# MACHINE TOOL TECHNOLOGY (MACH), AAS

At Dunwoody College of Technology, the Machine Tool Technology program provides students with entry-level skills and theoretical knowledge to program and operate all of the latest machine tools utilized in modern manufacturing facilities.

Graduates from this program are prepared to enter the industry as machine operators, production machinists, CAD/CAM technicians, CNC programmers, and tool designers.

The course of study includes: manual milling and turning; measurement and materials; job planning and layout; CAD/CAM software; CNC milling and turning; mold and die making; and EDM technology.

The program's curriculum is closely aligned with standards set forth by the National Institute of Metalworking Skills (NIMS). Due to high demand, most machine tool students can find full-time employment in the field long before graduation, and many will be working in a shop within the first year of the program.

Arts & Sciences curriculum supports the technical coursework by enhancing the students' communication, mathematics, and critical thinking skills.

Credits earned in the Machine Tool Technology AAS directly transfer into the following Dunwoody programs:

- Industrial Engineering Technology Bachelor of Science (IENG) (https://catalog.dunwoody.edu/catalog-student-handbook/academic-programs/engineering/industrial-engineering-technology-ieng-bachelor-science/)
- Business Management & Leadership Bachelor of Science (AMGT) (https://catalog.dunwoody.edu/catalog-student-handbook/academic-programs/business/business-management-leadership-amgt-bs/)

**Credential Earned:** AAS
**Length of Program:** 2 years (4 semesters)
**Classes Offered:** Day
**Available Starts:** Fall Semester
**Accreditation:** NIMS (National Institute for Metalworking Skills)

## Program Outcomes

- Demonstrate required industry safety standards.
- Create professional documentation using appropriate methods.
- Develop a relationship between fit, form, and function using ergonomics to ensure a working product.
- Develop problem-solving skills and techniques conducive to pursuing manufacturing related solutions.
- Explore cultural and environmental issues related to manufacturing.
- Demonstrate proper use of manufacturing equipment.
- Perform objectives required of an industry-based capstone project.

## Degree Requirements

| Code | Title | Credits |
|---|---|---|
| **General Requirements** | | |
| MATH1010 | Algebra I | 3 |
| MATH1020 | Algebra II | 3 |
| Communications | | 3 |
| General Science Elective | | 3 |
| Humanities | | 3 |
| Social Sciences | | 3 |
| **Technical Requirements** | | |
| MACH1110 | Machine Tool Fundamentals Lab | 5 |
| MACH1120 | Machine Tool Fundamentals Theory | 4 |
| MACH1210 | Advanced Machining Lab | 5 |
| MACH1220 | Advanced Machining Theory | 4 |
| MACH2110 | CNC Lathe, Mill & Mold Making Lab | 5 |
| MACH2120 | CNC Lathe & Mill Theory | 2 |
| MACH2130 | Mold Design Theory | 2 |
| MACH2140 | MasterCAM I | 4 |
| MACH2210 | CNC Mill, EDM & Die Making Lab | 5 |
| MACH2220 | CNC Mill & EDM Theory | 2 |
| MACH2230 | Die Design Theory | 2 |
| MACH2240 | MasterCAM II | 4 |
| MDES1110 | Engineering Drawings with SolidWorks | 4 |
| MDES1230 | Geometric Dimensioning & Tolerances | 4 |
| **Total Credits** | | **70** |

## Courses

### Descriptions

**MACH1110 | Machine Tool Fundamentals Lab | Laboratory (5 Credits)**
Manufacturing of parts through layout and bench work, includes the use of band saws, drill presses, surface grinders, manual lathes and vertical mills. Basic principles in metal-cutting technology includes threading, tapers, knurling, boring, radii cutting and milling procedures such as squaring stock, the use of rotary table and the many other milling and turning operations.
**Corequisite(s):** MACH1120

**MACH1120 | Machine Tool Fundamentals Theory | Lecture (4 Credits)**
Identification, recognition and calculations associated with basic principles in metal-cutting technology including machine feeds and speeds, threading, tapers, knurling, boring, radii cutting and milling and turning procedures.
**Corequisite(s):** MACH1110

