Applied Studies Division

Computer Integrated Manufacturing Technology

- Associate of Applied Science Degree in Computer Integrated Manufacturing
- Maintenance and Repair Concentration
- CNC Operator Mini Certificate
- CNC Set-Up and Programming Technology Certificate
- Industrial Computer Hardware Technician Certificate
- Production Shift Leader / Manufacturing Management Certificate
- Tool and Die Technology Certificate
- Tool Room / Maintenance Machinist Apprentice Certificate

Opportunity starts HERE
lakelandcc.edu
Career Opportunities

Today’s manufacturing industry is highly computerized and advanced. Mills and factories have gone from hand-held machinery to high-tech, specialized computer programs and robotics that do the projects. It takes highly trained and qualified people to perform the requirements needed in the manufacturing industry today. Northeast Ohio shows very strong job growth in this area and some companies are having difficulties finding enough employees to fill open positions.

Lakeland’s Program

The general manufacturing major prepares students for employment as engineering technicians at the operations level in manufacturing industries having a concentration in computer applications. Technicians assist in the design and implementation of manufacturing process systems that include numerical control equipment, computer aided part programming, computer aided manufacturing, factory automation, and flexible manufacturing cells and systems.

The maintenance and repair concentration prepares graduates for repairing and maintaining equipment in an industrial environment.

There are also several certificates available that students can choose to supplement their learning.

The Lakeland Advantage

- Classes meet today’s technology requirements for the manufacturing industry.
- Faculty members have years of experience working for local companies and update the courses and equipment to keep up with the latest industry trends.
- Students receive hands-on experience to meet or exceed the requirements of today’s manufacturing companies.
- Scholarships may be available to those who qualify.

Lakeland Community College

Admission Requirements

For admission into Lakeland, students must be a high school graduate or have obtained a high school diploma equivalency. Please consult Lakeland Community College's Enrollment Guide (available on Lakeland's website at lakelandcc.edu/enrollment) for specific admissions requirements and procedures.

For more information

1.800.589.8520 • lakelandcc.edu

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Professor and Co-Chair
Computer Integrated Manufacturing and Mechanical Engineering Technology
440.525.7293
mshingler@lakelandcc.edu

To further your education, Lakeland’s Holden University Center offers a variety of bachelor’s degree programs from a number of four-year colleges and universities offering you the opportunity to stay here and go far! Visit lakelandcc.edu/uc to explore your options.
Lakeland's Computer Integrated Manufacturing Technology degree program prepares students for employment in a variety of manufacturing industries. There are two choices available to students in this degree program:

- General Manufacturing Major (AWT)
- Maintenance and Repair Concentration (AWT, ArcelorMittal)

Both degrees are approved by the AWT ( Alliance for Working Together http://thinkmfg.com/) to meet employment needs throughout the Alliance in Northeast Ohio. The Maintenance and Repair Concentration also offers an option for becoming a mechanical maintenance and repair technician at ArcelorMittal Cleveland.

Students are reminded of the college’s policy requiring students in associate of applied science programs to have a “C” grade or better in their applicable technical courses. Students who are concerned about their grades should consult with the Counseling Office or the department chair for the approved list of technical courses for their specified degree program.

Certificates are also available.

### General Manufacturing Major (9430)

The General Manufacturing major prepares students for employment as engineering technicians at the operations level in manufacturing industries having a concentration in computer applications. Technicians assist in the design and implementation of manufacturing process systems that include numerical control equipment, computer aided part programming, computer aided manufacturing, factory automation, and flexible manufacturing cells and systems.

**NOTE:** Students without prior exposure to machining will find CIMN 0950 Introduction to Machine-Tool Technology helpful in gaining experience for CIMN 1110.

#### First Semester:

- CADT 1100 .......... Introduction to AutoCAD ........................................... 3
- COMM 1050*........ Fundamentals of Public Speaking .............................. 2
- OR
- COMM 1150......... Fundamentals of Interpersonal Communication
- CIMN 1110 .......... Machining Processes .............................................. 3
- ENGL 1110** ........ English Composition I (A) ....................................... 3
- OR
- ENGL 1111 .......... English Composition I (B)
- ENGR 1000 .......... Introduction to Engineering Technology ..................... 2
- FYEX 1000 .......... First Year Experience ............................................. 1
- MATH 1001 .......... Introduction to Technical Mathematics ....................... 4

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#### Second Semester:

