

Industrial Technologies

*Effective 2014 Spring

Bioprocess Technology**Credential: Associate in Applied Science
Degree in Bioprocess Technology
A50440**

The Bioprocess Technology curriculum is designed to prepare individuals to work as Process Operators in biological products manufacturing facilities. Students will combine basic science and communication skills, manufacturing technologies, and good manufacturing practices in the course of study. Students will be expected to develop a strong basic science foundation with a sound understanding of the major technologies employed in the industry. They will also be expected to develop collaborative and disciplined work ethics while consistently practicing problem-solving skills.

Upon successful completion of the program, individuals should possess the necessary skills to qualify for employment in a variety of bioprocessing industries.

Program Length: 5 semesters

Career Pathway Options: Associate in Applied Science in Bioprocess Technology; Certificate in Bioprocess Technology

Program Sites: Lee Campus - Day Program

Course requirements for Bioprocess Technology Degree

A. General Education Courses (18 SHC)		C-L-SHC
COM 120	Interpersonal Communication	3-0-3
	OR	
COM 231	Public Speaking	3-0-3
ENG 111	Expository Writing	3-0-3
ENG 114	Professional Research and Reporting	3-0-3
	Humanities/Fine Arts Elective	3
MAT 161	College Algebra	3-0-3
	OR	
MAT 121	Algebra/Trigonometry I	2-2-3
	Social/Behavioral Science Elective	3-0-3
B. Technical Core Courses (21 SHC)		
BPM 110	Bioprocess Practices	3-4-5
BPM 111	Bioprocess Measurements	3-3-4
BPM 112	Upstream Bioprocessing	3-4-5
BPM 113	Downstream Bioprocessing	3-3-4
PTC 110	Industrial Environment	3-0-3
C. Other Major Hours (29 SHC)		
BIO 110	Principles of Biology	3-3-4
BIO 175	General Microbiology	2-2-3
BIO 176	Advanced General Microbiology	1-2-2
CHM 131	Introduction to Chemistry	3-0-3
CHM 131A	Introduction to Chemistry Lab	0-3-1
CHM 132	Organic and Biochemistry	3-3-4
CIS 110	Introduction to Computers	2-2-3

ISC 121	Environmental Health and Safety	3-0-3
ISC 221	Statistical Quality Control	3-0-3
	Co-op/Project Elective	2

Co-op/Project Elective (Choose one course.)

COE 112	Co-op Work Experience I	0-20-2
EGR 285	Design Project	0-4-2

ACA 111	College Student Success	1-0-1
ACA 115	Success and Study Skills	0-2-1
ACA 122	College Transfer Success	1-0-1

Total Semester Hours Credit required for graduation: 68

Semester Curriculum for Bioprocess Technology Degree

1st Semester (Fall)		C-L-SHC
BIO 110	Principles of Biology	3-3-4
CHM 131	Introduction to Chemistry	3-0-3
CHM 131A	Introduction to Chemistry Lab	0-3-1
CIS 110	Introduction to Computers	2-2-3
MAT 121	Algebra/Trigonometry I	2-2-3
	OR	
MAT 161	College Algebra	3-0-3
PTC 110	Industrial Environment	<u>3-0-3</u>
		13/14-8/10-17

2nd Semester (Spring)

BIO 175	General Microbiology	2-2-3
BPM 110	Bioprocess Practices	3-4-5
CHM 132	Organic/Biochemistry	3-3-4
ENG 111	Expository Writing	3-0-3
ACA 111	College Student Success	1-0-1
ISC 121	Environmental Health and Safety	<u>3-0-3</u>
		15-9-19

3rd Semester (Summer)

	Co-op/Project Elective	0-20/4-2
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4th Semester (Fall)

BIO 176	Advanced General Microbiology	1-2-2
BPM 111	Bioprocess Measurements	3-3-4
COM 120	Interpersonal Communication	3-0-3
	OR	
COM 231	Public Speaking	<u>3-0-3</u>
	Humanities/Fine Arts Elective	10-5-12

5th Semester (Spring)

BPM 112	Upstream Bioprocessing	3-4-5
BPM 113	Downstream Bioprocessing	3-3-4
ENG 114	Professional Research and Reporting	3-0-3
ISC 221	Statistical Quality Control	3-0-3
	Social/Behavioral Science Elective	<u>3-0-3</u>
		15-7-18

Total Semester Hours Credit: 68

*Effective 2014 Spring

Bioprocess Technology
Credential: Certificate in Bioprocess Technology
C50440

2nd Semester (Spring)

BPM 110 Bioprocess Practices
 Major Elective

3-4-5
3/4

5/6-4/6/7- 8/9

Total Semester Hours Credit: 17/18

This program prepares individuals to enter the workforce in biological products manufacturing facilities. Coursework includes computer or math skill development, exposure to the industrial work environment, basic bioprocessing operations, and a major course elective. Graduates should be qualified to become entry-level trainees in bioprocess manufacturing.

Program Length: 2 semesters

Career Pathway Options: Associate in Applied Science Degree in Bioprocess Technology, Certificate in Bioprocess Technology,

Program Site: Lee Campus – Day or Evening Program

Course Requirements for Bioprocess Technology Certificate

A. Required Major Core Courses (8 SHC) C-L-SHC

BPM 110	Bioprocess Practices	3-4-5
PTC 110	Industrial Environment	3-0-3

B. Other Courses (9/10 SHC)

CIS 110	Introduction to Computers	2-2-3
	OR	
MAT 121	Algebra/Trigonometry I	2-2-3
	OR	
MAT 161	College Algebra	3-0-3
ISC 121	Environmental Health and Safety	3-0-3
	Major Elective	3/4

Major Elective may be selected from the following:

BIO 110	Principles of Biology	3-3-4
CHM 131	Introduction to Chemistry	3-0-3
CHM 131A	Introduction to Chemistry Lab	0-3-1
CIS 110	Introduction to Computers	2-2-3
ISC 221	Statistical Quality Control	3-0-3
MAT 121	Algebra/Trigonometry I	2-2-3
MAT 161	College Algebra	3-0-3

Total Semester Hours Credit required for graduation: 17/18

Semester Curriculum for Bioprocess Technology Certificate

1st Semester (Fall) C-L-SHC

CIS 110	Introduction to Computers	2-2-3
	OR	
MAT 121	Algebra/Trigonometry I	2-2-3
	OR	
MAT 161	College Algebra	3-0-3
ISC 121	Environmental Health and Safety	3-0-3
PTC 110	Industrial Environment	<u>3-0-3</u>
		8/9-0/2-9

*Effective 2014 Spring

Bioprocess Technology**Credential: Associate in Applied Science****Degree in BioQuality Technology****A50440QA**

The BioQuality Technology curriculum is designed to prepare individuals to work in Quality Assurance in biological products manufacturing facilities. Students will combine basic science and communication skills, manufacturing technologies, current good manufacturing practices (cGMP), quality systems, auditing, and validation in the course of study.

Students will be expected to develop a strong basic science foundation with a sound understanding of the major technologies employed in the industry. They will also be expected to develop collaborative and disciplined work ethics while consistently practicing problem-solving skills.

Upon successful completion of the program, individuals should possess the necessary skills to qualify for employment in a variety of bioprocessing industries.

