



# Lesson Plan: Technical Education with Safe Operation of Unimat Machines

**Grade/Level: Middle School/High School (Adaptable) Grade 6-10**

**Subject: Technical Education**

**Duration: 12 Weeks (1 semester)**

**Class Schedule: 2 sessions per week, 2 hours per session**



# Semester Objectives

## By the end of the semester, students will:

1. Master the safe setup and operation of Unimat machines (saw, sander, wood and metal lathe, drill, and mill).
2. Understand the principles of machining, material properties, and tool selection.
3. Develop technical drawings and translate designs into physical components.
4. Collaborate to create a functional, multi-component final project.

## 1 Week 1: Introduction and Workshop Safety

### • Session 1:

- o Introduction to Unimat machines and their applications.
- o Workshop safety rules and protocols.
- o Overview of tools and materials used with Unimat machines.

### • Session 2:

- o Detailed explanation of Unimat machine components (saw, sander, wood and metal lathe, drill, and mill).
- o Hands-on: Practice identifying machine parts and their functions. Use manual and videos
- o Safety quiz and discussion.

## 2 Week 2: Basic Lathe Operations

### • Session 1:

- o Introduction to lathe operations (turning, facing, and chamfering). Use manual and videos
- o Demonstration of setup and operation.

### • Session 2:

- o Hands-on: Practice turning and facing a cylindrical piece of softwood or plastic. Use project plans
- o Emphasis on precision, measurements, and safety compliance.

## 3 Week 3: Drilling Operations

### • Session 1:

- o Introduction to the drilling module of the Unimat machine.
- o Demonstration of drilling straight and angled holes.

- **Session 2:**
  - Hands-on: Drilling practice on various materials (wood, plastic).
  - Discuss drill bit types and their applications.

## 4 Week 4: Introduction to Milling

- **Session 1:**
  - Overview of milling operations (face milling, slotting). Vertical milling and horizontal milling
  - Setup of materials and tools for milling.
- **Session 2:**
  - Hands-on: Milling practice to create simple shapes.
  - Focus on machine setup accuracy and secure clamping.

## 5 Week 5-6: Small Individual Project

- Students design and complete a small project incorporating lathe, drilling, and milling.
- **Examples:**
  - A simple wooden penholder.
  - Different turning parts by using drawings – spring-element
  - Milling finger-joint
  - A plastic keychain with a drilled hole and milled edges.
- **Deliverables:**
  - Technical drawings of the design.
  - A finished piece that demonstrates safety and precision.

## 6 Week 7: Tool Maintenance and Material Properties

- **Session 1:**
  - Discussion on maintaining Unimat machines for optimal performance.
  - Understanding material properties (wood, plastics, aluminum) and their machining behavior.
- **Session 2:**
  - Hands-on: Sharpening and replacing tools, cleaning machine parts.
  - Experimentation with different materials to observe machining differences.

## 7 Week 8-9: Collaborative Team Project

- Objective: Build a multi-component project (e.g. steam-engine, aluminium model of modern art) – see project booklets
- **Week 8:**
  - Team brainstorming and design drafting.
  - Division of responsibilities for different parts.
- **Week 9:**
  - Machining individual parts in groups.
  - Focus on teamwork, precision, and time management.

## 8 Week 10: Assembling and Troubleshooting

- **Assemble the components of the team project.**
- **Troubleshoot issues in fitting, alignment, and machining errors.**
- **Conduct peer reviews to evaluate team projects.**

## 9 Week 11: Advanced Machining Techniques

- **Introduction to advanced techniques like threading, gear cutting, or using jigs.**
- **Hands-on practice with these techniques, depending on student progress.**

## 10 Week 12: Final Project Showcase and Reflection

- **Session 1:**
  - Finalize all projects.
  - Prepare presentations explaining the process, challenges, and solutions.
- **Session 2:**
  - Project showcase: Students present their projects to peers and instructors.
  - Reflection discussion: Lessons learned and future applications of skills.



## 11 Assessment Criteria

### 1. Safety Practices (30%)

- o Adherence to safety protocols throughout the semester.

### 2. Technical Skills (30%)

- o Accuracy and quality of individual and team projects.

### 3. Teamwork and Collaboration (20%)

- o Analyze a case study on process optimization.

### 4. Reflection and Documentation (20%)

- o Completeness and clarity of technical drawings, project reports, and reflections.

## 12 Extension Opportunities

- Explore CNC programming for automated machining.
- Integrate CAD software to design components.
- Visit a local workshop or manufacturing facility for real-world exposure.

This semester plan progressively builds students' confidence and competence in machining with Unimat machines, fostering both technical skills and teamwork. Easy access to technical devices is particularly suitable for getting girls excited about it.