- CIMN 1210 .......... Materials Processing .............................................. 3
- MATH 1101 .......... Technical Mathematics I ........................................ 4
- MECT 1150 .......... Technical Communications ..................................... 3
- MECT 1600 .......... Geometric Dimensioning and Tolerancing ................. 2
- PHYS 1100 .......... Applied Physics I .................................................... 3

**15**

#### Third Semester:

- CADT 2100 .......... Introduction to SolidWorks ..................................... 3
- CIMN 2190 .......... Manufacturing Methods and Costs ........................... 3
- CIMN 2240 .......... Jig and Fixture Design I .......................................... 3
- PHYS 1200 .......... Applied Physics II .................................................. 3

(1st 8 weeks)

- CIMN 1420 .......... Computer Numerical Control Part Programming ........ 2

(2nd 8 weeks)

- CIMN 1430 .......... Introduction to Computer Assisted Part Programming ... 2

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#### Fourth Semester:

- CIMN 1450 .......... Programming CNC Lathes ..................................... 2
- CIMN 1460 .......... Programming CNC Machining Centers ....................... 2
- CIMN 2875 .......... Design and Manufacturing Capstone ......................... 3
- QENT 1200 .......... Quality Concepts and Techniques ............................ 2
- Choose course(s) from the Arts and Humanities Electives list ............... 3
- Choose course(s) from the Social and Behavioral Sciences Electives list ... 3

**15**

**Program Total: 64**

*Students may substitute either COMM 1000 or COMM 1100. One of these 3 credit courses may be required for students transferring to a four-year college.*

**English course selection is based on placement test results (ENGL 1111 is 4 credits, only 3 credits apply to the degree).**

### Arts and Humanities Electives: minimum 3 credits

- ARTS 1120, 2220, 2230; ENGL 2250, 2260, 2280, 2290; HUMX 1100, 1200; MUSC 1200, 1215, 1800, 2200, 2250; PHIL 1500, 2000; PHOT 1000

### Social and Behavioral Sciences Electives: minimum 3 credits

- ANTH 1160; ECON 1150, 2500, 2600; GEOG 1500, 1600, 2500; HIST 1150, 1250, 2150, 2250; POLS 1300, 2500; PSYC 1500; SOCY 1150
### Maintenance and Repair Concentration (9439)

The Maintenance and Repair Concentration prepares graduates for repairing and maintaining equipment in an industrial environment.

The AWT option is designed to meet AWT employment needs throughout the Alliance in Northeast Ohio. See [http://thinkmfg.com/](http://thinkmfg.com/).

The ArcelorMittal Endorsed Option for the Maintenance and Repair Concentration (ArcelorMittal Steelworker for the Future Program) is for students wanting a career as a maintenance technician mechanical at ArcelorMittal Cleveland. The Steelworker for the Future program is a partnership with Lakeland Community College, ArcelorMittal Cleveland, and the United Steelworkers Local 979 designed to prepare students for successful careers as mechanical maintenance or electrical maintenance technicians in the steel industry. Steelworker for the Future is an estimated 2.5-year program that includes four semesters of classroom training, plus up to 16 weeks of paid on-the-job (co-op) training at ArcelorMittal Cleveland for students who pass the company’s hiring requirements. Students will earn an Associate of Applied Science (AAS) degree and can be eligible for hire at ArcelorMittal upon completion of the program. (Students are not required to work for ArcelorMittal, nor are they guaranteed employment at ArcelorMittal.) For more information about the program and to apply go to [http://steelworkerforthefuture.com/](http://steelworkerforthefuture.com/).

**NOTE:** Students without prior exposure to machining will find CIMN 0950 Introduction to Machine-Tool Technology helpful in gaining experience for CIMN 1110.

#### First Semester:
- CADT 1100 .................................. Introduction to AutoCAD .................................. 3
- CIMN 1110 .................................. Machining Processes .................................. 3
- COMM 1050* .................................. Fundamentals of Public Speaking ................. 2
- OR
  - COMM 1150 .................................. Fundamentals of Interpersonal Communication
  - ENGL 1110** .................................. English Composition I (A) ......................... 3
  - OR
  - ENGL 1111 .................................. English Composition I (B)
  - ENGR 1000 .................................. Introduction to Engineering Technology ....... 2
  - FYEX 1000 .................................. First Year Experience .................................. 1
  - MATH 1001 .................................. Introduction to Technical Mathematics ....... 4

**Third Semester:**
- MECT 2150 .................................. Power Transmission .................................. 2
- PHYS 1200 .................................. Applied Physics II .................................. 3
- Choose course(s) from the Arts and Humanities Electives list .................... 3
- Choose course(s) from the Technical Electives list ................................. 4