Program Length: 5 semesters

Career Pathway Options: Associate in Applied Science

Degree in BioQuality Technology

Program Sites: Lee Campus - Day Program

Course requirements for BioQuality Technology Degree

A. General Education Courses (18 SHC) C-L-SHC

COM 120	Interpersonal Communication	3-0-3
	OR	
COM 231	Public Speaking	3-0-3
ENG 111	Expository Writing	3-0-3
ENG 114	Professional Research and Reporting	3-0-3
	Humanities/Fine Arts Elective	3-0-3
MAT 121	Algebra/Trigonometry I	2-2-3
	OR	
MAT 161	College Algebra	3-0-3
	Social/Behavioral Science Elective	3-0-3

B. Technical Core Courses (21 SHC)

BPM 110	Bioprocess Practices	3-4-5
BPM 111	Bioprocess Measurements	3-3-4
BPM 112	Upstream Bioprocessing	3-4-5
BPM 113	Downstream Bioprocessing	3-3-4
PTC 110	Industrial Environment	3-0-3

C. Other Major Hours (29 SHC)

BIO 110	Principles of Biology	3-3-4
BIO 175	General Microbiology	2-2-3
CHM 131	Introduction to Chemistry	3-0-3
CHM 131A	Introduction to Chemistry Lab	0-3-1
CHM 132	Organic and Biochemistry	3-3-4
CIS 110	Introduction to Computers	2-2-3
ISC 175	Quality Assurance Fundamentals	1-0-1
ISC 278	cGMP Quality Systems	2-0-2

ISC 279	Auditing for cGMP	2-2-3
ISC 280	Validation Fundamentals	1-2-2
	*Co-op/Project Elective	0-20/4-2

Student Success—Select one:

ACA 111	College Student Success	1-0-1
ACA 115	Success and Study Skills	0-2-1
ACA 122	College Transfer Success	1-0-1

Total Semester Hours Credit required for graduation: 68

*Co-Op/Project Elective (Choose one)

COE 112	Co-op Work Experience I	0-20-2
EGR 285	Design Project	0-4-2

Semester Curriculum for BioQuality Technology Degree

1st Semester (Fall)		C-L-SHC
BIO 110	Principles of Biology	3-3-4
CHM 131	Introduction to Chemistry	3-0-3
CHM 131A	Introduction to Chemistry Lab	0-3-1
CIS 110	Introduction to Computers	2-2-3
MAT 161	College Algebra	3-0-3
	OR	
MAT 121	Algebra/Trigonometry I	2-2-3
PTC 110	Industrial Environment	3-0-3
		13/14-8/10-17

2nd Semester (Spring)

BIO 175	General Microbiology	2-2-3
BPM 110	Bioprocess Practices	3-4-5
CHM 132	Organic/Biochemistry	3-3-4
ENG 111	Expository Writing	3-0-3
ACA 111	College Student Success	1-0-1
ISC 175	Quality Assurance Fundamentals	1-0-1
		13-9-17

3rd Semester (Summer)

	Co-op/Project Elective	0-20/4-2
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4th Semester (Fall)

BPM 111	Bioprocess Measurements	3-3-4
COM 231	Public Speaking	3-0-3
	OR	
COM 120	Interpersonal Communication	3-0-3
	Humanities/Fine Arts Elective	3-0-3
ISC 278	cGMP Quality Systems	2-0-2
ENG 114	Professional Research and Reporting	3-0-3
		14-3-15

5th Semester (Spring)

BPM 112	Upstream Bioprocessing	3-4-5
BPM 113	Downstream Bioprocessing	3-3-4
ISC 280	Validation Fundamentals	1-2-2
	Social/Behavioral Science Elective	3-0-3
ISC 279	Auditing for cGMP	2-2-3
		12-11-17

Total Semester Hours Credit: 68

*Effective 2014 Spring

Bioprocess Technology
Credential: Certificate in BioQuality Technology
C50440QA

This program prepares individuals with a background in manufacturing to function in the quality assurance area of a biological product manufacturing facilities. Coursework includes basic bioprocessing operations, cGMP, quality systems, auditing, and validation. Graduates should be qualified to work in a bioprocess quality assurance environment.

Applicants must have previous industrial experience.

Program Length: 2 semesters

Career Pathway Options: Associate in Applied Science Degree in BioQuality Technology (Higher entrance standards required), Certificate in BioQuality Technology, Program Site: Lee Campus – Day or Evening Program or Online

Course Requirements for BioQuality Technology Certificate

A. Required Major Core Courses (5 SHC)

BPM 110	Bioprocess Practices	3-4-5
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B. Other Courses (8 SHC)

ISC 175	Quality Assurance Fundamentals	1-0-1
ISC 278	cGMP Quality Systems	2-0-2
ISC 279	Auditing for cGMP	2-2-3
ISC 280	Validation Fundamentals	1-2-2

Total Semester Hours Credit required for graduation: 13

Semester Curriculum for BioQuality Technology Certificate

1st Semester (Fall)		C-L-SHC
BPM 110	Bioprocess Practices	3-4-5
ISC 175	Quality Assurance Fundamentals	1-0-1
ISC 278	cGMP Quality Systems	2-0-2
		6-4-8
2nd Semester (Spring)		
ISC 279	Auditing for cGMP	2-2-3
ISC 280	Validation Fundamentals	1-2-2
		3-4-5

Total Semester Hours Credit: 13

*Effective 2014 Spring

Computer Aided Drafting Technology
Credential: Associate in Applied Science Degree in Computer-Aided Drafting Technology
A50150

The Computer Aided Drafting Technology curriculum prepares graduates for employment as drafters or designers in a wide range of fields including mechanical and manufacturing engineering. Computer aided drafters and designers assist in the design and development of manufactured products.

This course-of-study prepares students to apply technical skills and advanced computer software and hardware to develop plans and related documentation, and manage the hardware and software of a CAD system. It includes instruction in mechanical drafting, computer-aided-drafting (CAD), creating and managing two and three-dimensional models, and linking CAD documents to other software applications and operating systems.

In addition to coursework in computer aided drafting, students will study computer applications, machining, computer-aided manufacturing (CAM), planning and problem solving, and oral and written communication.

Graduates of the curriculum will qualify for employment opportunities in the manufacturing or service sectors of engineering consulting firms and industrial design businesses.

Program Length: 5 semesters

Career Pathway Options: Associate in Applied Science in Computer-Aided Drafting Technology
 Program Sites: Lee Campus - Day Program

Course Requirements for the Computer-Aided Drafting Technology Degree

A. General Education Courses (19 SHC)		C-L-SHC
*ENG 110	Freshman Composition	3-0-3
**ENG 116	Technical Report Writing	3-0-3
MAT 120	Geometry and Trigonometry	2-2-3
	Humanities/Fine Arts Elective	3-0-3
	Social/Behavioral Science Elective	3-0-3
***PHY 110	Conceptual Physics	3-0-3
***PHY 110A	Conceptual Physics Lab	0-2-1

B. Technical Core (12 SHC)

DFT 151	CAD I	2-3-3
DFT 152	CAD II	2-3-3
DFT 153	CAD III	2-3-3
DFT 154	Intro to Solid Modeling	2-3-3

C. Program Major (17 SHC)

DFT 111	Technical Drafting I	1-3-2
DFT 112	Technical Drafting II	1-3-2
DDF 211	Design Process I	1-6-4

DFT 253	CAD Data Management	2-2-3
DFT 254	Intermed Solid Model/Render	2-3-3
DFT 259	CAD Project	1-4-3

D. Other Major Hours (19 SHC)

****CIS 110	Introduction to Computers	2-2-3
MEC 110	Intro to CAD/CAM	1-2-2
MEC 180	Engineering Materials	2-3-3
MEC 161	Manufacturing Processes I	3-0-3
MEC 161A	Manufacturing Processes I Lab	0-3-1
MEC 231	Comp-Aided Manufac I	1-4-3
MEC 130	Mechanisms	2-2-3

Student Success—Select one:

ACA 111	College Student Success	1-0-1
ACA 115	Success and Study Skills	0-2-1
ACA 122	College Transfer Success	1-0-1

Total Semester Hours Credit required for graduation: 67

*Student may substitute ENG 111

**Student may substitute ENG 114

*** Student may substitute PHY 121

****Student may substitute CIS 111

Semester Curriculum Computer-Aided Drafting Technology Degree

1st Semester (Fall)		C-L-SHC
ACA 111	College Student Success	1-0-1
CIS 110	Introduction to Computers	2-2-3
DFT 111	Technical Drafting I	1-3-2
ENG 110	Freshman Composition	3-0-3
MEC 110	Intro to CAD/CAM	1-2-2
MEC 180	Engineering Materials	2-3-3
PHY 110	Conceptual Physics	3-0-3
PHY 110A	Conceptual Physics Lab	<u>0-2-1</u>
		13-

