Lakeshore Technical College

31-420-326 Machining Geometry and Basic Trigonometry

Course Outcome Summary

Course Information

Alternate Title	Apply geometry and basic trig to solve technical problems
Description	...prepares the learner to apply geometry and basic trig to solve technical problems.
Total Credits	1
Total Hours	32

Types of Instruction

Instruction Type	Credits/Hours
Lab	1/32

Pre/Corequisites

Corequisite 31-420-325 Machining Math Basic

Textbooks

Mathematics for Machine Technology, **Author:** Smith & Peterson **Edition:** 7th **ISBN:** 1133281450. **Source:** LTC Bookstore. **Required**

Learner Supplies

LTC Machine Tool Operations - Math Study Guide. **Source:** Blackboard Course. (required)

LTC Math & Print Course Guidelines **Source:** Blackboard Course. (required)

Scientific Calculator FX991EX Plus -SR. **Manufacturer:** Casio. **Source:** LTC Bookstore (required)

Access to a computer with internet connectivity

Core Abilities

1. Use mathematics effectively

Criteria

1.1. Learner solves real world problems using mathematics
1.2. Learner measures accurately
1.3. Learner analyzes graphical information
1.4. Learner demonstrates an understanding of world measurements and foreign currency exchange

Program Outcomes

1. Interpret industrial/engineering drawings

Summative Assessment Strategies

1.1. WTCS TSA Scoring Guide

Criteria

1.1. Interpret orthographic projections
1.2. Interpret lines, symbols, conventions and notations
1.3. Distinguish between structural shapes
1.4. Interpret a Bill of Materials
1.5. Determine location of part features according to established specifications
1.6. Calculate tolerances according to established specifications
1.7. Drawings follow view projection standards
1.8. Interpret Geometric Dimensioning and Tolerancing

2. Apply precision measuring methods to part inspection

Summative Assessment Strategies

2.1. WTCS TSA Scoring Guide

Criteria

2.1. Select correct measuring tool for job requirements
2.2. Demonstrate care of precision measuring equipment according to established procedures
2.3. Convert English/metric measurements
2.4. Use standard industry measurement terminology
2.5. Perform precision measurement according to established procedures

3. Perform advanced machine tool equipment set-up and operation

Summative Assessment Strategies

3.1. WTCS TSA Scoring Guide
3.2. given an engineering drawing

Criteria

3.1. Select and load tools according to the requirements of the job
3.2. Select and set-up various work-holding devices for complex parts
3.3. Verify machine set-up
3.4. Verify proper application of speeds and feeds
3.5. Operate machine tools according to established procedures
3.6. Complete project within specified timeframe
3.7. Take action to optimize machine tool operation

4. Perform advanced programming, set-up and operation of CNC Machine Tools

Summative Assessment Strategies

4.1. WTCS TSA Scoring Guide

Criteria

4.1. Utilize CAD/CAM software to create programs
4.2. Write G&M code programs according to standards
4.3. Load the correct program into the machine
4.4. Verify the accuracy of the CNC program
4.5. Demonstrate selection, loading, entering, and verification of work and tool offsets
4.6. Execute program
4.7. Adjust speeds and feeds to optimize CNC machining conditions

5. Perform advanced CNC machining operations

Summative Assessment Strategies

5.1. WTCS TSA Scoring Guide

Criteria

5.1. Troubleshoot CNC machine operations
5.2. Create advanced process plans
5.3. Perform multi-axis operations

5.4. Perform one or more alternative CNC machining processes as defined by local industry needs.

Course Competencies

1. Solve equations by addition, subtraction, multiplication, division, and root and power principles.

Linked Core Abilities
Apply learning
Demonstrate critical thinking
Demonstrate responsible and professional workplace behaviors
Use mathematics effectively

Linked Program Outcomes
Perform advanced CNC machining operations

Assessment Strategies
1.1. Skillbuilder Exercise
1.2. Written Test

Criteria

Your performance will be successful when:
1.1. learner submits the assignment.
1.2. you can solve equations using addition, subtraction, multiplication, division, root and power principles .
1.3. learner completes the unit test.

Learning Objectives
1.a. Solve equations using the power principle of equality.
1.b. Write comparisons as ratios.

2. Solve equations by rearrangement of formulas.

Linked Core Abilities
Apply learning
Demonstrate critical thinking
Demonstrate responsible and professional workplace behaviors
Use mathematics effectively

Linked Program Outcomes
Perform advanced CNC machining operations

Assessment Strategies
2.1. Skillbuilder Exercise
2.2. Written Test

Criteria

Your performance will be successful when:
2.1. learner submits the assignment.
2.2. you can solve equations by rearrangement.
2.3. learner completes the unit test.