**Fourth Semester:**
- CIMN 2390 .................................. Fluid Power Technology ............................ 3
- CIMN 2840 .................................. Repair and Maintenance Capstone ................ 2
- QENT 1200 .................................. Quality Concepts and Techniques ............... 2
- Choose course(s) from the Social and Behavioral Sciences Electives list ......... 3
- Choose course(s) from the Technical Electives list*.................................. 6

Program Total: 63

*Students may substitute either COMM 1000 or COMM 1100. One of these 3 credit courses may be required for students transferring to a four-year college.

**English course selection is based on placement test results (ENGL 1111 is 4 credits, only 3 credits apply to the degree).**

**Technical Electives: minimum 12 credits**

Students are required to develop an area of emphasis in the program through the selection of technical electives. Options include:

- Maintenance and Repair Option
- AWT Endorsed Option (Alliance for Working Together Consortium)
- ArcelorMittal Endorsed Option

The **Maintenance and Repair Option** requires the following elective course:
- MECT 1600 .................................. Geometric Dimensioning and Tolerancing ........ 2

The **AWT Endorsed Option** requires all of the following elective courses:
- MECT 1600 .................................. Geometric Dimensioning and Tolerancing ........ 2
- ENGR 2800* .................................. Engineering Co-Op Experience .................. 1

*The co-op experience(s) with a company in the AWT will have a maximum of 2 credits.

The **ArcelorMittal Endorsed Option** requires all of the following elective courses:
- WELD 1225 .................................. Oxyfuel Cutting, Carbon Arc Gouging, and Plasma Cutting 2
- WELD 1240 .................................. SMAW (Stick) Welding ............................... 2
- WELD 1265 .................................. GTAW (TIG) Welding .............................. 2
- WELD 1270 .................................. FCAW (Flux Cored) Welding ..................... 3
- ENGR 2800* .................................. Engineering Co-Op Experience .................. 1
- ENGR 2800* .................................. Engineering Co-Op Experience .................. 1

*There are two co-op experiences, each with ArcelorMittal, for a maximum of 2 credits.
Students are required to choose the remaining technical electives from the following list of courses:

- CADT 1500. Advanced AutoCAD. 3
- CADT 2120. Introduction to SolidWorks. 3
- CADT 2500. Advanced SolidWorks. 3
- CIMN 1430. Introduction to Computer Assisted Part Programming. 2
- CIMN 1450. Programming CNC Lathes. 2
- CIMN 1460. Programming CNC Machining Centers. 2
- CIMN 2190. Manufacturing Methods and Costs. 3
- CIMN 2240. Jig and Fixture Design I. 3
- CNET 1100. Cisco Networking Technology I. 2
- CNET 1200. Cisco Networking Technology II. 2
- CNET 1300. Cisco Networking Technology III. 2
- CPET 1120. C Programming for Engineering Technology. 3

(Certificate Total: 24-26)

For more information about our graduation rates, the median debt of students who completed the program, and other important information, please visit lkn.lakelandcc.edu/go/ge/?g=4312.

Arts and Humanities Electives: minimum 3 credits
ARTS 1120, 2220, 2230; ENGL 2250, 2260, 2280, 2290; HUMX 1100, 1200; MUSC 1200, 1215, 1800, 2200, 2250; PHIL 1500, 2000; PHOT 1000

Social and Behavioral Sciences Electives: minimum 3 credits
ANTH 1150; ECON 1150, 2500, 2600; GEOG 1500, 1600, 2500; HIST 1150, 1250, 2150, 2250; POLS 1300, 2500; PSYC 1500; SOCY 1150

Computer Integrated Manufacturing Technology Certificates

- CNC Operator Mini Certificate
- CNC Set-Up and Programming Technology
- Computer Integrated Manufacturing Technology
- Industrial Computer Hardware Technician
- Production Shift Leader/Manufacturing Management
- Tool and Die Technology
- Tool Room/Maintenance Machinist Apprentice

CNC Operator Mini Certificate (4315)

NOTE: Some courses in this certificate are available only on weekends.

NOTE: Courses below the 1000 level can not be used to meet degree requirements.