12-18

2nd Semester (Spring)

DFT 151	CAD I	2-3-3
MEC 161	Manufacturing Processes I	3-0-3
MEC 161A	Manufacturing Processes I Lab	0-3-1
MAT 120	Geometry and Trigonometry	2-2-3
DFT 112	Technical Drafting II	1-3-2
MEC 231	Comp-Aided Manufac I	<u>1-4-3</u>
		9-15-15

3rd Semester (Summer)

	Humanities/Fine Arts Elective	
	OR	
	Social/Behavioral Science Elective	<u>3-0-3</u>
		3-0-3

4th Semester (Fall)

DFT 152	CAD II	2-3-3
DFT 154	Intro to Solid Modeling	2-3-3
DDF 211	Design Process I	1-6-4
MEC 130	Mechanisms	2-2-3
ENG 116	Technical Report Writing	<u>3-0-3</u>
		10-14-16

5th Semester (Spring)		
DFT 153	CAD III	2-3-3
DFT 253	CAD Data Management	2-2-3
DFT 254	Intermed Solid Model/Render	2-3-3
DFT 259	CAD Project	1-4-3
	Humanities/Fine Arts Elective	
	OR	
	Social/Behavioral Science Elective	<u>3-0-3</u>
		10-12-15

Total Semester Hours Credit Required for Graduation: 67

*Effective 2014 Spring

**Computer Aided Drafting Technology
Credential: Diploma in Computer-Aided
Drafting Technology
D50150**

The Computer Aided Drafting Technology curriculum prepares graduates for employment as drafters or designers in a wide range of fields including mechanical and manufacturing engineering. Computer aided drafters and designers assist in the design and development of manufactured products.

This course-of-study prepares students to apply technical skills and advanced computer software and hardware to develop plans and related documentation, and manage the hardware and software of a CAD system. It includes instruction in mechanical drafting, computer-aided-drafting (CAD), creating and managing two and three-dimensional models, and linking CAD documents to other software applications and operating systems.

In addition to coursework in computer aided drafting, students will study computer applications, machining, computer-aided manufacturing (CAM), planning and problem solving, and oral and written communication.

Graduates of the curriculum will qualify for employment opportunities in the manufacturing or service sectors of engineering consulting firms and industrial design businesses.

Program Length: 5 semesters

Career Pathway Options: Associate in Applied Science in Computer-Aided Drafting Technology, Diploma in Computer-Aided Drafting Technology

Program Sites: Lee Campus - Day Program

**Course Requirements for the Computer-Aided Drafting
Technology Diploma**

A. General Education Courses (6 SHC)		C-L-SHC
ENG 110	Freshman Composition	3-0-3
	OR	
ENG 111	Expository Writing	3-0-3
MAT 120	Geometry and Trigonometry	2-2-3
B. Technical Core (9 SHC)		
DFT 151	CAD I	2-3-3
DFT 152	CAD II	2-3-3
DFT 154	Intro to Solid Modeling	2-3-3
C. Program Major (5 SHC)		
DFT 111	Technical Drafting I	1-3-2
DFT 254	Intermed Solid Model/Render	2-3-3
D. Other Major Hours (18 SHC)		
*CIS 110	Introduction to Computers	2-2-3
DFT 153	CAD III	2-3-3
MEC 110	Introduction to CAD/CAM	1-2-2

MEC 161	Manufacturing Processes I	3-0-3
MEC 161A	Manufacturing Proc I Lab	0-3-1
DFT 112	Technical Drafting II	1-3-2
DFT 253	CAD Data Management	2-2-3

Student Success—Select one:

ACA 111	College Student Success	1-0-1
ACA 115	Success and Study Skills	0-2-1
ACA 122	College Transfer Success	1-0-1

Total Semester Hours Credit required for graduation: 38

*Student may substitute CIS 111

**Semester Curriculum for Computer-Aided Drafting
Technology Diploma**

1st Semester (Fall)		C-L-SHC
ACA 111	College Student Success	1-0-1
CIS 110	Introduction to Computers	2-2-3
DFT 111	Technical Drafting I	1-3-2
MAT 120	Geometry and Trigonometry	2-2-3
MEC 110	Introduction to CAD/CAM	<u>1-2-2</u>
		7-9-11
2nd Semester (Spring)		
DFT 151	CAD I	2-3-3
MEC 161	Manufacturing Processes I	3-0-3
MEC 161A	Manufacturing Proc I Lab	0-3-1
DFT 112	Technical Drafting II	<u>1-3-2</u>
		6-9-9
3rd Semester (Summer)		
ENG 110	Freshman Composition	3-0-3
	OR	
ENG 111	Expository Writing	<u>3-0-3</u>
		3-0-3
4th Semester (Fall)		
DFT 152	CAD II	2-3-3
DFT 154	Intro to Solid Modeling	<u>2-3-3</u>
		4-6-6
5th Semester (Spring)		
DFT 153	CAD III	2-3-3
DFT 253	CAD Data Management	2-2-3
DFT 254	Intermed Solid Model/Render	<u>2-3-3</u>
		6-8-9

Total Semester Hours Credit Required for Graduation: 38

*Effective 2014 Spring

**Computer Aided Drafting Technology
 Credential: Certificate in Computer-Aided
 Drafting Technology
 C50150**

The Computer Aided Drafting Technology curriculum prepares graduates for employment as drafters or designers in a wide range of fields including mechanical and manufacturing engineering. Computer aided drafters and designers assist in the design and development of manufactured products.

This course-of-study prepares students to apply technical skills and advanced computer software and hardware to develop plans and related documentation, and manage the hardware and software of a CAD system. It includes instruction in mechanical drafting, computer-aided-drafting (CAD), creating and managing two and three-dimensional models, and linking CAD documents to other software applications and operating systems.

Graduates of the curriculum will qualify for employment opportunities in the manufacturing or service sectors of engineering consulting firms and industrial design businesses.

Program Length: 4 semesters

Career Pathway Options: Associate in Applied Science in Computer-Aided Drafting Technology (Higher entrance standards required), Diploma Computer-Aided Drafting Technology (Higher entrance standards required), Certificate in Computer-Aided Drafting Technology
 Program Sites: Lee Campus - Day Program

**Course Requirements for the Computer-Aided Drafting
 Technology Certificate**

A. Technical Core (9 SHC)

DFT 151	CAD I	2-3-3
DFT 152	CAD II	2-3-3
DFT 154	Intro to Solid Modeling	2-3-3

C. Program Major (5 SHC)

DFT 111	Technical Drafting I	1-3-2
DFT 254	Intermed Solid Model/Render	2-3-3

D. Other Major Hours (3HC)

DFT 153	CAD III	2-3-3
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Total Semester Hours Credit required for graduation: 17

**Semester Curriculum for Computer-Aided Drafting
 Technology Certificate**

1st Semester (Fall)		C-L-SHC
DFT 111	Technical Drafting I	<u>1-3-2</u>
		1-3-2

2nd Semester (Spring)		
DFT 151	CAD I	<u>2-3-3</u>
		2-3-3
3rd Semester (Fall)		
DFT 152	CAD II	2-3-3
DFT 154	Intro to Solid Modeling	<u>2-3-3</u>
		4-6-6
4th Semester (Spring)		
DFT 153	CAD III	2-3-3
DFT 254	Intermed Solid Model/Render	<u>2-3-3</u>
		4-6-6

Total Semester Hours Credit Required for Graduation: 17

*Effective 2014 Spring

Industrial Systems Technology
Credential: Associate in Applied Science
Degree in Industrial Systems Technology
A50240

The Industrial Systems Technology curriculum is designed to prepare or upgrade individuals to safely service, maintain, repair and install equipment. Instruction includes theory and skill training needed for inspecting, testing, troubleshooting, and diagnosing industrial systems.

