four year mechanical and/or and electrical engineering technology programs at various universities, including a direct transfer into the Miami University degree completion program, as well as being qualified for entry level engineering technicians in product design, engineering support, and other technical support positions. This program, as well, is aligned to provide an option for college credit plus students who may be interested in an engineering technology field.

Career Outlook

The demand for technicians and engineering technologists remains high, with two of the main areas of interest in mechanical and electrical. While positions have historically been described as either mechanical or electrical, today many companies are looking for mechanical engineering technologists with some electrical background or electrical with some mechanical aptitude. Companies are looking for individuals with both mechanical and electrical skills. This has also been recognized by universities, who now offer Bachelor of Science degrees in electro-mechanical engineering technology. Graduates from this program will have the foundational coursework leading into four year mechanical and/or electrical engineering technology programs at various universities, including a direct transfer into the Miami University degree completion program. Graduates will also be qualified for entry level engineering technicians in product design, engineering support, and other technical support positions.

Program Learning Outcomes

Students earning an Associate degree from this program will be able to:

1. Understand fundamental electrical and magnetic theory and reduce to practice direct current (DC) and alternating current (AC) circuits.
2. Interpret electrical diagrams and schematics to predict behavior and to assess functionality using handheld and bench-top measurement instruments.
3. Implement computer-based instrumentation, and control of digital and analog electronics.
4. Interpolate and complete engineered drawings using orthographic projection, isometric views, and proper dimensioning practices, then employ the use of Computer-Aided-Design (CAD) software.
5. Describe the different manufacturing processes and demonstrate proper use of precision measuring devices and instruments.
6. Analyze and calculate the resolution of forces on rigid bodies; determine the stress, strain, and deflection.

See page 31 for a list of Humanities and Social/Behavioral Science Electives.

See page 40 for Communications Elective.

<u>First Semester</u>		<u>Credits</u>	
	ENG111	Composition I	3
	MTH109	College Algebra	3
	MET100	Intro to Engineering Technology	2
+	MET107	Engineering Graphics	3
+	EET122	DC Circuits	<u>3</u>
			14

<u>Second Semester</u>		<u>Credits</u>	
	ENG112	Composition II	3
	MTH112	Trigonometry	3
	PHY251	Physics-Mechanics and Heat	4
+	MET121	Manufacturing Processes	3
+	EET122	AC Circuits	<u>3</u>
			16

<u>Third Semester</u>		<u>Credit</u>	
+	MET235	Statics.....	3
+	MET234	Strengths of Materials.....	3
+	EET231	Microprocessors.....	3
		Social/Behavioral Science Elective	3
		Communications Elective.....	<u>3</u>
			15

<u>Fourth Semester</u>		<u>Credits</u>	
+	EET221	Digital Electronics	3
+	CAD213	Solid Modeling	4
+	CET115	Project Management OR.....	3
+	QCT100	Quality Concepts	
		Natural Science Elective.....	3
		Humanities Elective.....	<u>3</u>
			17

Total Program Hours **62**

+ Students must attain a minimum grade of “C” in all courses with a ‘+’ to progress in the program and to graduate.

Electrical Engineering Technology

Associate of Applied Science

Science, Technology, Engineering Tech, and Math Division

Electrical Engineering Technology (EET) is a comprehensive electrical technologies program that prepares graduates for employment as skilled technicians, or for pursuit of a Bachelor of Science degree in Engineering Technology. The EET program provides a foundation of electrical and electronics theory and practice applicable to a variety of subject areas including, but not limited to, Alternative energy systems, automation and control and electric drive technology. A focus on laboratory experience gives students the technical hand skill and problem solving insight to employ solutions in the field. The curriculum includes algebra-based courses with emphasis on applied science and engineering.

Students in the EET program have opportunity to participate in applied research and testing activities to supplement coursework.

Career Outlook

Demand is growing for technicians in the electrical-related fields in northwest Ohio and across the country who possess diverse technical skills and problem solving acumen. The career outlook for graduates of the EET program is promising, with special opportunities in Alternative Energy and Electric Vehicle manufacturing and product improvement.

Program Learning Outcomes

Students earning an Associate degree from this program will be able to:

1. Understand fundamental electrical and magnetic theory and reduce to practice direct current (DC) and alternating current (AC) circuits.
2. Interpret electrical diagrams and schematics to predict behavior and to assess functionality using handheld and benchtop measurement instruments.
3. Analyze electrical circuits using Ohm's Law and theorems for specifying conductors and components, and for calculating power and energy.
4. Fabricate electrical circuits, modules, and systems using industry-accepted practices.