**MACH1210 | Advanced Machining Lab | Laboratory (5 Credits)**
Advanced manufacturing of parts through layout, bench work and job planning. Advanced manual turning and milling and an introduction to CNC M & G codes. CNC portion includes manual programming via machine control and software simulation.
**Prerequisite(s):** MACH1110
**Corequisite(s):** MACH1220

**MACH1220 | Advanced Machining Theory | Lecture (4 Credits)**
Identification, recognition and calculations associated with advanced milling and turning operations, inspection of finished parts and an introduction to the G & M codes used in CNC programming. CNC portion includes manual programming in notepad and Immersive software simulation.
**Prerequisite(s):** MACH1120
**Corequisite(s):** MACH1210

**MACH2110 | CNC Lathe, Mill & Mold Making Lab | Laboratory (5 Credits)**
Advanced manufacturing processes using CNC lathes, CNC mill and EDM, design and build of an injection mold, along with hand and inspection tool techniques.
**Prerequisite(s):** MACH1210
**Corequisite(s):** MACH2120 MACH2130

**MACH2120 | CNC Lathe & Mill Theory | Lecture (2 Credits)**
Advanced CNC mill programming and introduction to CNC lathe programming. G & M codes, canned cycles, jigs, fixtures and work holding methods.
**Prerequisite(s):** MACH1220
**Corequisite(s):** MACH2110

**MACH2130 | Mold Design Theory | Lecture (2 Credits)**
Mold making methods and industry standard practices, history and uses. Design of one injection mold from concept to finished prints. Includes mold steels, press operation, molding cycle and inspection of finished parts.
**Prerequisite(s):** MACH1220
**Corequisite(s):** MACH2110

**MACH2140 | MasterCAM I | Lecture (4 Credits)**
2D and 3D geometry and surface model creation using MasterCAM software, an associative computer-aided manufacturing system for milling and turning. M and G code programs will be created, debugged and simulated cutter paths run for simple part geometries.
**Prerequisite(s):** MDES1110

**MACH2210 | CNC Mill, EDM & Die Making Lab | Laboratory (5 Credits)**
Advanced manufacturing processes using CNC lathe, CNC mill, wire EDM and sinker EDM. Design and build a complete blanking die, along with hand and inspection tool techniques to ensure proper fits and finishes. Explore the set up and operation of 4 axis machine tool.
**Corequisite(s):** MACH2220

**MACH2220 | CNC Mill & EDM Theory | Lecture (2 Credits)**
Advanced work holding principles, 4 axis CNC programming, axis definitions, wire EDM programming and power definitions.
**Prerequisite(s):** MACH1220
**Corequisite(s):** MACH2210

**MACH2230 | Die Design Theory | Lecture (2 Credits)**
Die design fundamentals and components including bend tolerances, cutting clearances, tonnage calculations, forming, and fits and clearances for dies.
**Prerequisite(s):** MACH1220

**MACH2240 | MasterCAM II | Lecture (4 Credits)**
Advanced 3D design, surface and solid model creation using MasterCAM. Tool path creation and posting for both 2D and 3D geometry including advanced surface and solid models. Lathe part creation and programming in 2D.
**Prerequisite(s):** MACH2140

**MDES1110 | Engineering Drawings with SolidWorks | Lecture (4 Credits)**
Creation of 3D solid models, assemblies and related engineering documentation using SolidWorks. Blueprint reading and application of ASME/ANSI standards to CAD drawings.

**MDES1230 | Geometric Dimensioning & Tolerances | Lecture (4 Credits)**
Principles of geometric dimensioning and tolerancing in the context of engineering and manufacturing. Application of principles using coordinate measurement machines.
**Prerequisite(s):** MDES1110

**MATH1010 | Algebra I | Lecture (3 Credits)**
Foundational algebra is applied the in the context of geometry and trigonometry. Topics include rules of exponents, simplifying expressions, solving equations, computing measurements of two and three dimensional shapes, solving right triangles, and solving oblique triangles.
**General Education:** Mathematics

**MATH1020 | Algebra II | Lecture (3 Credits)**
Algebraic and trigonometric skills are developed further. Topics include, functions, graphing, factoring, advanced solving techniques, systems of linear equations, coordinate trigonometry, and vectors.
**Prerequisite(s):** MATH1010
**General Education:** Mathematics