Students will learn multi-craft technical skills in blueprint reading, mechanical systems maintenance, electricity, hydraulics/pneumatics, welding, machining or fabrication, as well as various diagnostic and repair procedures.

Practical application in these industrial systems will be emphasized and additional advanced coursework may be offered.

Upon completion of this curriculum, graduates should be able to individually, or with a team, safely install, inspect, diagnose, repair and maintain industrial process and support equipment. Students will also be encouraged to develop their skills as life-long learners.

Program Length: 5 semesters

Career Pathway Options: Associate in Applied Science in Industrial Systems Technology

Program Sites: Lee Campus - Day Program

Course Requirements for Industrial Systems Technology

A. General Education Courses (15/16 SHC) C-L-SHC

*ENG 111	Expository Writing	3-0-3
	Humanities/Fine Arts Elective	3-0-3
	Social/Behavioral Science Elective	3-0-3
MAT 115	Mathematical Models	2-2-3
	Or	
PHY 121	Applied Physics I	3-2-4
ENG 116	Technical Report Writing	3-0-3

B. Technical Core (18 SHC)

BPR 111	Print Reading	1-2-2
ELC 112	DC/AC Electricity	3-6-5
HYD 110	Hydraulics/Pneumatics I	2-3-3
ISC 110	Workplace Safety	1-0-1
MEC 111	Machine Processes I	1-4-3
MNT 110	Introduction to Maintenance Procedures	1-3-2
WLD 112	Basic Welding Processes	1-3-2

C. Required Subject Area (13 SHC)

BPR 115	Electric/Fluid Power Diagrams	1-2-2
ELC 117	Motors and Controls	2-6-4
ELC 128	Introduction to PLC	2-3-3
ELC 228	PLC Applications	2-6-4

D. Other Major Hours (30 SHC)

AHR 120	HVACR Maintenance	1-3-2
**CIS 111	Basic PC Literacy	1-2-2
ELC 229	Applications Project	1-3-2

ELN 231	Industrial Controls	2-3-3
ELN 260	Prog. Logic Controllers	3-3-4
HYD 121	Hydraulics/Pneumatics II	1-3-2
MNT 111	Maintenance Practices	2-2-3
MNT 230	Pumps and Piping Systems	1-3-2
MNT 240	Industrial Equipment Troubleshooting	1-3-2
WLD 117	Industrial SMAW	1-4-3
WLD 121	GMAW (MIG) FCAW/Plate	2-6-4

Student Success—Select one:

ACA 111	College Student Success	1-0-1
ACA 115	Success and Study Skills	0-2-1
ACA 122	College Transfer Success	1-0-1

*Students may substitute ENG 110.

**Students may substitute CIS 110.

Total Semester Hours Credit required for graduation: 76/77

Semester Curriculum for Industrial Systems Technology

1st Semester (Fall)		C-L-SHC
BPR 111	Print Reading	1-2-2
CIS 111	Basic PC Literacy	1-2-2
ELC 112	DC/AC Electricity	3-6-5
	Humanities/Fine Arts Elective	3-0-3
MEC 111	Machine Processes I	1-4-3
MNT 110	Introduction to Maintenance Procedures	1-3-2
		10-17-17

2nd Semester (Spring)

ELC 128	Introduction to PLC	2-3-3
*ENG 111	Expository Writing	3-0-3
ACA 111	College Student Success	1-0-1
MAT 115	Mathematical Models	2-2-3
	Or	
PHY 121	Applied Physics I	3-2-4
WLD 112	Basic Welding Processes	1-3-2
WLD 117	Industrial SMAW	1-4-3
		10/11-12-15/16

3rd Semester (Summer)

AHR 120	HVACR Maintenance	1-3-2
BPR 115	Electric/Fluid Power Diagrams	1-2-2
ISC 110	Workplace Safety	1-0-1
HYD 110	Hydraulics/Pneumatics I	2-3-3
MNT 111	Maintenance Practices	2-2-3
		7-10-11

4th Semester (Fall)

ELC 117	Motors and Controls	2-6-4
ELN 260	Prog. Logic Controllers	3-3-4
ENG 116	Technical Report Writing	3-0-3
HYD 121	Hydraulics/Pneumatics II	1-3-2
MNT 230	Pumps and Piping Systems	1-3-2
WLD 121	GMAW (MIG) FCAW/Plate	2-6-4
		12-21-19

5th Semester (Spring)

ELC 228	PLC Applications	2-6-4
ELC 229	Applications Project	1-3-2
ELN 231	Industrial Controls	2-3-3
MNT 240	Industrial Equipment Troubleshooting	1-3-2
	Social/Behavioral Science Elective	3-0-3
		9-15-14

Total Semester Hours Credit: 76/77

*Effective 2014 Spring

Industrial Systems Technology

Credential: Diploma in Industrial Systems Technology

D50240

The Industrial Systems Technology curriculum is designed to prepare or upgrade individuals to safely service, maintain, repair and install equipment. Instruction includes theory and skill training needed for inspecting, testing, troubleshooting, and diagnosing industrial systems. Students will learn multi-craft technical skills in blueprint reading, mechanical systems maintenance, electricity, hydraulics/pneumatics, welding, machining or fabrication, as well as various diagnostic and repair procedures. Practical application in these industrial systems will be emphasized and additional advanced coursework may be offered.

Upon completion of this curriculum, graduates should be able to individually, or with a team, safely install, inspect, diagnose, repair, and maintain industrial process and support equipment. Students are encouraged to develop life-long learning skills.

Program Length: 3 semesters

Career Pathway Options: Associate in Applied Science in Industrial Systems Technology (Higher entrance standards required); Diploma in Industrial Systems Maintenance Technology

Program Sites: Lee Campus - Day Program

Course Requirements for Industrial Systems Technology Diploma

A. General Education Courses (9/10 SHC)		C-L-SHC
*ENG 102	Applied Communication II	3-0-3
	Humanities/Fine Arts Elective	3-0-3
*MAT 101	Applied Mathematics I	2-2-3
	Or	
PHY 121	Applied Physics I	3-2-4
B. Required Major Core Courses (18 SHC)		
BPR 111	Print Reading	1-2-2
ELC 112	DC/AC Electricity	3-6-5
HYD 110	Hydraulics/Pneumatics I	2-3-3
ISC 110	Workplace Safety	1-0-1
MEC 111	Machine Processes I	1-4-3
MNT 110	Introduction to Maintenance Procedures	1-3-2
WLD 112	Basic Welding Processes	1-3-2
C. Other Major Hours Required for Graduation (15 SHC)		
AHR 120	HVACR Maintenance	1-3-2
BPR 115	Elc Fluid Power Diagrams	1-2-2
CIS 111	Basic PC Literacy	1-2-2
ELC 128	Introduction to PLC	2-3-3
MNT 111	Maintenance Practices	2-2-3
WLD 117	Industrial SMAW	1-4-3

*These courses are not transferable to the Associate in Applied Science Degree.

Total Semester Hours Credit required for graduation: 42/43

Semester Curriculum for Industrial Systems Technology Diploma

1st Semester (Fall)		C-L-SHC
BPR 111	Print Reading	1-2-2
CIS 111	Basic PC Literacy	1-2-2
ELC 112	DC/AC Electricity	3-6-5
MEC 111	Machine Processes I	1-4-3
MNT 110	Introduction to Maintenance Procedures	1-3-2
	Humanities/Fine Arts Elective	<u>3-0-3</u>
		10-17-17
2nd Semester (Spring)		
ELC 128	Introduction to PLC	2-3-3
*ENG 102	Applied Communication II	3-0-3
WLD 112	Basic Welding Processes	1-3-2
WLD 117	Industrial SMAW	1-4-3
*MAT 101	Applied Mathematics I	2-2-3
	OR	
PHY 121	Applied Physics I	<u>3-2-4</u>
		9/10-12-14/15
3rd Semester (Summer)		
AHR 120	HVACR Maintenance	1-3-2
BPR 115	Electric/Fluid Power Diagrams	1-2-2
ISC 110	Workplace Safety	1-0-1
HYD 110	Hydraulics/Pneumatics I	2-3-3
MNT 111	Maintenance Practice	<u>2-2-3</u>
		7-10-11

*These courses are not transferable to the Associate in Applied Science Degree.