See page 31 for a list of Humanities and Social/Behavioral Science Electives.

See page 40 for a list of Communications Electives.

<u>First Semester</u>		<u>Credits</u>
	CAD111 CAD I or.....	4
	CAD112 CAD II	
+	EET121 DC Circuits.....	3
	ENG111 Composition I.....	3
	MET100 Intro to Engineering Technology.....	2
	MTH109 College Algebra.....	<u>3</u>
		15

<u>Second Semester</u>		<u>Credits</u>
+	EET122 AC Circuits.....	3
+	EET221 Digital Electronics.....	4
	ENG112 Composition II	3
	MTH112 Trigonometry.....	3
	Communications Elective	<u>3</u>
		16

<u>Third Semester</u>		<u>Credits</u>
+	EET231 Microprocessors	4
+	EET272 Networking I	3
+	EET277 Industrial Electronics	3
	PHY251 Physics: Mechanics & Heat	4
	Social/Behavioral Science Elective	<u>3</u>
		17

<u>Fourth Semester</u>		<u>Credits</u>
+	EET240 Engineering Programming	3
+	PHY252 Physics: Electricity & Magnetism ..	4
+	PLC200 Programmable Controller I	3
+	EET282 Networking II or	
	PLC230 Servo/Robotics Systems or	
	CET115 Project Management.....	3
	Humanities Elective	<u>3</u>
		16

Total Program Hours **64**

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

Internet Security

Associate of Applied Business in Information Technology

Science, Technology, Engineering Tech, and Math Division

An Internet Security professional assists in securing networks and computers from unauthorized activity. This program will teach students how to monitor networks using packet sniffing, secure networks using firewalls, secure network file systems, manage passwords, encrypt files, encrypt network traffic and deal with threats such as spyware, malware and viruses.

<u>First Semester</u>		<u>Credits</u>
	BUS101	Introduction to Business..... 3
+	CIS191	Computer Operations 3
+	CIS193	Microsoft Server Technology..... 3
+	CIS195	Networking Essentials..... 3
	ENG111	Composition I..... 3
		<u>15</u>

Career Outlook

Career opportunities are numerous for individuals in this field. All organizations, large and small, use the computer as an integral part of their business. Workers need both software and hardware support to do their jobs. Graduates may find employment in entry-level positions with typical titles such as Internet Security Specialist, Network Security Analyst, Security Administrator or Computer Security Specialist.

<u>Second Semester</u>		<u>Credits</u>
	CIS114	Microsoft Applications..... 3
+	CIS194	IT Security Fundamentals 3
	ENG112	Composition II 3
		Natural Science Elective 3
+		Technical Elective 3
		<u>15</u>

Program Learning Outcomes

Students earning an Associate degree from this program will be able to:

1. Demonstrate the ability to apply structured programming concepts.
2. Install and troubleshoot current Personal Computer hardware and current Operating System software.
3. Demonstrate software skills.
4. Implement procedures designed to counteract current Computer and Network security risks.

<u>Third Semester</u>		<u>Credits</u>
	ACC111	Financial Accounting 3
+	CJT130	Criminal Justice Principles..... 3
		Mathematics Elective 3
+		Programming Elective..... 4
+		Technical Elective 3
		<u>16</u>

Mathematics Electives:

MTH105	Quantitative Reasoning
MTH109	College Algebra
STA120	Introduction to Statistics
STA222	Business Statistics

<u>Fourth Semester</u>		<u>Credits</u>
	BUS211	Business Communications 3
+	CIS155	Linux Networking I..... 4
+	CIS284	Microsoft Infrastructure Technology 3
		Humanities Elective 3
		Social Behavioral Science Elective. 3
		<u>16</u>

Total Program Credit Hours 62

Programming Electives:

CIS108	Internet Scripting
CIS111	Visual Basic Programming
CIS150	Programming C++
CIS161	C#
CIS165	Java Programming

Technical Electives:

CAD111	CAD I
CIS109	Database Management
CIS192	Microsoft Workstation Technology
CIS255	Linux Networking II
CIS285	Microsoft Directory Services Technology
CIS290	Information Technology Internship
EET272	Cisco Networking I

See page 31 for Natural Science, Humanities and Social Behavioral Science Electives.

