

**APPENDIX 02: SCOPE AND FREQUENCY OF INSPECTION AND MAINTENANCE  
OF THE LABS' EQUIPMENT**

No.	Item	Frequency	Scope of inspection and maintenance	PIC
1.	Emergency shower and eyewash station	Inspection: 01 time/month Maintenance: when incurred	<ul style="list-style-type: none"> <li>- The handle and lever operate smoothly with no signs of difficulty in pulling or pushing.</li> <li>- Normal flow capacity.</li> <li>- No water leakage before and after use.</li> </ul>	CHS Lab
2.	Chemical fume hood	Inspection: 01 time/month Maintenance: when incurred	<ul style="list-style-type: none"> <li>- The outside of the fumehood and its glass door is not distorted or broken. Glass door hinges and safety latches work properly. The water supply and drainage system of the cabinet works well.</li> <li>- The suction capacity of the cabinet is at least 0.3 m<sup>3</sup>/s when the glass door is in the safe latch position.</li> <li>- The fume hood is kept clean.</li> </ul>	CHS Lab
3.	Plastinated specimen preservation cabinet	Inspection: 01 time/month Maintenance: 01 time/ 06 months	<ul style="list-style-type: none"> <li>- The outside of the fumehood and its glass door is not distorted or broken. Glass door hinges and electric locks work properly.</li> <li>- Air conditioning system works well (temperature is lower than 25°C and humidity is lower than 50%). No water leakage. Compare the environmental parameters reported on the control panel and the meter independently.</li> <li>- Water tank has more than 50% capacity left</li> <li>- The lights work normally.</li> </ul>	CHS Lab
4.	Water filtration system	Inspection: 01 time /month Maintenance: 01 time / year	<ul style="list-style-type: none"> <li>- The resistance of the device always reaches 15 ohm.</li> <li>- Water supply and drainage system works normally. <ul style="list-style-type: none"> <li>o Annual maintenance: change the water filter when there is a warning displayed on the screen.</li> </ul> </li> </ul>	CHS Lab
5.	Autoclave	Inspection: 1 time/month Maintenance: as detailed in the scope of maintenance	<ul style="list-style-type: none"> <li>- Standard temperature and pressure: 121 °C/134 °C &amp; 76kPa-106kPa</li> <li>- The water supply and drainage system works normally, no water leakage phenomenon. <ul style="list-style-type: none"> <li>o Weekly maintenance: clean the door gasket with a cloth soaked in distilled water and dry the autoclave chamber.</li> <li>o Annual maintenance: change the door gasket.</li> </ul> </li> </ul>	CHS Lab
6.	Technical scale	Inspection & maintenance: 1 time/month	<ul style="list-style-type: none"> <li>- The scale is kept clean, the weighing plate is not distorted.</li> <li>- The scale reaches the equilibrium position. <ul style="list-style-type: none"> <li>o Monthly maintenance: clean the scale.</li> </ul> </li> </ul>	CHS Lab
7.	Analytical scale	Inspection & maintenance: 1 time/month	<ul style="list-style-type: none"> <li>- The scale is kept clean. The glass door is not broken and its hinges work normally. The weighing pan is not distorted.</li> <li>- The scale reaches the equilibrium position. <ul style="list-style-type: none"> <li>o Monthly maintenance: clean the scale.</li> </ul> </li> </ul>	CHS Lab
8.	pH meter	Inspection & maintenance: 1 time/month	<ul style="list-style-type: none"> <li>- The probe is protected by the protective cap containing the included protective solution. <ul style="list-style-type: none"> <li>o Monthly maintenance: cleaning and calibrating the meter.</li> </ul> </li> </ul>	CHS Lab
9.	Micropipette	Inspection: 1 time/month Maintenance: 01 time / year	<ul style="list-style-type: none"> <li>- Micropipette is returned to the maximum suction volume value after use. <ul style="list-style-type: none"> <li>o Annual maintenance: replacement of accessories, oiling, and calibration</li> </ul> </li> </ul>	CHS Lab
10.	Deep freezer, Chemical freezer, and Sample freezer	Inspection: 1 time/day Maintenance: when incurred	<ul style="list-style-type: none"> <li>- Make sure the temperature of the cabinet always reaches the set value. The screen shows no error.</li> <li>- Clean the storage compartment, tools/samples are arranged neatly, do not obstruct the air circulation in the fridge/freezer.</li> </ul>	CHS Lab