Total Semester Hours Credit: 42/43

*Effective 2014 Spring

Industrial Systems Technology/Bio-maintenance

Credential: Associate in Applied Science

Degree in Industrial Systems Technology/Bio-maintenance

A502400B

The Industrial Systems Technology curriculum is designed to prepare or upgrade individuals to safely service, maintain, repair and install equipment. Instruction includes theory and skill training needed for inspecting, testing, troubleshooting, and diagnosing industrial systems. Students will learn multi-craft technical skills in blueprint reading, mechanical systems maintenance, electricity, hydraulics/pneumatics, welding, machining or fabrication, as well as various diagnostic and repair procedures. Practical application in these industrial systems will be emphasized and additional advanced coursework may be offered.

Upon completion of this curriculum, graduates should be able to individually, or with a team, safely install, inspect, diagnose, repair and maintain industrial process and support equipment. Students will also be encouraged to develop their skills as life-long learners.

Program Length: 5 semesters

Career Pathway Options: Associate in Applied Science in Industrial Systems Technology

Program Sites: Lee Campus - Day Program

Course Requirements for Industrial Systems Technology

A. General Education Courses (15/16 SHC) C-L-SHC

*ENG 111	Expository Writing	3-0-3
	Humanities/Fine Arts Elective	3-0-3
	Social/Behavioral Science Elective	3-0-3
MAT 115	Mathematical Models	2-2-3
	Or	
PHY 121	Applied Physics I	3-2-4
ENG 116	Technical Report Writing	3-0-3

B. Technical Core (18 SHC)

BPR 111	Print Reading	1-2-2
ELC 112	DC/AC Electricity	3-6-5
HYD 110	Hydraulics/Pneumatics I	2-3-3
ISC 110	Workplace Safety	1-0-1
MEC 111	Machine Processes I	1-4-3
MNT 110	Introduction to Maintenance Procedures	1-3-2
WLD 112	Basic Welding Processes	1-3-2

C. Required Subject Area (13 SHC)

BPR 115	Electric/Fluid Power Diagrams	1-2-2
ELC 117	Motors and Controls	2-6-4
ELC 128	Introduction to PLC	2-3-3
ELC 228	PLC Applications	2-6-4

D. Other Major Hours (30 SHC)

AHR 120	HVACR Maintenance	1-3-2
BPM 110	Bioprocess Practices	3-4-5
**CIS 111	Basic PC Literacy	1-2-2
ELN 231	Industrial Controls	2-3-3
ELN 260	Prog. Logic Controllers	3-3-4
ISC 278	cGMP Quality Systems	2-0-2
MNT 111	Maintenance Practices	2-2-3
MNT 230	Pumps and Piping Systems	1-3-2
MNT 240	Industrial Equipment Troubleshooting	1-3-2
MNT 270	Bioprocess Equipment Maintenance	1-3-2
MNT 280	Bioprocess Operating Systems	1-3-2

Student Success—Select one:

ACA 111	College Student Success	1-0-1
ACA 115	Success and Study Skills	0-2-1
ACA 122	College Transfer Success	1-0-1

*Students may substitute ENG 110.

**Students may substitute CIS 110.

Total Semester Hours Credit required for graduation: 76/77

Semester Curriculum for Industrial Systems Technology

1st Semester (Fall) C-L-SHC

BPR 111	Print Reading	1-2-2
CIS 111	Basic PC Literacy	1-2-2
ELC 112	DC/AC Electricity	3-6-5
	Humanities/Fine Arts Elective	3-0-3
MEC 111	Machine Processes I	1-4-3
MNT 110	Introduction to Maintenance Procedures	1-3-2
		10-17-17

2nd Semester (Spring)

ACA 111	College Student Success	1-0-1
BPM 110	Bioprocess Practices	3-4-5
ELC 128	Introduction to PLC	2-3-3
*ENG 111	Expository Writing	3-0-3
MAT 115	Mathematical Models	2-2-3
	Or	
PHY 121	Applied Physics I	3-2-4
WLD 112	Basic Welding Processes	1-3-2
		12/13-12-17/18

3rd Semester (Summer)

AHR 120	HVACR Maintenance	1-3-2
BPR 115	Electric/Fluid Power Diagrams	1-2-2
ISC 110	Workplace Safety	1-0-1
HYD 110	Hydraulics/Pneumatics I	2-3-3
MNT 111	Maintenance Practices	2-2-3
		7-10-11

4th Semester (Fall)

ELC 117	Motors and Controls	2-6-4
ELN 260	Prog. Logic Controllers	3-3-4
ENG 116	Technical Report Writing	3-0-3
ISC 278	cGMP Quality systems	2-0-2
MNT 230	Pumps and Piping Systems	1-3-2
		11-12-15

5th Semester (Spring)

ELC 228	PLC Applications	2-6-4
ELN 231	Industrial Controls	2-3-3
MNT 240	Industrial Equipment Troubleshooting	1-3-2
MNT 270	Bioprocess Equipment Maintenance	1-3-2

MNT 280 Bioprocess Operating Systems 1-3-2
 Social/Behavioral Science Elective 3-0-3
 10-18-16
 Total Semester Hours Credit: 76/77

*Effective 2014 Spring
Industrial Systems Technology
Credential: Certificate in Electrical Controls
C5024010

This curriculum will provide students with knowledge of electricity and electrical controls. Students will learn AC/DC electricity, pilot devices, control relays, motor starters, and electromechanical devices. Upon completion, students will have the flexibility of pursuing a Diploma or an Associate in Applied Science Degree in Industrial Systems Maintenance Technology.

Program Length: 2 semesters
 Career Pathway Options: Associate in Applied Science in Industrial Systems Technology (Higher entrance standards required); Diploma in Industrial Systems Technology (Higher entrance standards required); Certificate in Electrical Controls
 Program Sites: Lee Campus - Evening Program

Course Requirements for Electrical Controls Certificate

A. Required Subject Areas (5 SHC)	C-L-SHC
ELC 112 DC/AC Electricity	3-6-5

B. Other Major Hours Required for Graduation (11/12 SHC)		
ELC 117	Motors and Controls	2-6-4
ELC 128	Introduction to PLC	2-3-3
ELN 231	Industrial Controls	2-3-3
ISC 110	Workplace Safety	1-0-1

Total Semester Hours Credit required for graduation: 16

Semester Curriculum for Electrical Controls Certificate		
1st Semester (Spring) C-L-SHC		
ELC 112	DC/AC Electricity	3-6-5
ISC 110	Workplace Safety	1-0-1
4-6-6		
2nd Semester (Fall)		
ELC 117	Motors and Controls	2-6-4
ELC 128	Introduction to PLC	2-3-3
4-9-7		
3 rd Semester (Spring)		
ELN 231	Industrial Controls	2-3-3
2-3-3		

Total Semester Hours Credit: 16

*Effective 2014 Spring

Industrial Systems Technology
Credential: Certificate in Industrial
Hydraulics
C5024020

This curriculum will provide students with knowledge of hydraulics and pneumatics. Students will learn hydraulic and pneumatic blueprint reading, how to repair valves and pumps, and how to measure and troubleshoot systems. Upon completion, students will have the flexibility of pursuing a Diploma or an Associate in Applied Science Degree in Industrial Systems Technology.

