



Machine Tool Technology

Organization Washburn Institute of Technology

Program Number 48.0501

Instructional Level Certificate

Target Population

Grades 11 & 12
Post-secondary

Description

The program will cover the basics of the trade and expand the student's knowledge and skills in the use of machine tools. Students will be instructed in blueprint reading, shop theory, set-up and operation of conventional machine tools including lathes, mills, drill presses, and surface grinders. Basic operations and set-up of CNC machines will be introduced.

Entry Requirements

| | | |
|-----------|-------------------------|---------|
| WorkKeys® | Applied Math | Level 4 |
| WorkKeys® | Reading for Information | Level 4 |

Assessment Plan

Assessment is an integral part of the educational process at Washburn Tech and accurate feedback is an important tool in continuously improving the institution's technical programs. Students can expect to participate in assessment activities prior to entry into programs, within specific courses and following program completion for specific fields of study.

Student Learning Outcomes

- A. Communicate effectively.
- B. Integrate technology.
- C. Learn effectively - use academics effectively.
- D. Demonstrate cooperative/teamwork skills.
- E. Apply safety.
- F. Think critically and creatively.
- G. Demonstrate responsible work ethics.

Program Outcomes

- A. Learn and apply safe work habits in the classroom and laboratory.
- B. Learn and apply basic knowledge of the use and care of hand and power tools related to this field.
- C. Maintain 90% or better attendance.
- D. Demonstrate professional and quality workmanship in the classroom and laboratory assignments.
- E. Apply essential math skills for all areas in building trades.

| Course # | Course Title | Credit Hours | Required |
|----------|---------------------------------------|--------------|----------|
| MTT106 | Safety (OSHA 10) | 1 | Yes |
| MTT112 | Print Reading | 3 | Yes |
| MTT114 | Machining I | 3 | Yes |
| MTT115 | Print Reading/Math II | 1 | Yes |
| MTT116 | Machine Tool Processes | 1 | Yes |
| MTT118 | Lathe/Mill/Grind I | 4 | Yes |
| MTT123 | Machining II | 3 | Yes |
| MTT124 | Lathe/Mill/Grind II | 5 | Yes |
| MTT131 | Quality Control & Inspection (Spring) | 1 | Yes |
| MTT151 | Workplace Ethics | 2 | Yes |
| MTT210 | Print Reading/Math III | 1 | Yes |
| MTT218 | Metallurgy | 1 | Yes |
| MTT219 | Lathe/Mill/Grind III | 6 | Yes |
| MTT221 | Bench Work | 1 | Yes |
| MTT232 | Bench/Saw/Drill | 3 | Yes |
| MTT238 | Print Reading/Math IV | 2 | Yes |
| MTT241 | CNC Operations | 3 | Yes |
| MTT244 | Lathe/Mill/Grind IV | 6 | Yes |
| MTT250 | Workplace Skills II | 1 | Yes |
| MTT260 | Mach Tool OJT (Optional) | 3 | No |

Program Course Descriptions

MTT106 Safety/OSHA 10 (1 credit)

Through a variety of classroom and/or lab learning and assessment activities, students in this course will:

explain job/site safety and precautions for job/site hazards; determine the uses of personal protective equipment (PPE); identify the safety equipment and procedures related to safe work practices and environment; identify fire prevention and protection techniques; explore Hazardous Communications (HazCom) including Material Safety Data Sheets (MSDS).course includes a review of general shop safety rules and practices in cabinet/millwork, information, and instruction in the use of professional tools for the woodworking trades. Emphasis will be

placed on the safe use of each tool covered. Topics include layout and measuring tools, sawing tools, shaping and cutting tools, fastening tools, drilling and boring tools, finishing tools, job site set-up, and shop tool use.

MTT112 Print Reading (3 credits)

Students will learn to identify basic lines, views and abbreviations used in blueprints, determine dimensions of features of simple parts, sketch simple parts with dimensional measurements, determine dimensions of multi-feather part, interpret GDT symbols, frame, and datums.

MTT114 Machining I (3 credits)

Student will learn to conduct job hazard analysis for conventional mills and lathes, develop math skill for machine tool operation, perform preventive maintenance and housekeeping on conventional mills and lathes, select work holding devices for mills, lathes and other machine tools, calculate feed and speeds, remove material using milling and turning processes, align milling head, use a vertical mill to center drill, drill and ream holes, change tools and tool holders on milling machines, and maintain saws and grinders.