+ Students must attain a 2.00 grade point average in these technical courses to graduate.

Mechanical Engineering Technology

Associate of Applied Science

Science, Technology, Engineering Tech, and Math Division

The machinery of modern industry consists of mechanical devices, levers that move, wheels that spin and cogs that must mesh. The mechanical engineering technology degree is designed to educate students in technology based, entry-level occupations related to the mechanical and manufacturing engineering fields. Graduates will be able to assist engineers and other professional staff engaged in plant and facilities maintenance and other plant engineering and management functions.

All aspects of industry are dependent on the production and reading of drawings to convey information.

The mechanical engineering technology degree provides students the opportunity to study engineering topics associated with the design and installation of mechanical equipment and systems with the option of transferring to another institution to pursue a four-year bachelor degree in Mechanical Engineering Technology.

The student who follows this course of study will be trained to function as a Mechanical Technician in a number of industrial situations which require knowledge of mechanical systems, engineering materials and equipment. The student may find himself/herself working closely with engineers engaged in designing, testing, servicing or assembly and installation of machinery and industrial equipment.

Career Outlook

Many diverse occupations find their origins in the mechanical field. These occupations include a variety of titles in the areas of drafting, production, testing, design and analysis, to name a few. Employment in the mechanical field should be quite good with job opportunities growing as fast as average nationally and in the state of Ohio.

The largest need for mechanical engineering technicians will be in manufacturing, with companies continually wanting new or improved machinery.

Program Learning Outcomes

Students earning an Associate degree from this program will:

1. Interpolate and complete engineered drawings using orthographic projection, isometric views, and proper dimensioning practices, then employ the use of Computer-Aided-Design (CAD) software.
2. Describe the different manufacturing processes and demonstrate proper use of precision measuring devices and instruments.
3. Examine the physical and chemical properties of engineering materials, analyze and calculate the properties of fluids.
4. Analyze and calculate the resolution of forces on rigid bodies; determine the stress, strain, and deflection, then design machines and mechanisms.

<u>First Semester</u>		<u>Credits</u>
ENG111	Composition I.....	3
MET100	Intro to Engineering Technologies	2
+ MET107	Engineering Graphics.....	3
+ MET121	Manufacturing Processes	3
MTH109	College Algebra	<u>3</u>
		14

<u>Second Semester</u>		<u>Credits</u>
+ CAD213	CAD III	4
ENG112	Composition II	3
+ MET134	Engineering Materials	3
MTH112	Trigonometry.....	3
PHY251	Physics: Mechanics and Heat.....	<u>4</u>
		17

<u>Third Semester</u>		<u>Credits</u>
+ QCT100	Quality Concepts.....	3
+ MET234	Strength of Materials.....	3
+ MET235	Statics	3
	Natural Science Elective	4
	Communications Elective	<u>3</u>
		16

<u>Fourth Semester</u>		<u>Credits</u>
+ MET255	Fluid Mechanics	3
+ MET265	Machine Design	3
+ CAD II	CADII or	
+ EET121	DC Circuits or	
+ CET115	Project Management.....	3
	Social/Behavioral Science Elective.	3
	Humanities Elective	<u>3</u>
		15

Total Program Hours **62**

See page 31 for a list of Humanities and Social/Behavioral Science Electives.

See page 40 for a list of Communications, Natural Science and Technical Electives.

+ Students must attain a minimum grade of “C” in all courses with a ‘+’ to progress in the program and to graduate.

Network Administration

Associate of Applied Business in Information Technology

Science, Technology, Engineering Tech, and Math Division

The Network Administration major provides the skills and training necessary to install and maintain networks using Microsoft and Linux Operating Systems. The program provides the student with training in current programming languages such as C++, Java, C#, and Visual Basic. Training is provided which will help students to prepare for certification tests offered by organizations such as CompTIA and Microsoft.

Career Outlook

Career opportunities are numerous for individuals in this field. All organizations, large and small, use computers as an integral part of how they do business. Workers need both software and hardware support to do their jobs. Graduates may find employment in entry-level positions with typical titles such as Network Administrator, Network Engineer, Network Installation Engineer, Computer Programmer, Technical Support or Help Desk. A career path may include Enterprise Network Administration, Lead or Senior Programmer, Systems Programmer and Data Processing Manager.