Program Length: 2 semesters

Career Pathway Options: Associate in Applied Science in Industrial Systems Technology (Higher entrance standards required); Diploma in Industrial Systems Maintenance Technology (Higher entrance standards required); Certificate in Industrial Hydraulics

Program Sites: Lee Campus - Evening Program

Course Requirements for Industrial Hydraulics Certificate

A. Required Major Core Courses (5 SHC)	C-L-SHC
HYD 110 Hydraulics/Pneumatics I	2-3-3
MNT 110 Introduction to Maintenance Procedures	1-3-2

B. Other Major Hours Required for Graduation (12 SHC)

BPR 115 Electric/Fluid Power Diagrams	1-2-2
ELC 128 Introduction to PLC	2-3-3
HYD 121 Hydraulics/Pneumatics II	1-3-2
MNT 111 Maintenance Practices	2-2-3
MNT 230 Pumps and Piping Systems	1-3-2

Total Semester Hours Credit required for graduation: 17

Semester Curriculum for Industrial Hydraulics Certificate

1st Semester (Summer)	C-L-SHC
BPR 115 Electric/Fluid Power Diagrams	1-2-2
HYD 110 Hydraulics/Pneumatics I	2-3-3
MNT 111 Maintenance Practices	2-2-3
	5-7-8

2nd Semester (Fall)

HYD 121 Hydraulics/Pneumatics II	1-3-2
MNT 230 Pumps and Piping Systems	1-3-2
MNT 110 Introduction to Maintenance Procedures	1-3-2
	3-6-6

Spring Semester (Spring)

ELC 128 Introduction to PLC	2-3-3
	2-3-3

Total Semester Hours Credit: 17

*Effective 2014 Spring

Industrial Systems Technology
Credential: Certificate in Programmable
Logic Controllers (PLC)
C5024030

This curriculum will provide students with knowledge of PLC's and PLC applications. In addition, students will become proficient in the use of PLC software, hardware, maintenance and troubleshooting, and programming. Upon completion, students will have the flexibility of pursuing a Diploma or an Associate in Applied Science Degree in Industrial Systems Technology.

Program Length: 2 semesters

Career Pathway Options: Associate in Applied Science in Industrial Systems Technology (Higher entrance standards required); Diploma in Industrial Systems Technology (Higher entrance standards required); Certificate in Programmable Logic Controllers

Program Sites: Lee Campus - Evening Program

Course Requirements for Programmable Logic Controller Certificate

A. Required Subject Area Courses (5 SHC)	C-L-SHC
ELC 112 DC/AC Electricity	3-6-5

B. Other Major Hours Required for Graduation (11 SHC)

ELC 128 Introduction to PLC	2-3-3
ELC 228 PLC Applications	2-6-4
ELN 260 Prog. Logic Controllers	3-3-4
ISC 110 Workplace Safety	1-0-1
Total Semester Hours Credit required for graduation: 17	

Semester Curriculum for Programmable Logic Controller Certificate

1 st semester (Spring)	C-L-SHC
ELC 128 Introduction to PLC	2-3-3
	2-3-3

2nd Semester (Summer)

ISC 110 Workplace Safety	1-0-1
	1-0-1

3rd Semester (Fall)

ELC 112 DC/AC Electricity	3-6-5
ELN 260 Prog. Logic Controllers	3-3-4
	6-9-9

4th Semester (Spring)

ELC 228 PLC Applications	2-6-4
	2-6-4

Total Semester Hours Credit: 17

*Effective 2014 Spring

**Computer Integrated Machining
Credential: Associate in Applied Science
Degree in Computer-Integrated Machining
with an Emphasis in Tool, Die and Mold
Making
A50210**

The Computer-Integrated Machining curriculum prepares students with the analytical, creative and innovative skills necessary to take a production idea from an initial concept through design, development and production, resulting in a finished product.

Coursework may include manual machining, computer applications, engineering design, computer-aided drafting (CAD), computer-aided machining (CAM), blueprint interpretation, advanced computerized numeric control (CNC) equipment, basic and advanced machining operations, precision measurement and high-speed multi-axis machining.

Graduates should qualify for employment as machining technicians in high-tech manufacturing, rapid-prototyping and rapid-manufacturing industries, specialty machine shops, fabrication industries, and high-tech or emerging industries such as aerospace, aviation, medical, and renewable energy, and to sit for machining certification examinations.

This Program has an emphasis on Tool, Die and Mold Making.

Program Length: 6 semesters

Career Pathway Options: Associate in Applied Science in Computer-Integrated Machining with an Emphasis in Tool, Die and Mold Making

Program Sites: Lee Campus - Day Program

Course Requirements for Computer-Integrated Machining Technology with an emphasis in Tool, Die and Mold Making

A. General Education Courses (15 SHC)		C-L-SHC
ENG 110	Freshman Composition	3-0-3
	AND	
ENG 116	Technical Report Writing	3-0-3
	OR	
ENG 111	Expository Writing	3-0-3
	AND	
ENG 114	Professional Research and Reporting	3-0-3
MAT 120	Geometry and Trigonometry	2-2-3
	Humanities/Fine Arts Elective	3-0-3
	Social/Behavioral Science Elective	3-0-3

B. Required Major Core Courses (16 SHC)

BPR 111	Print Reading	1-2-2
MAC 111	Machining Technology I	2-12-6

MAC 112	Machining Technology II	2-12-6
MAC 124	CNC Milling	1-3-2

C. Other Major Hours Required for Graduation (45 SHC)

CIS 111	Basic PC Literacy	1-2-2
BPR 121	Print Reading: Mechanical	1-2-2
MAC 113	Machining Technology III	2-12-6
MAC 122	CNC Turning	1-3-2
MAC 151	Machining Calculations	1-2-2
MAC 153	Compound Angles	1-2-2
MAC 171	Measure/Material & Safety	0-2-1
MAC 224	Advanced CNC Milling	1-3-2
MAC 226	CNC EDM Machining	1-3-2
MAC 241	Jigs and Fixtures I	2-6-4
MAC 243	Die Making I	2-6-4
MAC 244	Die Making II	1-9-4
MAC 245	Mold Construction I	2-6-4
MAC 246	Mold Construction II	1-9-4
MEC 110	Introduction to CAD/CAM	1-2-2
MEC 142	Physical Metallurgy	1-2-2

Total Semester Hours Credit required for graduation: 76

Semester Curriculum for Computer Integrated Machining Technology with a Concentration in Tool, Die and Mold Making

1st Semester (Fall)		C-L-SHC
BPR 111	Print Reading	1-2-2
CIS 111	Basic PC Literacy	1-2-2
MAC 111	Machining Technology	2-12-6
MAC 151	Machining Calculations	1-2-2
MAC 171	Measure/Material & Safety	0-2-1
MEC 142	Physical Metallurgy	1-2-2
		6-22-15

2nd Semester (Spring)

BPR 121	Print Reading: Mechanical	1-2-2
ENG 110	Freshman Composition	3-0-3
	OR	
ENG 111	Expository Writing	3-0-3
MAC 112	Machining Technology II	2-12-6
MAC 124	CNC Milling	1-3-2
MAT 120	Geometry/Trigonometry	2-2-3
		9-19/21-16/17

3rd Semester (Summer)

MAC 113	Machining Technology III	2-12-6
	Humanities/Fine Arts Elective	3-0-3
		5-12-9

4th Semester (Fall)

MAC 122	CNC Turning	1-3-2
MAC 153	Compound Angles	1-2-2
MAC 241	Jigs and Fixtures I	2-6-4
MAC 245	Mold Construction I	2-6-4
ENG 116	Technical Report Writing	3-0-3
	OR	
ENG 114	Professional Research and Reporting	3-0-3
		9-17-15

5th Semester (Spring)

MAC 224	Advanced CNC Milling	1-3-2
MAC 226	CNC EDM Machining	1-3-2
MAC 243	Die Making I	2-6-4
MAC 246	Mold Construction II	1-9-4
MEC 110	Introduction to CAD/CAM	1-2-2
		6-23-14

6th Semester (Summer)

MAC 244	Die Making II	1-9-4
	Social/Behavioral Science Elective	3-0-3
		4-9-7

Total Semester Hours Credit: 76

*Effective 2014 Spring

**Computer-Integrated Machining
Credential: Diploma in Computer-Integrated
Machining
D50210**

The Computer-Integrated Machining curriculum prepares students with the analytical, creative and innovative skills necessary to take a production idea from an initial concept through design, development and production, resulting in a finished product.