- CIMN 0950. Introduction to Machine-Tool Technology. 2
- CIMN 0980. Manufacturing Shop Mathematics. 2
- CIMN 0990. Basic Blueprint Reading and Sketching. 2
- CNET 1120. C Programming for Engineering Technology. 3
- CADT 1100. Introduction to AutoCAD. 3
- CIMN 1450. Programming CNC Lathes. 2
- CIMN 1460. Programming CNC Machining Centers. 2
- ENGR 1000. Introduction to Engineering Technology. 2

(Certificate Total: 14-15)
## Computer Integrated Manufacturing Technology Certificate (4311)

**NOTE:** Students without prior exposure to machining will find CIMN 0950 Introduction to Machine-Tool Technology and CIMN 0960 Introduction to Machine-Tool Set-Up and CAM helpful to gain the required knowledge and experience for CIMN 1110 and CIMN 1420.

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CADT 1100</td>
<td>Introduction to AutoCAD</td>
<td>3</td>
</tr>
<tr>
<td>CIMN 1110</td>
<td>Machining Processes</td>
<td>3</td>
</tr>
<tr>
<td>CIMN 1210</td>
<td>Materials Processing</td>
<td>3</td>
</tr>
<tr>
<td>CIMN 1420</td>
<td>Computer Numerical Control Part Programming (CNC)</td>
<td>2</td>
</tr>
<tr>
<td>CIMN 1430</td>
<td>Introduction to Computer Assisted Part Programming</td>
<td>2</td>
</tr>
<tr>
<td>CIMN 2190</td>
<td>Manufacturing Methods and Costs</td>
<td>3</td>
</tr>
<tr>
<td>CIMN 2240</td>
<td>Jig and Fixture Design I</td>
<td>3</td>
</tr>
<tr>
<td>ENGR 1000</td>
<td>Introduction to Engineering Technology</td>
<td>2</td>
</tr>
<tr>
<td>MATH 1001</td>
<td>Introduction to Technical Mathematics</td>
<td>4</td>
</tr>
<tr>
<td>MECT 1150</td>
<td>Technical Communications</td>
<td>3</td>
</tr>
</tbody>
</table>

**Certificate Total: 28**

For more information about our graduation rates, the median debt of students who completed the program, and other important information, please visit [lkn.lakelandcc.edu/go/ge/?g=4311](http://lkn.lakelandcc.edu/go/ge/?g=4311).

## Production Shift Leader/Manufacturing Management Certificate (4351)

**NOTE:** Students without prior exposure to machining will find CIMN 0950 Introduction to Machine-Tool Technology helpful in gaining machining experience for CIMN 1110.

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
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</thead>
<tbody>
<tr>
<td>BUSM 1300</td>
<td>Introduction to Business</td>
<td>3</td>
</tr>
<tr>
<td>BUSM 1800</td>
<td>Essentials of Management and Supervision</td>
<td>3</td>
</tr>
<tr>
<td>BUSM 2200</td>
<td>Organizational Behavior</td>
<td>3</td>
</tr>
<tr>
<td>CADT 1100</td>
<td>Introduction to AutoCAD</td>
<td>3</td>
</tr>
<tr>
<td>CIMN 1110</td>
<td>Machining Processes</td>
<td>3</td>
</tr>
<tr>
<td>CIMN 1210</td>
<td>Materials Processing</td>
<td>3</td>
</tr>
<tr>
<td>CIMN 2190</td>
<td>Manufacturing Methods and Costs</td>
<td>3</td>
</tr>
<tr>
<td>ENGR 1000</td>
<td>Introduction to Engineering Technology</td>
<td>2</td>
</tr>
<tr>
<td>MATH 1001</td>
<td>Introduction to Technical Mathematics</td>
<td>4</td>
</tr>
<tr>
<td>MECT 1150</td>
<td>Technical Communications</td>
<td>3</td>
</tr>
</tbody>
</table>

**Certificate Total: 30**

For more information about our graduation rates, the median debt of students who completed the program, and other important information, please visit [lkn.lakelandcc.edu/go/ge/?g=4351](http://lkn.lakelandcc.edu/go/ge/?g=4351).