Learning Objectives
2.a. Solve equations involving several operations.
2.b. Solve for the unknown term of a proportion.
2.c. Set up and solve direct and inverse proportions.

3. Solve problems involving lines and angular measure.

Linked Core Abilities
Apply learning
Demonstrate critical thinking
Demonstrate responsible and professional workplace behaviors
Use mathematics effectively

Linked Program Outcomes
Interpret industrial/engineering drawings
Apply precision measuring methods to part inspection

Assessment Strategies
3.1. Skillbuilder Exercise
3.2. Written Test

Criteria

Your performance will be successful when:

3.1. learner submits the assignment.
3.2. you can solve problems of lines and angular measurement.
3.3. learner completes the unit test.

Learning Objectives
3.a. Add, subtract, multiply, and divide angles in terms of degrees, minutes, and seconds.
3.b. Compute compliments and supplements of angles.

4. Solve unknown angles using angular principles.

Linked Core Abilities
Apply learning
Demonstrate critical thinking
Demonstrate responsible and professional workplace behaviors
Use mathematics effectively

Linked Program Outcomes
Interpret industrial/engineering drawings
Apply precision measuring methods to part inspection

Assessment Strategies
4.1. Skillbuilder Exercise
4.2. Written Test

Criteria

Your performance will be successful when:

4.1. learner submits the assignment.
4.2. you can solve for unknown angles using geometric principles .
4.3. learner completes the unit test.

Learning Objectives
4.a. Identify different types of angles.
4.b. Determine unknown angles in geometric figures using the principles of opposite, alternate interior, corresponding, parallel, and perpendicular angles.

5. Solve angles and sides of triangles.

Linked Core Abilities
Apply learning
Demonstrate critical thinking
Demonstrate responsible and professional workplace behaviors
Use mathematics effectively

Linked Program Outcomes
Interpret industrial/engineering drawings
Apply precision measuring methods to part inspection
Perform advanced CNC machining operations

Assessment Strategies
5.1. Skillbuilder Exercise
5.2. Written Test

Criteria

Your performance will be successful when:

5.1. learner submits the assignment.
5.2. you can solve angles and sides of triangles.
5.3. learner completes the unit test.

Learning Objectives

5.a. Identify different types of triangles.
5.b. Determine the unknown angles based on the principles that all triangles contain 180 degrees.
5.c. Identify corresponding parts of triangles.
5.d. Compute angles and sides of isosceles, equilateral, and right triangles.
5.e. Determine interior angles of any polygon.

6. Solve for the functions of angles given in decimal degrees and degrees, minutes, and seconds.

Linked Core Abilities

Apply learning
Demonstrate critical thinking
Demonstrate responsible and professional workplace behaviors
Use mathematics effectively

Linked Program Outcomes

Interpret industrial/engineering drawings
Apply precision measuring methods to part inspection
Perform advanced CNC machining operations

Assessment Strategies

6.1. Skillbuilder Exercise
6.2. Written Test

Criteria

Your performance will be successful when:

6.1. learner submits the assignment.
6.2. you can solve the functions of angles.
6.3. learner completes the unit test.

Learning Objectives

6.a. State the ratios of the six trigonometric functions in relation to given triangles.
6.b. Find functions of angles given in decimal degrees and degrees, minutes, and seconds.

7. Solve for the angles and length of sides in a right triangle.

Linked Core Abilities

Apply learning
Demonstrate critical thinking
Demonstrate responsible and professional workplace behaviors
Use mathematics effectively

Linked Program Outcomes

Interpret industrial/engineering drawings
Apply precision measuring methods to part inspection
Perform advanced CNC machining operations

Assessment Strategies

7.1. Skillbuilder Exercise
7.2. Written Test

Criteria

Your performance will be successful when:

7.1. learner submits the assignment.
7.2. you can solve for angles and sides of a right triangle.
7.3. learner completes the unit test.

Learning Objectives

7.a. Compute an unknown angle of a right triangle when two sides are known.
7.b. Compute an unknown side of a right triangle when an angle and a side are known.

8. Solve simple practical machine application problems.

Linked Core Abilities

Apply learning
Demonstrate critical thinking
Demonstrate responsible and professional workplace behaviors
Use mathematics effectively

Linked Program Outcomes

Interpret industrial/engineering drawings
Perform advanced machine tool equipment set-up and operation
Perform advanced programming, set-up and operation of CNC Machine Tools
Perform advanced CNC machining operations

Assessment Strategies

8.1. Skillbuilder Exercise
8.2. Written Test

Criteria

Your performance will be successful when:

8.1. learner submits the assignment.
8.2. you can solve practical right triangle problems with applied trigonometry.
8.3. learner completes the unit test.

Learning Objectives

8.a. Solve simple machine technology problems that require the projection of auxiliary lines and the use of geometric principles and trigonometric functions.