Coursework may include manual machining, computer applications, engineering design, computer-aided drafting (CAD), computer-aided machining (CAM), blueprint interpretation, advanced computerized numeric control (CNC) equipment, basic and advanced machining operations, precision measurement and high-speed multi-axis machining.

Graduates should qualify for employment as machining technicians in high-tech manufacturing, rapid-prototyping and rapid-manufacturing industries, specialty machine shops, fabrication industries, and high-tech or emerging industries such as aerospace, aviation, medical, and renewable energy, and to sit for machining certification examinations.

Program Length: 3 semesters

Career Pathway Options: Associate in Applied Science in Computer-Integrated Machining with an Emphasis in Tool, Die and Mold Making (Higher entrance standards required); Diploma in Computer-Integrated Machining Technology
Program Sites: Lee Campus – Day/Evening Program
Harnett Campus – Day/Evening Program

Course Requirements for Computer-Integrated Machining
Technology Diploma

A. General Education Courses (9 SHC)		C-L-SHC
*ENG 102	Applied Communication II	3-0-3
	OR	
ENG 110	Freshman Composition	3-0-3
	OR	
ENG 111	Expository Writing	3-0-3
*MAT 101	Applied Mathematics I	2-2-3
	OR	
MAT 120	Geometry and Trigonometry	2-2-3
	Humanities/Fine Arts Elective	3-0-3
B. Required Major Core Courses (16 SHC)		
BPR 111	Print Reading	1-2-2
MAC 111	Machining Technology I	2-12-6
MAC 112	Machining Technology II	2-12-6
MAC 124	CNC Milling	1-3-2
C. Other Major Hours Required for Graduation (15 SHC)		
BPR 121	Print Reading: Mechanical	1-2-2

CIS 111	Basic PC Literacy	1-2-2
MAC 113	Machining Technology III	2-12-6
MAC 151	Machining Calculations	1-2-2
MAC 171	Measure/Material & Safety	0-2-1
MEC 142	Physical Metallurgy	1-2-2

Total Semester Hours Credit required for graduation: 40

Semester Curriculum for Computer-Integrated Machining Technology Diploma

1st Semester (Fall)		C-L-SHC
BPR 111	Print Reading	1-2-2
CIS 111	Basic PC Literacy	1-2-2
MAC 111	Machining Technology	2-12-6
MAC 151	Machining Calculations	1-2-2
MAC 171	Measure/Material & Safety	0-2-1
MEC 142	Physical Metallurgy	<u>1-2-2</u>
		6-22-15

2nd Semester (Spring)

BPR 121	Print Reading: Mechanical	1-2-2
*ENG 102	Applied Communication II OR	3-0-3
ENG 111	Expository Writing	3-0-3
MAC 112	Machining Technology II	2-12-6
MAC 124	CNC Milling	1-3-2
*MAT 101	Applied Mathematics I OR	2-2-3
MAT 120	Geometry and Trigonometry	<u>2-2-3</u>
		9-19-16

3rd Semester (Summer)

MAC 113	Machining Technology III Humanities/Fine Arts Elective	2-12-6 <u>3-0-3</u>
		5-12-9

*These courses are not transferable to the Associate in Applied Science Degree.

Total Semester Hours Credit: 40

*Effective 2014 Spring

Computer-Integrated Machining Credential: Certificate in Computer- Integrated Machining C50210

The Computer-Integrated Machining curriculum prepares students with the analytical, creative and innovative skills necessary to take a production idea from an initial concept through design, development and production, resulting in a finished product.

Coursework may include manual machining, computer applications, engineering design, computer-aided drafting (CAD), computer-aided machining (CAM), blueprint interpretation, advanced computerized numeric control (CNC) equipment, basic and advanced machining operations, precision measurement and high-speed multi-axis machining.

Graduates should qualify for employment as machining technicians in high-tech manufacturing, rapid-prototyping and rapid-manufacturing industries, specialty machine shops, fabrication industries, and high-tech or emerging industries such as aerospace, aviation, medical, and renewable energy, and to sit for machining certification examinations.

Program Length: 2 semesters

Career Pathway Options: Associate in Applied Science in Computer-Integrated Machining with an Emphasis in Tool, Die and Mold Making (Higher entrance standards required); Diploma Computer Integrated-Machining (Higher entrance standards required); Certificate in Computer-Integrated Machining .

Program Sites:

Lee Campus –Day/ Evening Program

Harnett Campus –Day/ Evening Program

Course Requirements for Computer-Integrated Machining Technology Certificate

A. Required Major Core Courses (10 SHC)		C-L-SHC
MAC 111	Machining Technology I	2-12-6
BPR 111	Print Reading	1-2-2
MAC 124	CNC Milling	1-3-2

B. Required Subject Areas (7 SHC)

BPR 121	Print Reading: Mechanical	1-2-2
MAC 171	Measure/Material & Safety	0-2-1
MEC 142	Physical Metallurgy	1-2-2
MAC 151	Machining Calculations	1-2-2

Total Semester Hours Credit required for graduation: 17

Semester Curriculum for Computer Integrated Machining Technology Certificate

1st Semester (Fall)		C-L-SHC
BPR 111	Print Reading	1-2-2
MAC 111	Machining Technology I	2-12-6

MAC 151	Machining Calculations	1-2-2
MAC 171	Measure/Material & Safety	0-2-1
MEC 142	Physical Metallurgy	<u>1-2-2</u>
		5-20-13
2nd Semester (Spring)		
BPR 121	Blueprint Reading: Mechanical	1-2-2
MAC 124	CNC Milling	<u>1-3-2</u>
		2-5-4

Total Semester Hours Credit: 17

*Effective 2014 Spring

Telecommunications Installation and Maintenance

Credential: Diploma in Telecommunications Installation and Maintenance D50380

The Telecommunications Installation and Maintenance curriculum prepares individuals for jobs in the telecommunications industry. It provides fundamental training for new students and provides upgrade training for current employees of telecommunications companies. Coursework includes basic electricity, cable splicing, fiber optics, LAN/WAN, cable fault location and repair, central office administration, standards and codes, and other related topics. Emphasis is placed on hands-on installation and maintenance training. A graduate should be prepared to work in the telecommunications industry in outside plant operations, on central office equipment, and on business communication equipment.

Program Length: 3 semesters

Career Pathway Options: Diploma in Telecommunications Installation and Maintenance

Program Sites: North Carolina School of Telecommunications. Day and selected evening courses. Corporate and career-centered programs.

Course Requirements for Telecommunications Installation and Maintenance Diploma

A. General Education Courses (6 SHC)		C-L-SHC
ENG 102	Applied Communication II	3-0-3
	Humanities or Social/Behavioral Science	
	Elective	3-0-3

B. Required Core Courses (17 SHC)

TCT 103	Installer Level I Cabling	1-2-2
TEL 100	Telecommunications Basic Electricity	3-0-3
TEL 105	Fiber Optics: Splicing	1-2-2
TEL 106	Fiber Optics: Connectors	1-2-2
TEL 108	Comdial Key Systems	0-2-1
TEL 201	Station Installation and Repair	1-2-2
TEL 202	Cable Splicing	1-2-2
TEL 203	Cable Fault Location	0-2-1
TEL 205	Digital Central Office Administration	1-2-2

C. Other Major Hours (18 SHC)

*CIS 111	Basic PC Literacy	1-2-2
**MAT 101	Applied Mathematics I	2-2-3
TEL 209	ADSL Installation	0-2-1
	Business Elective	3
	Major Electives	9

Business Electives (Choose one course)

BUS 110	Introduction to Business	3-0-3
BUS 125	Personal Finance	3-0-3
BUS 137	Principles of Management	3-0-3
BUS 151	People Skills	3-0-3

