### Industrial Technologies

#### 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

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**Course requirements for Bioprocess Technology Degree**

**A. General Education Courses (19 SHC)**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>SHC</th>
</tr>
</thead>
<tbody>
<tr>
<td>COM 120</td>
<td>Interpersonal Communication</td>
<td>3-0-3</td>
</tr>
<tr>
<td>OR</td>
<td></td>
<td></td>
</tr>
<tr>
<td>COM 231</td>
<td>Public Speaking</td>
<td>3-0-3</td>
</tr>
<tr>
<td>ENG 111</td>
<td>Expository Writing</td>
<td>3-0-3</td>
</tr>
<tr>
<td>ENG 111A</td>
<td>Expository Writing Lab</td>
<td>0-2-1</td>
</tr>
<tr>
<td>ENG 114</td>
<td>Professional Research and Reporting</td>
<td>3-0-3</td>
</tr>
</tbody>
</table>

**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**

**B. Required Major Core Courses (21 SHC)**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>SHC</th>
</tr>
</thead>
<tbody>
<tr>
<td>BPM 110</td>
<td>Bioprocess Practices</td>
<td>3-4-5</td>
</tr>
<tr>
<td>BPM 111</td>
<td>Bioprocess Measurements</td>
<td>3-3-4</td>
</tr>
<tr>
<td>BPM 112</td>
<td>Upstream Bioprocessing</td>
<td>3-4-5</td>
</tr>
<tr>
<td>BPM 113</td>
<td>Downstream Bioprocessing</td>
<td>3-3-4</td>
</tr>
<tr>
<td>PTC 110</td>
<td>Industrial Environment</td>
<td>3-0-3</td>
</tr>
</tbody>
</table>

**C. Other Major Hours Required for Graduation (28 SHC)**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>SHC</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIO 110</td>
<td>Principles of Biology</td>
<td>3-3-4</td>
</tr>
<tr>
<td>BIO 175</td>
<td>General Microbiology</td>
<td>2-2-3</td>
</tr>
<tr>
<td>BIO 176</td>
<td>Advanced General Microbiology</td>
<td>1-2-2</td>
</tr>
<tr>
<td>CHM 131</td>
<td>Introduction to Chemistry</td>
<td>3-0-3</td>
</tr>
<tr>
<td>CHM 131A</td>
<td>Introduction to Chemistry Lab</td>
<td>0-3-1</td>
</tr>
<tr>
<td>CHM 132</td>
<td>Organic and Biochemistry</td>
<td>3-3-4</td>
</tr>
<tr>
<td>CIS 110</td>
<td>Introduction to Computers</td>
<td>2-2-3</td>
</tr>
</tbody>
</table>

**American Red Cross Certification**

**A50442**

**127**

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**2011-2013 College Catalog – Central Carolina Community College**

**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**

**Total Semester Hours Credit required for graduation:** **68**

**Semester Curriculum for Bioprocess Technology Degree**

**1st Semester (Fall)**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>SHC</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIO 110</td>
<td>Principles of Biology</td>
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<td>CHM 131</td>
<td>Introduction to Chemistry</td>
<td>3-0-3</td>
</tr>
<tr>
<td>CHM 131A</td>
<td>Introduction to Chemistry Lab</td>
<td>0-3-1</td>
</tr>
<tr>
<td>CIS 110</td>
<td>Introduction to Computers</td>
<td>2-2-3</td>
</tr>
<tr>
<td>MAT 121</td>
<td>Algebra/Trigonometry I</td>
<td>2-2-3</td>
</tr>
</tbody>
</table>

**OR**

**MAT 161**

**College Algebra**

**3-0-3**

**PTC 110**

**Industrial Environment**

**3-0-3**

**13/14/0/10-17**

**2nd Semester (Spring)**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>SHC</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIO 175</td>
<td>General Microbiology</td>
<td>2-2-3</td>
</tr>
<tr>
<td>BPM 110</td>
<td>Bioprocess Practices</td>
<td>3-4-5</td>
</tr>
<tr>
<td>CHM 132</td>
<td>Organic/Biochemistry</td>
<td>3-3-4</td>
</tr>
<tr>
<td>ENG 111</td>
<td>Expository Writing</td>
<td>3-0-3</td>
</tr>
<tr>
<td>ENG 111A</td>
<td>Expository Writing Lab</td>
<td>0-2-1</td>
</tr>
<tr>
<td>ISC 121</td>
<td>Environmental Health and Safety</td>
<td>3-0-3</td>
</tr>
</tbody>
</table>