Program Learning Outcomes

Students earning an Associate degree from this program will be able to:

1. Demonstrate the ability to apply structured programming concepts.
2. Install and troubleshoot current Personal Computer hardware and current Operating System software.
3. Demonstrate software skills.
4. Install and troubleshoot Network Operating Systems and protocols.

Mathematics Electives:

MTH105	Quantitative Reasoning
MTH109	College Algebra
STA120	Introduction to Statistics
STA222	Business Statistics

Programming Electives:

CIS108	Internet Scripting
CIS111	Visual Basic Programming
CIS150	Programming C++
CIS161	C#
CIS165	Java Programming

Technical Electives:

CAD111	CAD I
CIS109	Database Management
CIS194	IT Security Fundamentals
CIS255	Linux Networking II
CIS290	Information Technology Internship
EET272	Cisco Networking I

See page 31 for a list of Humanities and Social/Behavioral Science Electives.

See page 40 for a list of Communications Electives.

<u>First Semester</u>		<u>Credits</u>
	BUS101	Introduction to Business
+	CIS191	Computer Operations.....
+	CIS193	Microsoft Server Technology
+	CIS195	Networking Essentials
	ENG111	Composition I
		15

<u>Second Semester</u>		<u>Credits</u>
+	CIS155	Linux Networking I
+	CIS284	Microsoft Infrastructure Technology ..
	ENG112	Composition II
		Social Behavioral Science Elective ...
+		Technical Elective.....
		16

<u>Third Semester</u>		<u>Credits</u>
	ACC111	Financial Accounting
	CIS114	Microsoft Applications
+	CIS192	Microsoft Workstation Technology ...
+		Programming Elective
		Mathematics Elective
		16

<u>Fourth Semester</u>		<u>Credits</u>
	BUS211	Business Communications.....
+	CIS285	Microsoft Directory Services
		Technology
		Humanities Elective.....
		Natural Science Elective.....
+		Technical Elective.....
		15

Total Program Credit Hours **62**

+ Students must attain a 2.00 grade point average in these technical courses to graduate.

Plastics (pending)

Associate of Applied Science in Mechanical Engineering Technology

Science, Technology, Engineering Tech, and Math Division

Plastics is one of the fastest growing manufacturing industries today. The plastics program at Northwest State Community College was created in response to the industry demand in northwest Ohio for employee training and student education in plastics manufacturing. Students will receive specialized training in thermoplastic materials, injection molding and plastics testing. Graduates will also be skilled in various processes such as blow molding, extrusion and thermoforming.

Career Outlook

While consumer demand for convenient, plastic products increases, so will the need for highly-skilled plastics technicians. Job titles in this field can include Molding Technician, Production Supervisor, design and development and quality control technician to name a few. Employment of plastic processing workers is expected to grow as fast as the average both nationally and in the state of Ohio. An increase in workers trained in the field will stem from manufacturers substituting plastic parts for those that had been manufactured from metal in the past.

Program Learning Outcomes

Students earning an Associate degree from this program will:

1. Discuss and explain polymers including history, current industry, recycling, types of polymers and properties, as well as analyze various polymeric structures and applications based on those structures.
2. Explain, compare, and contrast common manufacturing processes used in the plastics industry and select the appropriate process depending on the product, as well as the ability to outline major plastics process and establish a production intent process and troubleshoot various defects.
3. Demonstrate and explain the various properties and test associated with plastics materials, as well as the ability to make decisions on part requirements based on various properties and tests.
4. Explain secondary operations used in the plastics industry primarily for assembly and decoration and select appropriate secondary operations based on production requirements.
5. Evaluate and design a mold and die for dimensional stability, process ability, flow characteristics for production intent.

See page 31 for a list of Humanities and Social/Behavioral Science Electives.

See page 40 for a list of Communications Electives.