BUS 152	Human Relations	3-0-3
BUS 230	Small Business Management	3-0-3
BUS 255	Organizational Behavior in Business	3-0-3
BUS 270	Professional Development	3-0-3
BUS 280	REAL Small Business	4-0-4

Major Elective Course Listing - Select a minimum of 9 SHC from one of the following groups:

(Telecommunications Group)

ELC 144	OTDR Operation	1-0-1
NET 113	Home Automation Systems	2-2-3
TEL 102	Pole Climbing	0-2-1
TEL 104	CATV Installation and Repair: Distribution	0-2-1
TEL 109	T-1 Span Line Maintenance	0-2-1
TEL 204	Transmission Fundamentals	2-0-2
TCT 100	Telco Safety Regulations	1-2-2
TCT 101	Vault Management	1-2-2
TCT 102	Underground Locating	1-2-2
TCT 104	Installer Level 2 Copper	1-2-2
TCT 105	Installer Level 2 Fiber	1-2-2
TCT 106	Technician Level Cabling	1-2-2

OR

(Small Home/Small Office Networking Group)

NET 125	Networking Basics	1-4-3
NET 126	Routing Basics	1-4-3
NOS 110	Operating Systems Concepts	2-3-3
NOS 130	Windows Single User	2-2-3

OR

(Networking Infrastructure Group)

NET 116	Fundamentals of Voice/Data Cable	2-2-3
NET 125	Networking Basics	1-4-3
NET 126	Routing Basics	1-4-3
NET 225	Routing and Switching I	1-4-3
NET 230	Wide Area Networking	2-2-3

*Students may substitute CIS 110

**Students may substitute MAT 140 or higher

Total Semester Hours Credit required for Graduation: 41

Semester Curriculum for Telecommunications Installation and Maintenance Diploma

1st Semester	C-L-SHC
TCT 103	Installer Level I Cabling 1-2-2
TEL 100	Telecommunication Basic Electricity 3-0-3
TEL 105	Fiber Optics: Splicing 1-2-2
TEL 106	Fiber Optics: Connectors 1-2-2
TEL 108	Comdial Key Systems 0-2-1
TEL 201	Station Installation and Repair 1-2-2
TEL 202	Cable Splicing 1-2-2
TEL 203	Cable Fault Location 0-2-1
TEL 205	Digital Central Office Administration 1-2-2
TEL 209	ADSL Installation <u>0-2-1</u>
	9-18-18

2nd Semester		
BUS	Business Elective	3
CIS 111	Basic PC Literacy	1-2-2
ENG 102	Applied Communication II	3-0-3
	Humanities or Social/Behavioral Science Elective	3-0-3
MAT 101	Applied Math I	<u>2-2-3</u>
		14

3rd Semester		
	Major Electives	9

Total Semester Hours Credit: 41

*Effective 2014 Spring

Telecommunications Installation and Maintenance
Credential: Certificate in Telecommunications Installation and Maintenance
C50380

TEL 205	Digital Central Office Administration	1-2-2
TEL 209	ADSL Installation	0-2-1
		9-18-18

Total Semester Hours Credit: 18

The Telecommunications Installation and Maintenance curriculum prepares individuals for jobs in the telecommunications industry. It provides fundamental training for new students and provides upgrade training for current employees of telecommunications companies. Coursework includes basic electricity, cable splicing, fiber optics, LAN/WAN, cable fault location and repair, central office administration, standards and codes, and other related topics. Emphasis is placed on hands-on installation and maintenance training. A graduate should be prepared to work in the telecommunications industry in outside plant operations, on central office equipment, and on business communication equipment.

Program Length: 1 semester

Career Pathway Options: Diploma in Telecommunications Installation and Maintenance (Higher entrance standards required).

Program Sites: N. C. School of Telecommunications – Day

Course Requirements for Telecommunications Installation and Maintenance Certificate

Required Core Courses (18 SHC)		C-L-SHC
TCT 103	Installer Level 1 Cabling	1-2-2
TEL 100	Telecommunications Basic Electricity	3-0-3
TEL 105	Fiber Optics: Splicing	1-2-2
TEL 106	Fiber Optics: Connectors	1-2-2
TEL 108	Comdial Key Systems	0-2-1
TEL 201	Station Installation and Repair	1-2-2
TEL 202	Cable Splicing	1-2-2
TEL 203	Cable Fault Location	0-2-1
TEL 205	Digital Central Office Administration	1-2-2
TEL 209	ADSL Installation	0-2-1

Total Semester Hours Credit required for graduation: 18

Semester Curriculum for Telecommunications Installation and Maintenance Certificate

1st Semester (Fall or Spring)		C-L-SHC
TEL 100	Telecommunications Basic Electricity	3-0-3
TEL 105	Fiber Optics: Splicing	1-2-2
TEL 106	Fiber Optics: Connectors	1-2-2
TEL 108	Comdial Key Systems	0-2-1
TCT 103	Installer Level 1 Cabling	1-2-2
TEL 201	Station Install/Repair	1-2-2
TEL 202	Cable Splicing	1-2-2
TEL 203	Cable Fault Location	0-2-1

*Effective 2014 Spring

Welding Technology**Credential: Diploma in Welding Technology
D50420**

The Diploma in Welding Technology provides students with a sound understanding of the science, technology, and applications essential for successful employment in the welding and metalworking industry.

Instruction includes consumable and non-consumable electrode welding and cutting processes. Courses may include math, print reading, metallurgy, welding inspection, and destructive and non-destructive testing providing the student with industry-standard skills developed through classroom training and practical application.

Graduates of the Welding Technology curriculum may be employed as entry-level technicians in welding and metalworking industries. Career opportunities also exist in construction, manufacturing, fabrication, sales, quality control, supervision, and welding-related self-employment.

Program Length: 5 semesters

Career Pathway Options: Diploma in Welding Technology

Program Sites:

Lee Campus - Day Program

Course Requirements for the Welding Technology Diploma

A. General Education Courses (6/7 SHC) C-L-SHC

ENG 102	Applied Communications II	3-0-3
MAT 101	Applied Mathematics I	2-2-3
	OR	
PHY 121	Applied Physics	3-2-4

B. Technical Core (18 SHC)

WLD 110	Cutting Processes	1-3-2
WLD 115	SMAW (Stick) Plate	2-9-5
WLD 121	GMAW (MIG) FCAW/Plate	2-6-4
WLD 131	GTAW (TIG) Plate	2-6-4
WLD 141	Symbols & Specifications	2-2-3

C. Other Major Hours (18 SHC)

BPR 111	Print Reading	1-2-2
ISC 110	Workplace Safety	1-0-1
WLD 116	SMAW (Stick) Plate/Pipe	1-9-4
WLD 151	Fabrication I	2-6-4
WLD 262	Inspection and Testing	2-2-3
WLD 265	Automated Welding/Cutting	2-6-4

Total Semester Hours Credit required for graduation: 42/43

Semester Curriculum for Welding Technology Diploma

1st Semester (Fall)		C-L-SHC
BPR 111	Print Reading	1-2-2
ISC 110	Workplace Safety	1-0-1
MAT 101	Applied Mathematics I	2-2-3

WLD 110	Cutting Processes	1-3-2
WLD 115	SMAW (Stick) Plate	<u>2-9-5</u>
		7-16-13

2nd Semester (Spring)

ENG 102	Applied Communications II	3-0-3
WLD 121	GMAW (MIG) FCAW/Plate	2-6-4
WLD 131	GTAW (TIG) Plate	2-6-4
WLD 141	Symbols & Specifications	<u>2-2-3</u>
		9-14-14

3rd Semester (Summer)

WLD 116	SMAW (Stick) Plate/Pipe	<u>1-9-4</u>
		1-9-4

4th Semester (Fall)

WLD 151	Fabrication I	2-6-4
WLD 262	Inspection and Testing	2-2-3
WLD 265	Automated Welding/Cutting	<u>2-6-4</u>
		6-14-11

Total Semester Hours Credit Required for Graduation: 42