**14-11-19**

**3rd Semester (Summer)**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>SHC</th>
</tr>
</thead>
<tbody>
<tr>
<td>COE 112</td>
<td>Co-op Work Experience I</td>
<td>0-20-2</td>
</tr>
<tr>
<td>EGR 285</td>
<td>Design Project</td>
<td>0-4-2</td>
</tr>
<tr>
<td></td>
<td>Co-op/Project Elective</td>
<td></td>
</tr>
</tbody>
</table>

**4th Semester (Fall)**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>SHC</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIO 176</td>
<td>Advanced General Microbiology</td>
<td>1-2-2</td>
</tr>
<tr>
<td>BPM 111</td>
<td>Bioprocess Measurements</td>
<td>3-3-4</td>
</tr>
<tr>
<td>COM 120</td>
<td>Interpersonal Communication</td>
<td>3-0-3</td>
</tr>
</tbody>
</table>

**OR**

**COM 231**

**Public Speaking**

**3-0-3**

**Hunans/Fine Arts Elective**

**3-0-3**

**10-5-12**

**5th Semester (Spring)**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>SHC</th>
</tr>
</thead>
<tbody>
<tr>
<td>BPM 112</td>
<td>Upstream Bioprocessing</td>
<td>3-4-5</td>
</tr>
<tr>
<td>BPM 113</td>
<td>Downstream Bioprocessing</td>
<td>3-3-4</td>
</tr>
<tr>
<td>ENG 114</td>
<td>Professional Research and Reporting</td>
<td>3-0-3</td>
</tr>
<tr>
<td>ISC 221</td>
<td>Statistical Quality Control</td>
<td>3-0-3</td>
</tr>
</tbody>
</table>

**Social/Behavioral Science Elective**

**3**

**15-7-18**

**Total Semester Hours Credit:** **68**
Bioprocess Technology  
**Credential: Certificate in Bioprocess Technology**  
C50440

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: Certificate in Bioprocess Technology, Associate in Applied Science Degree in Bioprocess Technology.  
Program Site: Lee Campus – Day or Evening Program

Course Requirements for Bioprocess Manufacturing Technology Certificate

<table>
<thead>
<tr>
<th>A. Required Major Core Courses (8 SHC)</th>
<th>C-L-SHC</th>
</tr>
</thead>
<tbody>
<tr>
<td>BPM 110 Bioprocess Practices</td>
<td>3-4-5</td>
</tr>
<tr>
<td>PTC 110 Industrial Environment</td>
<td>3-0-3</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>B. Other Courses (9 SHC)</th>
</tr>
</thead>
<tbody>
<tr>
<td>CIS 110 Introduction to Computers</td>
</tr>
<tr>
<td>MAT 121 Algebra/Trigonometry I OR</td>
</tr>
<tr>
<td>MAT 161 College Algebra</td>
</tr>
<tr>
<td>ISC 121 Environmental Health and Safety Major Elective</td>
</tr>
</tbody>
</table>

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

Semester Curriculum for Bioprocess Technology Certificate

<table>
<thead>
<tr>
<th>1st Semester (Fall)</th>
<th>C-L-SHC</th>
</tr>
</thead>
<tbody>
<tr>
<td>CIS 110 Introduction to Computers OR</td>
<td>2-2-3</td>
</tr>
<tr>
<td>MAT 121 Algebra/Trigonometry I OR</td>
<td>2-2-3</td>
</tr>
<tr>
<td>MAT 161 College Algebra</td>
<td>3-0-3</td>
</tr>
<tr>
<td>ISC 121 Environmental Health and Safety</td>
<td>3-0-3</td>
</tr>
<tr>
<td>PTC 110 Industrial Environment</td>
<td>3-0-3</td>
</tr>
<tr>
<td></td>
<td>8/9-0/2-9</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>2nd Semester (Spring)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>BPM 110 Bioprocess Practices</td>
<td>3-4-5</td>
</tr>
<tr>
<td>Major Elective</td>
<td>3-4-8</td>
</tr>
</tbody>
</table>

Total Semester Hours Credit: 17
Bioprocess Technology Credential:
Associate in Applied Science Degree in BioQuality Technology
A50440QA

The Bioprocess 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 (19 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 111A Expository Writing Lab 0-2-1
ENG 114 Professional Research and Reporting 3-0-3
Humanities/Fine Arts Elective 3
MAT 121 Algebra/Trigonometry I 2-2-3
OR
MAT 161 College Algebra 3-0-3
Social/Behavioral Science Elective 3

B. Required Major 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 Required for Graduation (28 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

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

2nd Semester (Spring)
BIO 175 General Microbiology 2-2-3
BPM 111 Bioprocess Measurements 3-4-5
CHM 132 Organic/Biochemistry 3-3-4
ENG 111 Expository Writing 3-0-3
ENG 111A Expository Writing Lab 0-2-1
ISC 175 Quality Assurance Fundamentals 1-0-1