MTT116 Machine Tool Processes (1 credit)

Students will learn to conduct a job hazard analysis for a machine tool group, analyze blueprints to layout parts and materials, select hand tools and common machine shop mechanical hardware for specific applications, prescribe cutting tools for assigned operations, calculate stock size to minimize drop, machine parts to specification outlined in machine handbooks, summarize preparations for machining operations, and apply precautions to minimize hazards for work with lathes, mills, drills, and grinders.

MTT118 Lathe/Mill/Grind I (4 credits)

Students will learn to conduct a job hazard analysis for a machine tool group, analyze blueprints to layout parts and materials, select hand tools and common machine shop mechanical hardware for specific applications, prescribe cutting tools for assigned operations, calculate stock size to minimize drop, machine parts to specification outlined in machine handbooks, summarize preparations for machining operations, and apply precautions to minimize hazards for work with lathes, mills, drills, and grinders.

MTT123 Machining II (3 credits)

Students learn to perform basic trigonometric functions and perform other procedures such as I.D. boring and facing operations, planning a sequence for machining operations, aligning work pieces, use work holding devices, jigs and fixtures, performing threading operation on lathes, machining key ways on a vertical mill, inspection and dressing grinding wheels, performing O.D. and I.D. threading operations, performing O.D. and I.D. tapering operations, machining parts using milling cutters and milling machines.

MTT124 Lathe/Mill/Grind II (5 credits)

Instruction will be given in the form of lectures, hands-on video tapes, shop demonstrations, shop assignments, and text book assignments. Students will perform required set-ups and operations of lathes, milling machines, and grinders in a timely manner. Students are required to practice all shop safety rules. Calculate feed and speeds using the math formulas taught. Math will also be used to calculate hole pattern layouts, gear cutting, threading information, inspecting and quality control, and programming. Students will be required to perform machine operations to satisfaction of the instruction. Student may be required to work in two or three person teams,

but all students will be given the opportunity to demonstrate their competency level and ability by means of written tests, verbal communications, and demonstrating hands-on abilities.

MTT131 Quality Control & Inspection (spring only) (1 credit)

Students are introduced to the science of dimensional metrology and its applications to ensure form and function of machined parts and assemblies using semi-precision and precision measuring instruments.

MTT115 Print Reading/Math II (1 credit)

Students learn to perform basic trigonometric functions, and perform other procedures such as I.D. boring and facing operations, planning a sequence for machining operations, aligning work pieces, use work holding devices, jigs and fixtures, performing threading operations on lathes, machining keyways on a vertical mill, inspecting and dressing grinding wheels, performing O.D. & I.D. threading operations, performing O.D. & I.D. tapering operations, machining parts using milling cutters and milling machines, and tapping holes on a vertical mill.

MTT151 Workplace Ethics (2 credits)

Students study human relations and professional development that exists in today's rapidly changing world so that they become better prepared for living and working in a complex society. Topics include human relations, job acquisition, job retention, job advancement, and professional image skills..

MTT218 Metallurgy (1 credit)

Students learn the metallurgical terms and definitions in an effort to understand the behavior and service of metals in industry. Characteristics during heating, cooling, shaping, forming, and the stress related to their mechanical properties are covered, as well as the theory behind alloys, heat treatment processes and wear resistance.

MTT219 Lathe/Mill/Grind III (6 credits)

Instruction will be given in the form of lectures, hands-on video tapes, shop demonstrations, shop assignments, and text book assignments. Students will perform required set-ups and operations of lathes, milling machines, and grinders in a timely manner. Students are required to practice all shop safety rules. Calculate feed and speeds using the math formulas taught. Math will also be used to calculate hole pattern layouts, gear cutting, threading information, inspecting and quality control, and programming. Students will be required to perform machine operations to satisfaction of the instruction. Student may be required to work in two or three person teams, but all students will be given the opportunity to demonstrate their competency level and ability by means of written tests, verbal communications, and demonstrating hands-on abilities.

MTT221 Bench Work (1 credit)

Students will be provided the opportunity to learn and practice bench work skills such as filing, drilling, tapping, deburring and layout for projects. They will gain valuable practical experience in the use of various hand tools by producing basic bench work projects. Topics will include safety, print reading, job planning, and quality control.