<u>First Semester</u>		<u>Credits</u>
ENG111	Composition I.....	3
MET100	Intro to Engineering Technology.....	2
MTH109	College Algebra.....	3
+ MET107	Engineering Graphics.....	3
+ MET121	Manufacturing Processes	<u>3</u>
		14

<u>Second Semester</u>		<u>Credits</u>
ENG112	Composition II	3
MTH112	Trigonometry.....	3
PHY251	Physics: Mechanics and Heat.....	4
+ CAD213	CAD111.....	4
+ PET115	Plastics Processes.....	<u>4</u>
		18

<u>Third Semester</u>		<u>Credits</u>
+ QCT100	Quality Concepts.....	3
+ MET234	Strength of Materials.....	3
+ MET235	Statics	3
CHM101	Chemistry	4
+ PET215	Plastics Processes II	<u>4</u>
		17

<u>Fourth Semester</u>		<u>Credits</u>
+ CET115	Program Management OR	
+ MET255	Fluid Mechanics	3
+ MET134	Engineering Materials	3
	Communications Elective	3
	Social/Behavioral Science Elective.....	3
	Humanities Elective	<u>3</u>
		15

Total Program Hours **64**

+ Students must attain a minimum grade of “C” in all courses with a ‘+’ to progress in the program and to graduate.

Plastics Manufacturing Certificate

Science, Technology, Engineering Tech, and Math Division

A Plastics Manufacturing Certificate prepares the individual to setup and maintain injection molding processes; plastics testing processes and ensure quality control. Individuals may also be skilled in various processes such as blow molding, extrusion, and thermoforming. Typically these individuals report to manufacturing supervisors, receiving daily objectives from them.

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

Coursework (100 level or higher) completed in this certificate directly applies toward the associate degree in plastics engineering technology.

Career Outlook

Graduates of this program may find employment as entry-level mold technicians, mold setters, job setters and material handlers working under the direction of the manufacturing department. Some of the typical duties of these technicians will include performing: mold insert changes; material color changes; press start-ups and shut downs; mold changes and planned maintenance (PMs) on the molds; performing product inspections to verify conformance to specifications, ensuring quality control; and directing and performing adjustments of molding equipment, working closely with the production and the quality control departments.

Program Learning Outcomes

Students earning a certificate from this program should demonstrate:

1. Discuss and explain polymers including history, current industry, recycling, types of polymers and properties.
2. Explain, compare, and contrast common manufacturing processes used in the plastics industry. Select the appropriate process depending on the product, as well as the ability to outline major plastics process and establish a production intent process and troubleshoot various defects.
3. Produce design concepts and orthographic projection. Interpolate dimensioning practices and read blueprints, as well as explain the various properties associated with plastics and the ability to perform functional tests used to determine properties.
4. Explain the theory of common secondary operations used in the plastics industry primarily for assembly and decorating.

<u>First Semester</u>		<u>Credits</u>
	IND105 Industrial Safety	2
	MET100 Intro to Engineering Tech.....	2
+	MET110 Print Reading & Sketching.....	3
+	PET110 Principles of Plastics	4
+	PET115 Plastics Processes I.....	<u>4</u>
		15

<u>Second Semester</u>		<u>Credits</u>
	ENG111 Composition I.....	3
	IND103 Applied Geometry and Trigonometry	3
+	PET215 Plastics Processes II	4
+	PET250 Plastics Secondary Operations	4
+	QCT100 Precision Measurement	<u>3</u>
		17

Total Program Hours **32**

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

Project Management Technology Associate of Applied Science

Science, Technology, Engineering Tech, and Math Division

This program is designed to prepare graduates for careers as technicians, management trainees or supervisors in manufacturing. Courses include a mixture of business management topics with an emphasis on engineering technologies.

Career Outlook

The demand for educated Project Managers continues to grow nationally and in the State of Ohio. Time management, hands on engineering, and refined communication skills are required by several industries in order to meet tight profit margins. Construction, Engineering, Logistics, and Manufacturing will be the strongest areas of employment for Project Management Technology.

Program Learning Outcomes

Students earning an Associate degree from this program should demonstrate:

1. Interpolate and complete and complete engineered drawings using orthographic projection, isometric views, and proper dimensioning practices, as well as employ the use of Computer-Aided-Design (CAD) software.
2. Demonstrate proper use of precision measuring devices and instruments and the ability to apply SPC practices to various processes within the industry.
3. Efficiently and effectively manage projects, including scheduling, monitoring, and analyzing with respect to cost, time, and resources..
4. Basic knowledge of Engineering Technology based on the selected track

Engineering Technology Tracks (Choose a track):

Alternative Energy: AET 100 Intro. to Alternative Energy and
AET 200 Sustainable Building Design

Construction: CET 100 Construction Methods and Materials and
CET 120 Construction Materials Testing