3rd Semester (Summer)
Co-op/Project Elective 0-20/4-2

4th Semester (Fall)
BPM 112 Upstream Bioprocessing 3-4-5
BPM 113 Downstream Bioprocessing 3-3-4
ISC 280 Validation Fundamentals 1-2-2
ISC 279 Auditing for cGMP 2-2-3

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
ISC 279 Auditing for cGMP 2-2-3

Total Semester Hours Credit: 68
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
Program Site: Lee Campus – Day or Evening Program

Course Requirements for BioQuality Technology Certificate

A. Required Major Core Courses (5 SHC)
   BPM 110  Bioprocess Practices  3-4-5

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)
   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

Total Semester Hours Credit: 13

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 (15/17 SHC) C-L-SHC
   *ENG 111  Expository Writing  3-0-3
   ENG 111A Expository Writing Lab  0-2-1
   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

   Communications Elective (select 3 SHC)
   ENG 112  Argument-Based Research  3-0-3
   ENG 113  Literature-Based Research  3-0-3
   ENG 114  Prof Research & Reporting  3-0-3
   ENG 116  Technical Report Writing  3-0-3

B. Required Major Core Courses (18/19 SHC)
   BPR 111  Blueprint Reading  1-2-2
   ELC 112  DC/AC Electricity  3-6-5
   HYD 110  Hydraulics/Pneumatics  2-3-3
   ISC 110  Workplace Safety  1-0-1
   Or
   ISC 112  Industrial Safety  2-0-2
   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 (43 SHC)
   AHR 120  HVACR Maintenance  1-3-2
   BPR 115  Electric/Fluid Power Diagrams  1-2-2
**CIS 111** Basic PC Literacy 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
**ELC 229** Applications Project 1-3-2
**ELN 229** Industrial Electronics 3-3-4
**ELN 231** Industrial Controls 2-3-3
**HYD 121** Hydraulics/Pneumatics II 1-3-2
**MNT 230** Pumps and Piping Systems 1-3-2
**MNT 240** Industrial Equipment Troubleshooting 1-3-2
**WLD 115** SMAW (Stick) Plate 2-9-5
**WLD 212** Inert Gas Welding 1-3-2

Technical Electives
**COE 111** Co-op Work Experience I 0-10-1
**COE 112** Co-op Work Experience I 0-20-2
**COE 121** Co-op Work Experience II 0-10-1
**MNT 111** Maintenance Practices 2-2-3

*Students may substitute ENG 110.
**Students may substitute CIS 110.
Total Semester Hours Credit required for graduation: 75/77

Semester Curriculum for Industrial Systems Technology
1st Semester (Fall) C-L-SHC
**BPR 111** Blueprint Reading 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
**WLD 112** Basic Welding Processes 1-3-2
10-18-17

2nd Semester (Spring)
**CIS 111** Basic PC Literacy 1-2-2
**ELN 229** Industrial Electronics 3-3-4
*ENG 111* Expository Writing 3-0-3
**ENG 111A** Expository Writing Lab 0-2-1
**MAT 115** Mathematical Models 2-2-3
Or
**PHY 121** Applied Physics I 3-2-4
**WLD115** SMAW (Stick) Plate 2-9-5
11/12-16/18-17/19

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
Or
**ISC 112** Industrial Safety 2-0-2
**HYD 110** Hydraulics/Pneumatics 2-3-3
**MNT 230** Pumps and Piping Systems 1-3-2
2
5/6-8-10/11

4th Semester (Fall)
**ELC 117** Motors and Controls 2-6-4
**ELC 128** Introduction to PLC 2-3-3
**ELC 129** Communications Elective 3-0-3
**HYD 121** Hydraulics/Pneumatics II 1-3-2
**MNT 230** Pumps and Piping Systems 1-3-2

**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

Total Semester Hours Credit: 75/77
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
*MAT 101 Applied Mathematics I 2-2-3
PHY 121 Applied Physics I 3-2-4

B. Required Major Core Courses (18/19 SHC)
BPR 111 Blueprint Reading 1-2-2
ELC 112 DC/AC Electricity 3-6-5
HYD 110 Hydraulics/Pneumatics 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 (17/18 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
ELN 229 Industrial Electronics 2-4-4

MNT 111 Maintenance Practices 2-2-3
OR
COE 112 Co-op Work Exp. I 0-20-2
WLD 115 SMAW (Stick) Plate 2-9-5

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

Total Semester Hours Credit required for graduation: 44/47

Semester Curriculum for Industrial Systems Technology Diploma

1st Semester (Fall) C-L-SHC
BPR 111 Blueprint Reading 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
WLD 112 Basic Welding Processes 1-3-2