## Tool and Die Technology Certificate (4303)

**NOTE:** Courses below the 1000 level cannot be used to meet degree requirements.

### First Semester:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CIMN 0950</td>
<td>Introduction to Machine-Tool Technology</td>
<td>2</td>
</tr>
<tr>
<td>CIMN 0960</td>
<td>Introduction to Machine-Tool Set-Up and CAM</td>
<td>2</td>
</tr>
</tbody>
</table>

**Certificate Total: 4**

### Second Semester:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENGR 1000</td>
<td>Introduction to Engineering Technology</td>
<td>2</td>
</tr>
<tr>
<td>MATH 1001</td>
<td>Introduction to Technical Mathematics</td>
<td>4</td>
</tr>
</tbody>
</table>

**Certificate Total: 6**

### Third Semester:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CADT 1100</td>
<td>Introduction to AutoCAD</td>
<td>3</td>
</tr>
<tr>
<td>CIMN 1110</td>
<td>Machining Processes</td>
<td>3</td>
</tr>
</tbody>
</table>

**Certificate Total: 6**

### Fourth Semester:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>MECT 1150</td>
<td>Technical Communications</td>
<td>3</td>
</tr>
<tr>
<td>MECT 1600</td>
<td>Geometric Dimensioning and Tolerancing</td>
<td>2</td>
</tr>
</tbody>
</table>

**Certificate Total: 5**

### Fifth Semester:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CADT 1500</td>
<td>Advanced AutoCAD</td>
<td>3</td>
</tr>
<tr>
<td>CIMN 2240</td>
<td>Jig and Fixture Design I</td>
<td>3</td>
</tr>
</tbody>
</table>

**Certificate Total: 6**

### Sixth Semester:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
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</thead>
<tbody>
<tr>
<td>CIMN 1210</td>
<td>Materials Processing</td>
<td>3</td>
</tr>
</tbody>
</table>

**Certificate Total: 3**

For more information about our graduation rates, the median debt of students who completed the program, and other important information, please visit [lkn.lakelandcc.edu/go/ge/?g=4303](http://lkn.lakelandcc.edu/go/ge/?g=4303).
**Tool Room/Maintenance Machinist Apprentice Certificate (4302)**

*NOTE:* Courses below the 1000 level cannot be used to meet degree requirements.

*NOTE:* Students without prior exposure to machining will find CIMN 0950 Introduction to Machine-Tool Technology helpful to gain the required knowledge and experience for CIMN 1110.

<table>
<thead>
<tr>
<th>Semester</th>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
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</thead>
<tbody>
<tr>
<td><strong>First Semester</strong></td>
<td>CIMN 0990</td>
<td>Basic Blueprint Reading and Sketching</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>MATH 0890</td>
<td>Pre-Technical Mathematics</td>
<td>3</td>
</tr>
<tr>
<td><strong>Second Semester</strong></td>
<td>ENGR 1000</td>
<td>Introduction to Engineering Technology</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>MATH 1001</td>
<td>Introduction to Technical Mathematics</td>
<td>4</td>
</tr>
<tr>
<td><strong>Third Semester</strong></td>
<td>CADT 1100</td>
<td>Introduction to AutoCAD</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>CIMN 1110</td>
<td>Machining Processes</td>
<td>3</td>
</tr>
<tr>
<td><strong>Fourth Semester</strong></td>
<td>CIMN 1210</td>
<td>Materials Processing</td>
<td>3</td>
</tr>
<tr>
<td><strong>Fifth Semester</strong></td>
<td>CIMN 1420</td>
<td>Computer Numerical Control Part Programming (CNC)</td>
<td>2</td>
</tr>
<tr>
<td><strong>Sixth Semester</strong></td>
<td>CIMN 1450</td>
<td>Programming CNC Lathes</td>
<td>2</td>
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<tr>
<td></td>
<td>CIMN 1460</td>
<td>Programming CNC Machining Centers</td>
<td>2</td>
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</tbody>
</table>

*Certificate Total: 26*

For more information about our graduation rates, the median debt of students who completed the program, and other important information, please visit [lkn.lakelandcc.edu/go/ge/?g=4302](http://lkn.lakelandcc.edu/go/ge/?g=4302).
Lakeland prepares you for a high-demand career or for transfer to a four-year college or university. Professors at Lakeland are experts in their fields with real-world experience. Small class sizes allow for personalized attention.

Affordable Tuition
Save thousands on your college education. Lakeland’s tuition is about one-third the cost of most four-year schools. Financial assistance is available, including federal and state grants, scholarships, loans, and work study employment.

Convenience
Lakeland offers convenient day, evening and weekend class times, and a growing number of online courses. The main campus in Kirtland is only 20 miles northeast of Cleveland. Classes are also offered in Madison.

Focus on Students
Lakeland offers a variety of student services to help you succeed, such as counseling, tutoring, wireless computer labs, career services, free parking, and affordable child care.

Curriculum and program requirements are subject to change. Find the most up-to-date information in the college catalog, available on the website at lakelandcc.edu.