Electrical: EET 121 DC Circuits and
EET 122 AC Circuits

Mechanical: MET 121 Manufacturing Processes and
MET 134 Engineering Materials

Plastics: PET115 Plastics Processes I and
PET215 Plastics Processes II

<u>First Semester</u>	<u>Credits</u>
ENG111 Composition I.....	3
+ MET100 Intro to Engineering Technology	2
+ MET107 Engineering Graphics.....	3
+ CIS114 Microsoft Applications.....	3
MTH109 College Algebra.....	<u>3</u>
	14

<u>Second Semester</u>	<u>Credits</u>
ENG112 Composition II	3
MTH112 Trigonometry.....	3
+ CAD213 CAD III	4
+ CET115 Project Management.....	3
+ Track 1.....	<u>3</u>
	16

<u>Third Semester</u>	<u>Credits</u>
PHY251 Physics: Mechanics & Heat	4
+ CET215 Project Management II.....	3
ECO212 Economics	3
Communications Elective	3
+ Track 2.....	<u>3</u>
	16

<u>Fourth Semester</u>	<u>Credits</u>
+ QCT100 Quality Concepts.....	3
ACC111 Financial Accounting	3
+ AET290 Capstone OR	
+ MET290 Engineering Tech Co-op Internship	3
Humanities Elective	3
Natural Science Elective	<u>4</u>
	16

Total Program Hours **62**

See page 31 for a list of Humanities and Social/Behavioral Science Electives.

See page 40 for Communications Electives.

+ Students must attain a minimum grade of “C” in all courses with a ‘+’ to progress in the program and to graduate.

Quality Control Certificate

Science, Technology, Engineering Tech, and Math Division

A Manufacturing Quality Certificate prepares the student for a career as a quality specialist (supplier quality engineer, green belt, mechanical inspector, quality technician, auditor and similar roles).

Twenty-first century manufacturing operations link productivity to quality. Lean manufacturing quality concepts are essential to modern competitiveness. Accordingly, persons seeking greater responsibility should consider the quality curriculum.

This program of study prepares the student to sit for American Society for Quality Technician exam. ASQ certifications are widely recognized and favorably impact hiring and compensation decisions.

Career Outlook

The greatest demand for engineering technicians will be in manufacturing. Companies need improved machinery, up-to-date processes, and lean manufacturing methods to compete on a global basis. Quality skills apply during all phases of the product cycle – from concept to production to distribution and service.

ISO/TS/OHSA certifications are becoming a common prerequisite for doing business, worldwide. This course of study imparts the skills needed to comply with many certification system requirements. Skills learned in this course form a solid foundation on which to build if your goal is to become a Quality Assurance Manager, Quality Engineer, or Quality Auditor.

Program Learning Outcomes

Students earning a certificate from this program should demonstrate:

1. Basic knowledge leading to quality from management, practitioner and customer perspectives.
2. Concentration on quality problem solving and process control tools.
3. Basic understanding of probability and philosophies espoused by Deming, Crosby, and Juran.
4. Basic knowledge of quality, measurement system analysis and control charting principles.
5. Proper selection and use of measuring tools for the feature based upon the print specification.
6. Proficiency for dealing with tolerance stacks, another layer of G D & T.
7. Basic understanding of more complex quality improvement methods by studying at least three of the following topics: Advanced SPC, Six Sigma Start-Up, DOE: Screening Experiments, Measurement Systems Analysis or Problem Solving.

<u>First Semester</u>		<u>Credits</u>
+	MET110 Print Reading & Sketching.....	3
	MTH109 College Algebra.....	3
+	QCT100 Quality Concepts.....	<u>3</u>
		9

<u>Second Semester</u>		<u>Credits</u>
+	CAD100 CAD for Machining	3
+	IND110* Industrial Computing I	3
+	QCT131 Quality for Lean Manufacturing	<u>3</u>
		9

<u>Third Semester</u>		<u>Credits</u>
+	QCT141 Precision Measurement	3
+	QCT243 Advanced Quality Improvement.....	3
	Communications Elective	<u>3</u>
		9

<u>Fourth Semester</u>		<u>Credits</u>
+	PET110 Principles of Plastics	4
+	QCT142 Advanced Concepts of GD&T	3
+	QCT250 Certified Quality Technician/ Certified Mechanical Inspector Review	<u>3</u>
		10

Total Program Hours **37**

See page 40 for a list of Communications Electives.

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