Humanities/Fine Arts Elective 3-0-3
10-18-17

2nd Semester (Spring)
CIS 111 Basic PC Literacy 1-2-2
ELN 229 Industrial Electronics 3-3-4
*ENG 102 Applied Communication II 3-0-3
HYD 110 Hydraulics/Pneumatics 2-3-3
WLD 115 SMAW (Stick) Plate 2-9-5

11-17-17

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
OR
ISC 112 Industrial Safety 2-0-2
*MAT 101 Applied Mathematics I 2-2-3
*MAT 102 Applied Mathematics II 2-2-3
OR
PHY 121 Applied Physics I 3-2-4
Technical Elective 2
5/6/7-7-10/11/12

Technical Elective (Choose 2/3 SHC)
COE 112 Co-op Work Exp. I 0-20-2
MNT 111 Maintenance Practice 2-2-3

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

Total Semester Hours Credit: 44/47
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

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENG 110</td>
<td>Freshman Composition</td>
<td>3-0-3</td>
</tr>
<tr>
<td>ENG 116</td>
<td>Technical Report Writing</td>
<td>3-0-3</td>
</tr>
<tr>
<td>MAT 115</td>
<td>Mathematical Models</td>
<td>3-0-3</td>
</tr>
<tr>
<td>PHY 121</td>
<td>Applied Physics I</td>
<td>3-2-4</td>
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</tbody>
</table>

B. Required Major Core Courses (18/19 SHC)

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
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</thead>
<tbody>
<tr>
<td>BPR 111</td>
<td>Blueprint Reading</td>
<td>1-2-2</td>
</tr>
<tr>
<td>ELC 112</td>
<td>DC/AC Electricity</td>
<td>3-6-5</td>
</tr>
<tr>
<td>HYD 110</td>
<td>Hydraulics/Pneumatics</td>
<td>2-3-3</td>
</tr>
<tr>
<td>ISC 110</td>
<td>Workplace Safety</td>
<td>1-0-1</td>
</tr>
<tr>
<td>ISC 112</td>
<td>industrial Safety</td>
<td>2-0-2</td>
</tr>
<tr>
<td>MEC 111</td>
<td>Machine Processes I</td>
<td>1-4-3</td>
</tr>
<tr>
<td>MNT 110</td>
<td>Introduction to Maintenance Procedures</td>
<td>1-3-2</td>
</tr>
<tr>
<td>WLD 112</td>
<td>Basic Welding Processes</td>
<td>1-3-2</td>
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</table>

C. Other Major Hours Required for Graduation (42 SHC)

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
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<tbody>
<tr>
<td>AHR 120</td>
<td>HVACR Maintenance</td>
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</tr>
<tr>
<td>BPM 110</td>
<td>Bioprocess Practices</td>
<td>3-4-5</td>
</tr>
<tr>
<td>BPR 115</td>
<td>Electric/Fluid Power Diagrams</td>
<td>1-2-2</td>
</tr>
<tr>
<td>CIS 111</td>
<td>Basic PC Literacy</td>
<td>1-2-2</td>
</tr>
<tr>
<td>ELC 117</td>
<td>Motors and Controls</td>
<td>2-6-4</td>
</tr>
<tr>
<td>ELC 128</td>
<td>Introduction to PLC</td>
<td>2-3-3</td>
</tr>
</tbody>
</table>

Technical Elective Course Listing (Select 3 SHC):

- COE 111 Co-op Work Experience I 0-10-1
- COE 112 Co-op work Experience I 0-20-2
- COE 121 Co-op Experience II 0-10-1
- MNT 111 Maintenance Practices 2-2-3

*Students may substitute ENG 110.

Total Semester Hours Credit required for graduation: 75/77

Semester Curriculum for Industrial Systems Technology

1st Semester (Fall) C-L-SHC

<table>
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<tr>
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<th>Course Title</th>
<th>Credits</th>
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<td>BPR 111</td>
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<td>ELC 112</td>
<td>DC/AC Electricity</td>
<td>3-6-5</td>
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<tr>
<td>ENG 116</td>
<td>Technical Report Writing</td>
<td>3-0-3</td>
</tr>
<tr>
<td>ISC 110</td>
<td>Workplace Safety</td>
<td>1-4-3</td>
</tr>
<tr>
<td>MNT 110</td>
<td>Introduction to Maintenance Procedures</td>
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<tr>
<td>WLD 112</td>
<td>Basic Welding Processes</td>
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2nd Semester (Spring)