MTT232 Bench/Saw/Drill (3 credits)

Students will learn to conduct job hazard analysis for conventional mills and lathes, develop math skills for machine tool operations, perform preventive maintenance and housekeeping on conventional mills and lathes, select work holding devices for mills, lathes and other machine

tools, calculate feeds and speeds, remove material using milling and turning processes, align milling head, use a vertical mill to center drill, drill and ream holes, change tools and tool holders on milling machines, and maintain saws and grinders.

MTT210 Print Reading/Math III (1 credit)

Student learn to perform basic trigonometric functions, and perform other procedures such as I.D. boring and facing operations, planning a sequence for machining operations, aligning work pieces, use work holding devices, jigs and fixtures, performing threading operations on lathes, machining keyways on a vertical mill, inspecting and dressing grinding wheels, performing O.D. & I.D. threading operations, performing O.D. & I.D. tapering operations, machining parts using milling cutters and milling machines, and tapping holes on a vertical mill.

MTT241 CNC Operations (3 credits)

Students will become acquainted with the history of Numerical Control (NC) and Computer Numerical Control (CNC) machines and will be introduced to a CNC machine used in the precision machining trades. They will gain practical experience in the application of "G" codes and "M" codes, writing CNC machine programs, and machine setup and operation.

MTT244 Lathe/Mill/Grind IV (6 credits)

Instruction will be given in the form of lectures, hands-on video tapes, shop demonstrations, shop assignments, and text book assignments. Students will perform required set-ups and operations of lathes, milling machines, and grinders in a timely manner. Students are required to practice all shop safety rules. Calculate feed and speeds using the math formulas taught. Math will also be used to calculate hole pattern layouts, gear cutting, threading information, inspecting and quality control, and programming. Students will be required to perform machine operations to satisfaction of the instruction. Student may be required to work in two or three person teams, but all students will be given the opportunity to demonstrate their competency level and ability by means of written tests, verbal communications, and demonstrating hands-on abilities.

MTT238 Print Reading/Math IV (2 credits)

Students learn to perform basic trigonometric functions, and perform other procedures such as I.D. boring and facing operations, planning a sequence for machining operations, aligning work pieces, use work holding devices, jigs and fixtures, performing threading operations on lathes, machining keyways on a vertical mill, inspecting and dressing grinding wheels, performing O.D. & I.D. threading operations, performing O.D. & I.D. tapering operations, machining parts using milling cutters and milling machines, and tapping holes on a vertical mill..

MTT250 Workplace Skills II (1 credit)

This course is the final preparation for the exit assessment by using Key Train software for Applied Math, Reading for Information, and Locating Information. A student will be required to attend remaining seminars that were not attended in Workplace Skills I through the Career Resource Center.

MTT260 Machine Tool OJT (3 credits) OPTIONAL

OJT (On-the-Job Training) is an elective course for a student to work at a job site to apply skills and knowledge acquired in the program. A student is eligible for OJT only upon completion of all the program competencies, 90% attendance throughout the program, all expenses paid to the school, completion of the institution exit assessment, and agreement completed with an employer. If a student does not comply with the attendance and job performance expectations of the employer, the student will be required to return to the program. This is a pass/fail course.

ADA Notification Statement and Disability Services:

The Testing/ADA Coordinator office is responsible for assisting in arranging accommodations and for identifying resources at Washburn Tech for persons with disabilities. Qualified students with disabilities MUST register and provide documentation with the office to be eligible for services. New requests for accommodations should be submitted two months or more prior to the date services should begin by contacting the Testing/ADA Coordinator's office as soon as a need may arise. Depending on the accommodation request, four to eight weeks lead time may be needed for timely and effective provision of services. Testing/ADA Coordinator coordinates and assists in arranging services it deems appropriate for eligible students on a case-by-case basis.

If you are a student with a disability that may substantially limit your ability to participate in this class and believe you will need accommodations, it is your responsibility to contact:

Special Support Services Coordinator

Phone: 785-228-6356

E-Mail: gloria.christian@washburn.edu

Washburn University [prohibits discrimination](#) on the basis of race, color, religion, age, national origin, ancestry, disability, sex, sexual orientation, gender identity, genetic information, veteran status, or marital or parental status. The following person has been designated to handle inquiries regarding the non-discrimination policies: Dr. Pamela Foster, Equal Opportunity Director/Title IX Coordinator, Washburn University, 1700 SW College Ave, Topeka, Kansas 66621, 785.670.1509, eodirector@washburn.edu

