Lakeshore Technical College

31-420-325 Machining Math Basic

Course Outcome Summary

Course Information

Alternate Title	Apply basic math skills to solve problems
Description	…prepares the learner to apply basic technical math skills to solve problems.
Total Credits	1
Total Hours	36

Types of Instruction

Instruction Type	Credits/Hours
Lab	1/32

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 FX-991EX Plus -SR. **Manufacturer:** Casio. **Source:** LTC Bookstore (required)

Access to a computer with internet connectivity

Core Abilities

1. Apply learning

Criteria

1.1. Learner transfers academic knowledge and principles to life and work situations
1.2. Learner incorporates prior learning
1.3. Learner knows when to ask for help
1.4. Learner demonstrates appropriate safety precautions
1.5. Learner identifies the need for lifelong learning
1.6. Learner develops the ability to research beyond the required work
1.7. Learner demonstrates a curiosity for learning about cultures, norms, and practices

2. Communicate effectively

Criteria

2.1. Learner comprehends written materials

2.2. Learner writes clearly, concisely, and accurately
2.3. Learner adjusts communication style in order to meet the needs of others
2.4. Learner demonstrates active listening skills
2.5. Learner uses culturally appropriate verbal and non-verbal communication methods

3. Demonstrate critical thinking

Criteria

3.1. Learner determines issues that merit action
3.2. Learner takes initiative in the problem solving processes
3.3. Learner makes decisions considering alternatives and consequences
3.4. Learner refines action plans based on evaluation of feedback
3.5. Learner identifies interdependencies of world issues & events

4. Demonstrate responsible and professional workplace behaviors

Criteria

4.1. Learner displays behavior consistent with the ethical standards within a discipline or profession
4.2. Learner follows policies and procedures
4.3. Learner attends class as mandated by the instructor
4.4. Learner completes assignments on time
4.5. Learner exhibits academic honesty
4.6. Learner accepts responsibility and accountability for his/her actions
4.7. Learner demonstrates time management and task prioritization
4.8. Learner demonstrates ability to handle ambiguity and unfamiliar situations

5. Use mathematics effectively

Criteria

5.1. Learner solves real world problems using mathematics
5.2. Learner measures accurately
5.3. Learner analyzes graphical information
5.4. Learner demonstrates an understanding of world measurements and foreign currency exchange

6. Work cooperatively

Criteria

6.1. Learner contributes to a group with ideas, suggestions, and effort
6.2. Learner completes his/her share of tasks necessary to complete a project
6.3. Learner encourages team members by listening and responding appropriately to their contributions
6.4. Learner maintains self control
6.5. Learner resolves differences for the benefit of the team
6.6. Learner accepts constructive feedback
6.7. Learner effectively establishes rapport and builds situationally appropriate relationships

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 common fraction and mixed number problems.

Linked Core Abilities

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

Linked Program Outcomes

Interpret industrial/engineering drawings

Apply precision measuring methods to part inspection
Perform advanced machine tool equipment set-up and operation

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 common fraction and mixed number problems.
1.3. learner completes the unit test.

Learning Objectives

1.a. Express fractions in lowest terms.
1.b. Express fractions as equivalent fractions.
1.c. Express improper fractions as mixed numbers.
1.d. Determine lowest common denominators.
1.e. Add, subtract, multiply and divide fractions and mixed numbers.
1.f. Perform combinations of operations with fractions using a calculator.

2. Solve decimal fractions problems.

Linked Core Abilities

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

Linked Program Outcomes

Interpret industrial/engineering drawings
Apply precision measuring methods to part inspection
Perform advanced machine tool equipment set-up and operation

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 decimal fraction problems.
2.3. learner completes the unit test.

Learning Objectives

2.a. Write decimal numbers in word form.
2.b. Convert common fractions to decimal fractions.
2.c. Add and subtract combinations of decimals, mixed decimals, and whole numbers.
2.d. Multiply and divide combinations of decimals, mixed decimals, and whole numbers.
2.e. Perform combination of operations with decimals using a calculator.

3. Solve powers and root problems.

Linked Core Abilities

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

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 power and root problems.
3.3. learner completes the unit test.

Learning Objectives

3.a. Solve problems that involve combinations of powers with other basic operations
3.b. Solve problems consisting of combinations of operations by applying the order of operations.
3.c. Perform individual operations of addition, subtraction, multiplication, division, powers, and roots with decimals using a calculator.

4. Solve basic percentage problems.

Linked Core Abilities

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

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 basic percentage problems.
4.3. learner completes the unit test.

Learning Objectives

4.a. Express decimal fractions and common fractions as percent.
4.b. Express percent as decimal fractions and common fractions.
4.c. Solve simple and complex percentage practical applications in which two of the three parts are given.

5. Convert Inch and Metric units.

Linked Core Abilities

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

Linked Program Outcomes

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

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 convert inch and metric units.
5.3. learner completes the unit test.

Learning Objectives

5.a. Determine the degree of precision of and given number.
5.b. Compute total tolerance and maximum and minimum limits of dimensions.
5.c. Compute maximum and minimum clearance and interference of mating parts.

6. Interpret measurement scales for linear measuring tools.

Linked Core Abilities

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

Linked Program Outcomes

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

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 read common measurement scales.
6.3. learner completes the unit test.

Learning Objectives

6.a. Measure lengths using fractional-inch, decimal-inch, and metric scales.
6.b. Read measurements set on a decimal-inch vernier caliper and vernier height gage.
6.c. Read settings from the barrel, thimble, and vernier scales of a 0.0001- inch micrometer.
6.d. Determine proper gage block combinations for specified customary or metric system dimensions.

7. Interpret symbols used in algebraic expressions.

Linked Core Abilities

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

Linked Program Outcomes

Perform advanced machine tool equipment set-up and operation

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 basic algebraic equations.
7.3. learner completes the unit test.

Learning Objectives

7.a. Express word statements as algebraic expressions.
7.b. Evaluate algebraic expressions by substituting numbers for symbols.

7.c. Perform basic operations of addition, subtraction, multiplication, and division, powers, and roots using signed numbers.
7.d. Solve expressions that involve combined operations of signed numbers.

8. Solve algebraic operations of addition, subtraction, and multiplication.

Linked Core Abilities

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

Linked Program Outcomes

Perform advanced machine tool equipment set-up and operation

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 addition, subtraction, multiplication and division equations.
8.3. learner completes the unit test.

Learning Objectives

8.a. Perform basic algebraic operations of addition, subtraction, and multiplication.
8.b. Perform the basic algebraic operations of division, powers, and roots.
8.c. Simplify algebraic expressions that involve combined operations.