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<tr>
<td>BPM 110</td>
<td>Bioprocess Practices</td>
<td>3-4-5</td>
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<tr>
<td>CIS 111</td>
<td>Basic PC Literacy</td>
<td>1-2-2</td>
</tr>
<tr>
<td>ELC 112</td>
<td>DC/AC Electricity</td>
<td>3-6-5</td>
</tr>
<tr>
<td>ENG 110</td>
<td>Freshman Composition</td>
<td>3-0-3</td>
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<tr>
<td>HYD 110</td>
<td>Hydraulics/Pneumatics</td>
<td>2-3-3</td>
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3rd Semester (Summer)

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<tr>
<td>AHR 120</td>
<td>HVACR Maintenance</td>
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<tr>
<td>BPR 115</td>
<td>Electric/Fluid Power Diagrams</td>
<td>1-2-2</td>
</tr>
<tr>
<td>MAT 115</td>
<td>Mathematical Models</td>
<td>2-2-3</td>
</tr>
<tr>
<td>ISC 110</td>
<td>Workplace Safety</td>
<td>1-0-1</td>
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4th Semester (Fall)

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<tbody>
<tr>
<td>ELC 117</td>
<td>Motors and Controls</td>
<td>2-6-4</td>
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<tr>
<td>ELC 128</td>
<td>Introduction to PLC</td>
<td>2-3-3</td>
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<tr>
<td>ENG 116</td>
<td>Technical Report Writing</td>
<td>3-0-3</td>
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<tr>
<td>ISC 278</td>
<td>cGMP Quality systems</td>
<td>2-0-2</td>
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<tr>
<td>MNT 230</td>
<td>Pumps and Piping Systems</td>
<td>1-3-2</td>
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<tr>
<td>MNT 270</td>
<td>Bioprocess Equipment Maintenance</td>
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5th Semester (Spring)

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<tr>
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<tr>
<td>ELC 228</td>
<td>PLC Applications</td>
<td>2-6-4</td>
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<tr>
<td>ELN 231</td>
<td>Industrial Controls</td>
<td>2-3-3</td>
</tr>
<tr>
<td>MNT 240</td>
<td>Industrial Equipment Troubleshooting</td>
<td>1-3-2</td>
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<tr>
<td>MNT 280</td>
<td>Bioprocess Operating Systems</td>
<td>1-3-2</td>
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</tbody>
</table>
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
OR
ISC 112 Industrial Safety 2-0-2

Total Semester Hours Credit required for graduation: 16/17

Semester Curriculum for Electrical Controls Certificate

1st Semester (Fall) C-L-SHC
ELC 112 DC/AC Electricity 3-6-5
ELC 128 Introduction to PLC 2-3-3
5-9-8

2nd Semester (Spring)
ELC 117 Motors and Controls 2-6-4
ELN 231 Industrial Controls 2-3-3
ISC 110 Workplace Safety 1-0-1
OR
ISC 112 Industrial Safety 2-0-2
5/6-9-8/9

Total Semester Hours Credit: 16/17

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 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 (Fall) C-L-SHC
BPR 115 Electric/Fluid Power Diagrams 1-2-2
ELC 128 Introduction to PLC 2-3-3
HYD 110 Hydraulics/Pneumatics 2-3-3
MNT 110 Introduction to Maintenance Procedures 1-3-2
6-11-10

2nd Semester (Spring)
HYD 121 Hydraulics/Pneumatics II 1-3-2
MNT 111 Maintenance Practices 2-2-3
MNT 230 Pumps and Piping Systems 1-3-2
4-8-7

Total Semester Hours Credit: 17
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)  
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 229 Industrial Electronics 3-3-4

Total Semester Hours Credit required for graduation: 16

Semester Curriculum for Programmable Logic Controller Certificate

1st Semester (Fall)  
ELC 112 DC/AC Electricity 3-6-5  
ELC 128 Introduction to PLC 2-3-3  
5-9-8

2nd Semester (Spring)  
ELC 228 PLC Applications 2-6-4  
ELN 229 Industrial Electronics 3-3-4  
5-9-8

Total Semester Hours Credit: 16

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Industrial Systems Technology  
Credential: Certificate in Welding  
C5024040

The Welding certificate will provide students with knowledge of various types of welding processes and applications. Students will learn principles of welding, flame cutting, brazing, ARC, MIG, TIG and safety procedures. 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 Welding
Program Sites: Lee Campus - Evening Program

Course Requirements for Welding Certificate

A. Required Major Core Courses (5/6 SHC)  
BPR 111 Blueprint Reading 1-2-2  
ISC 110 Workplace Safety 1-0-1  
OR  
ISC 112 Industrial Safety 2-0-2  
WLD 112 Basic Welding Processes 1-3-2

B. Other Major Hours Required for Graduation (7 SHC)  
WLD 115 SMAW (Stick) Plate 2-9-5  
WLD 212 Inert Gas Welding 1-3-2

Total Semester Hours Credit Required for Graduation: 12

Semester Curriculum for Welding Certificate

1st Semester (Fall)  
BPR 111 Blueprint Reading 1-2-2  
WLD 112 Basic Welding Processes 1-3-2  
ISC 110 Workplace Safety 1-0-1  
OR  
ISC 112 Industrial Safety 2-0-2  
3/4-5-5/6

2nd Semester (Spring)  
WLD 115 SMAW (Stick) Plate 2-9-5  
WLD 212 Inert Gas Welding 1-3-2  
3-12-7

Total Semester Hours Credit: 12/13
Machining Technology
Credential: Diploma in Machining Technology
D50300

The Machining Technology curriculum is designed to develop skills in the theory and safe use of hand tools, power machinery, computerized equipment and sophisticated precision inspection instruments. Students will learn to interpret blueprints, set up manual and Computer Numerical Controllers (CNC) machines, perform basic and advanced machining operations and make decisions to insure that work quality is maintained. Employment opportunities for machining technicians exist in manufacturing industries, public institutions, governmental agencies, and in a wide range of specialty machining job shops.

Program Length: 3 semesters
Career Pathway Options: Associate in Applied Science in Machining Technology with a Concentration in Tool, Die and Mold Making (Higher entrance standards required); Diploma in Machining Technology
Program Sites:
Lee Campus - Day Program
Harnett Campus - Day Program

Course Requirements for Machining Technology Diploma
A. General Education Courses (9/10 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
ENG 111A Expository Writing Lab 0-2-1
*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 (26 SHC)
MAC 111 Machining Technology I 2-12-6
MAC 112 Machining Technology II 2-12-6
MAC 113 Machining Technology III 2-12-6

Required Subject Areas
BPR 111 Blueprint Reading 1-2-2
BPR 121 Blueprint Reading: Mechanical 1-2-2
MAC 121 Introduction to CNC 2-0-2
MAC 124 CNC Milling 1-3-2

C. Other Major Hours Required for Graduation (8 SHC)
CIS 111 Basic PC Literacy 1-2-2
ISC 110 Workplace Safety 1-0-1
MAC 151 Machining Calculations 1-2-2
MEC 141 Manufacturing Processes 2-2-3

Total Semester Hours Credit required for graduation: 43/44

Semester Curriculum for Machining Technology Diploma
1st Semester (Fall) C-L-SHC
BPR 111 Blueprint Reading 1-2-2
CIS 111 Basic PC Literacy 1-2-2
ISC 110 Workplace Safety 1-0-1
MAC 111 Machining Technology I 2-12-6
MAC 121 Introduction to CNC 2-0-2
MAC 151 Machining Calculations 1-2-2
MEC 141 Manufacturing Processes 2-2-3
10-20-18

2nd Semester (Spring)
BPR 121 Blueprint Reading: Mechanical 1-2-2
*ENG 102 Applied Communication II 3-0-3
OR
ENG 110 Freshman Composition 3-0-3
OR
ENG 111 Expository Writing 3-0-3
ENG 111A Expository Writing Lab 0-2-1
MAC 112 Machining Technology II 2-12-6
MAC 124 CNC Milling 1-3-2
*MAT 101 Applied Mathematics I 2-2-3
OR
MAT 120 Geometry and Trigonometry 2-2-3
9-19-16/17

3rd Semester (Summer)
MAC 113 Machining Technology III 2-12-6
Humanities/Fine Arts Elective 3-0-3
5-12-9

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

Total Semester Hours Credit: 43/44
Machining Technology
Credential: Certificate in Machining Technology
C50300

The Machining Technology curriculum is designed to develop skills in the theory and safe use of hand tools, power machinery, computerized equipment and sophisticated precision inspection instruments. Students will learn to interpret blueprints, set up manual and Computer Numerical Controllers (CNC) machines, perform basic machining operations and make decisions to insure that work quality is maintained. Employment opportunities for machining technicians exist in manufacturing industries, public institutions, governmental agencies, and in a wide range of specialty machining job shops.

Program Length: 2 semesters
Career Pathway Options: Associate in Applied Science in Machining Technology with a Concentration in Tool, Die and Mold Making (Higher entrance standards required); Diploma in Machining Technology (Higher entrance standards required); Certificate in Machining Technology
Program Sites:
Lee Campus - Evening Program
Harnett Campus - Evening Program

Course Requirements for Machining Technology Certificate
A. Required Major Core Courses (16 SHC)  C-L-SHC
MAC 111  Machining Technology I  2-12-6

Required Subject Areas
BPR 111  Blueprint Reading  1-2-2
BPR 121  Blueprint Reading: Mechanical  1-2-2
ISC 110  Workplace Safety  1-0-1
MAC 121  Introduction to CNC  2-0-2
MEC 141  Intro to Manufacturing Processes  2-2-3

Total Semester Hours Credit required for graduation: 16

Semester Curriculum for Machining Technology Certificate
1st Semester (Fall)  C-L-SHC
BPR 111  Blueprint Reading  1-2-2
ISC 110  Workplace Safety  1-0-1
MAC 111A  Machining Technology IA  1-6-3
MAC 121  Introduction to CNC  2-0-2
MEC 141  Intro to Manufacturing Processes  2-2-3
Total 7-10-11

2nd Semester (Spring)
BPR 121  Blueprint Reading: Mechanical  1-2-2
MAC 111B  Machining Technology IB  1-6-3
MAC 111C  Machining Technology IIIB  2-8-5

Total Semester Hours Credit: 16

Machining Technology with a Concentration in Tool, Die and Mold Making
Credential: Associate in Applied Science Degree in Machining Technology with a Concentration in Tool, Die and Mold Making A5030A

Tool, Die and Mold Making is a concentration under the curriculum title of Machining Technology. This curriculum is designed to develop skills in the use of hand tools, computerized equipment and precision instruments for machine tooling used for the mass production of parts.

Students will learn to interpret blueprints, set up manual and Computer Numerical Controllers (CNC) machines and perform basic and advanced machining operations. Emphasis will be placed on the production of tooling used for punching, stamping and molding of parts.

Graduates should qualify for employment opportunities in manufacturing industries and Tool, Die and Mold Making industries.

Program Length: 6 semesters
Career Pathway Options: Associate in Science in Machining Technology with a Concentration in Tool, Die and Mold Making
Program Sites: Lee Campus - Day Program

Course Requirements for Machining Technology with a Concentration in Tool, Die and Mold Making
A. General Education Courses (15/16 SHC)  C-L-SHC
ENG 110  Freshman Composition  3-0-3
OR
ENG 111  Expository Writing  3-0-3
AND
ENG 111A  Expository Writing Lab  0-2-1
ENG 114  Professional Research and Reporting  3-0-3
OR
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

B. Required Major Core Courses (44 SHC)  C-L-SHC
BPR 111  Blueprint Reading  1-2-2
BPR 121  Blueprint Reading: Mechanical  1-2-2
MAC 111  Machining Technology I  2-12-6
MAC 112  Machining Technology II  2-12-6
MAC 113  Machining Technology III  2-12-6

Required Subject Areas
MAC 122  CNC Turning  1-3-2
MAC 124  CNC Milling  1-3-2

Concentration Courses
MAC 153  Compound Angles  1-2-2
MAC 243  Die Making I  2-6-4
### 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**

<table>
<thead>
<tr>
<th>Semester</th>
<th>Course</th>
<th>Credits</th>
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<tbody>
<tr>
<td>1st</td>
<td>BPR 11 Blueprint Reading</td>
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<tr>
<td></td>
<td>CIS 111 Basic PC Literacy</td>
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<tr>
<td></td>
<td>MAC 111 Machining Technology</td>
<td>2-12-6</td>
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<tr>
<td></td>
<td>MAC 151 Machining Calculations</td>
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<td>MEC 141 Manufacturing Process</td>
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<tr>
<td>2nd</td>
<td>BPR 121 Blueprint Reading: Mechanical</td>
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<tr>
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<td>ENG 110 Freshman Composition</td>
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<tr>
<td></td>
<td>ENG 111 Expository Writing</td>
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<td>ENG 111A Expository Writing Lab</td>
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<td>MAC 112 Machining Technology II</td>
<td>2-12-6</td>
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<tr>
<td></td>
<td>MAC 124 CNC Milling</td>
<td>1-3-2</td>
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<tr>
<td></td>
<td>MAT 120 Geometry/Trigonometry</td>
<td>2-2-3</td>
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<tr>
<td>3rd</td>
<td>MAC 113 Machining Technology III</td>
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<td>Humanities/Fine Arts Elective</td>
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<td>OR</td>
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<tr>
<td>4th</td>
<td>MAC 122 CNC Turning</td>
<td>1-3-2</td>
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<td>MAC 153 Compound Angles</td>
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<tr>
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<td>MAC 241 Jigs and Fixtures I</td>
<td>2-6-4</td>
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<td>MAC 245 Mold Construction I</td>
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<td>ENG 116 Technical Report Writing</td>
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<td>OR</td>
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<td>5th</td>
<td>MAC 224 Advanced CNC Milling</td>
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<td>MAC 226 CNC EDM Machining</td>
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<td>MAC 243 Die Making I</td>
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<td>MAC 246 Mold Construction II</td>
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<td>MEC 110 Introduction to CAD/CAM</td>
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<td>6-23-14</td>
</tr>
<tr>
<td>6th</td>
<td>MAC 244 Die Making II</td>
<td>1-9-4</td>
</tr>
<tr>
<td></td>
<td>Social/Behavioral Science Elective</td>
<td>3-0-3</td>
</tr>
<tr>
<td></td>
<td>OR</td>
<td>4-9-7</td>
</tr>
</tbody>
</table>

Total Semester Hours Credit: 76/77

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### MAC 244 Die Making II 1-9-4

### MAC 245 Mold Construction I 2-6-4

### MAC 246 Mold Construction II 1-9-4

### C. Other Major Hours Required for Graduation (17 SHC)

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CIS 111 Basic PC Literacy</td>
<td>1-2-2</td>
</tr>
<tr>
<td>MAC 151 Machining Calculations</td>
<td>1-2-2</td>
</tr>
<tr>
<td>MAC 224 Advanced CNC Milling</td>
<td>1-3-2</td>
</tr>
<tr>
<td>MAC 226 CNC EDM Machining</td>
<td>1-3-2</td>
</tr>
<tr>
<td>MAC 241 Jigs and Fixtures I</td>
<td>2-6-4</td>
</tr>
<tr>
<td>MEC 110 Introduction to CAD/CAM</td>
<td>1-2-2</td>
</tr>
<tr>
<td>MEC 141 Manufacturing Process</td>
<td>2-2-3</td>
</tr>
</tbody>
</table>

Total Semester Hours Credit: 76/77
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 113 Home Automation Systems 2-2-3
NET 125 Networking Basics 1-4-3
NET 126 Routing Basics 1-4-3
NET 175 Wireless Technologies 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 1-4-3
NET 230 Wide Area Networking 2-2-3

*Students may substitute ENG 111/111A
**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 Certificate

1st Semester (Fall) C-L-SHC
TCT 103 Installer Level 1 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 0-2-1

9-18-18

2nd Semester (Spring)
BUS Business Elective 3

Total Semester Hours Credit required for graduation: 18

Semester Curriculum for Telecommunications Installation and Maintenance Certificate

1st Semester (Fall or Spring) C-L-SHC
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 2-2-3
MAJOR ELECTIVE 3

12-4-17

Total Semester Hours Credit: 41
### Public Service Technologies

#### Barbering Credential:

**Diploma in Barbering D55110**

The Barbering Curriculum is designed to provide competency-based knowledge, scientific/artistic principles and hands-on fundamentals associated with the barbering industry. The curriculum also provides a simulated environment that enables students to develop manipulative skills. Coursework includes instruction in all phases of professional barbering, hair design, chemical processes, skin care, nail care, multi-cultural practices, business/computer principles, product knowledge and other selected topics. Graduates should qualify to sit for the State Board of Examiners. Upon successfully passing the State Board exam, graduates will be issued a license. Employment is available in barbershops and related businesses.

Program Length: 4 semesters  
Career Pathway Options: Diploma in Barbering  
Program Sites: West Harnett Campus - Day and Evening  
Chatham Campus - Evening

Course Requirements for Barbering Diploma  

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

**B. Required Major Core Courses (32 SHC)**  
BAR 111(A/B) *Barbering Concepts I 4-0-4  
BAR 112(A/B) Barbering Clinic I 0-24-8  
BAR 113(A/B) Barbering Concepts II 4-0-4  
BAR 114(A/B) Barbering Clinic II 0-24-8  
BAR 115(A/B) Barbering Concepts III 4-0-4  
BAR 116(A/B) Barbering Clinic III 0-12-4

**C. Other Major Hours Required for Graduation (9 SHC)**  
BAR 117(A/B) Barbering Concepts IV 2-0-2  
BAR 118(A/B) Clinic IV 0-21-7

*Courses divided into A/B sections for part-time day/ evening students.

Total Semester Hours Credit required for graduation: 47

### Semester Curriculum for Barbering Diploma

**1st Semester (Fall)** C-L-SHC  
BAR 111 Barbering Concepts I 4-0-4  
BAR 112 Barbering Clinic I 0-24-8  
4-24-12

**2nd Semester (Spring)**  
BAR 113 Barbering Concepts II 4-0-4  
BAR 114 Barbering Clinic II 0-24-8  
4-24-12

**3rd Semester (Summer)**  
BAR 115 Barbering Concepts III 4-0-4