11.	Ultraviolet–visible spectroscopy	Inspection: 1 time/month Maintenance: when incurred	<ul style="list-style-type: none"> <li>- Make sure the spectroscopy is operating properly at every wavelength.</li> <li>- The sampling compartment is clean.</li> </ul>	CHS Lab
12.	Digital oscillators	Inspection: 01 time/month Maintenance: when incurred	<ul style="list-style-type: none"> <li>- The device functions normally.</li> <li>- Testing steps: <ul style="list-style-type: none"> <li>o Turn on device</li> <li>o Press Utility button</li> <li>o Choose Service option in screen</li> <li>o Choose Diagnostics option</li> <li>o Choose Hardware Self-Test option</li> </ul> </li> </ul>	CECS Lab
13.	Waveform generators	Inspection: 01 time/month Maintenance: when incurred	<ul style="list-style-type: none"> <li>- The device functions normally.</li> <li>- Testing steps: <ul style="list-style-type: none"> <li>o Turn on device</li> <li>o Press System button</li> <li>o Choose Instr. Setup option in screen</li> <li>o Choose Self-Test option</li> </ul> </li> </ul>	CECS Lab
14.	DC power supply	Inspection: 01 time/month Maintenance: when incurred	<ul style="list-style-type: none"> <li>- The device functions normally.</li> <li>- Testing steps: <ul style="list-style-type: none"> <li>o Turn on device</li> <li>o Choose Utilities option in screen</li> <li>o Choose Instr. Setup option</li> <li>o Choose Self-Test option</li> </ul> </li> </ul>	CECS Lab
15.	Bench multi-meters	Inspection: 01 time/month Maintenance: when incurred	<ul style="list-style-type: none"> <li>- The device functions normally.</li> <li>- Testing steps: <ul style="list-style-type: none"> <li>o Turn on device</li> <li>o Press Shift button and Store/Recal button to use Utility function</li> <li>o Choose Instr. Setup option</li> <li>o Choose Self-Test option</li> </ul> </li> </ul>	CECS Lab
16.	Lab computers	Inspection: 01 time/month Maintenance: 01 time/year	<p>A laboratory computer is considered functioning normally if it meets the following conditions:</p> <ul style="list-style-type: none"> <li>- Successfully powers on without unusual noise or delay</li> <li>- Operating system loads properly and login screen appears</li> <li>- Keyboard, mouse, monitor work correctly</li> <li>- Internet or local network connections are stable</li> <li>- No warning messages or errors pop-ups on startup</li> <li>- Cooling fan operates quietly, and ventilation is unobstructed</li> <li>- No physical damage or loose cables</li> </ul> <p>Perform the following checks regularly to ensure proper functioning:</p> <ul style="list-style-type: none"> <li>- Inspect for any visible damage to the case, cables, or ports</li> <li>- Turn on the computer and observe startup behavior</li> <li>- Check for system error messages or unusual noise</li> <li>- Confirm mouse, keyboard, and monitor are working properly</li> <li>- Verify antivirus or security software is active and up to date</li> <li>- Confirm access to the internet or internal network</li> <li>- Perform proper shutdown from the operating system</li> <li>- Ensure the system powers off completely</li> </ul>	CECS Lab
17.	The Instron Universal Testing Machine	Inspection: Monthly Maintenance: 1 time/year	<ul style="list-style-type: none"> <li>- Clean machine and work area</li> <li>- Inspect load cell and grips, check software and electronics, verify calibration with test standards.</li> <li>- Power On: run a 20-minute warm-up program</li> </ul>	CECS lab

18.	Pneumatics and Electro-pneumatics training system	Inspection: Monthly Maintenance: when incurred	<ul style="list-style-type: none"> <li>- Clean machine and work area</li> <li>- Air compressor: Drain water from tank and filter, adjust air pressure (~ 4-6 bar)</li> <li>- Check hoses and valves for leaks, test actuators and sensors, inspect wiring and connections.</li> <li>- Power On: run a 20-minute warm-up program</li> </ul>	CECS lab
19.	Hydraulics and Electro-hydraulics training system	Inspection: Monthly Maintenance: when incurred	<ul style="list-style-type: none"> <li>- Clean machine and work area</li> <li>- Inspect hydraulic hoses and cylinders, check oil levels and leaks, test control systems and sensors.</li> <li>- Power On: run a 20-minute warm-up program</li> </ul>	CECS lab
20.	Hydrostatics Bench	Inspection: Monthly Maintenance: when incurred	<ul style="list-style-type: none"> <li>- Clean machine and work area</li> <li>- Check manometers and piping, clean tank and valves, verify sensor functionality.</li> </ul>	CECS lab
21.	CNC Milling	Inspection: Monthly Maintenance: 1 time/year	<ul style="list-style-type: none"> <li>- Clean machine and work area, remove chips</li> <li>- Air pressure: Confirm proper PSI ~85–115 PSI (Inspect for air leaks)</li> <li>- Tool holders &amp; tools: Inspect for wear or damage</li> <li>- Vise: check for damage, remove chips, clean and lubricate.</li> <li>- Lubrication/coolant system: Check level and quality (Refill/replace if needed)</li> <li>- Power On: Ensure the machine homes properly and run a 20-minute warm-up program (Listen for unusual sounds)</li> <li>- Annual maintenance: according to manufacturer's recommendations</li> </ul>	CECS lab
22.	CNC Lathe	Inspection: Monthly Maintenance: 1 time/year	<ul style="list-style-type: none"> <li>- Clean machine and work area, remove chips</li> <li>- Air pressure: Confirm proper PSI ~85–115 PSI (Inspect for air leaks)</li> <li>- Chuck: Inspect jaws, clean inside and out (Blow out chips regularly)</li> <li>- Tool turret: Check for proper indexing and cleanliness (Wipe down, remove chips)</li> <li>- Lubrication/coolant system: Check level and quality (Refill/replace if needed)</li> <li>- Power On: Ensure the machine homes properly and run a 20-minute Warm-up program (Listen for unusual sounds)</li> <li>- Annual maintenance: according to manufacturer's recommendations</li> </ul>	CECS lab
23.	Laser Cutting (Fume Extraction System, Air compressor)	Inspection: Monthly Maintenance: 1 time/year	<ul style="list-style-type: none"> <li>- Clean machine and work area, remove chips</li> <li>- Air compressor: Drain water from tank and filter, adjust air pressure (~ 4-6 bar)</li> <li>- Power On: Ensure the machine homes properly and run a 20-minute Warm-up program</li> <li>- Annual maintenance: according to manufacturer's recommendations</li> </ul>	CECS lab
24.	Manual Lathe	Inspection: Monthly Maintenance: 1 time/year	<ul style="list-style-type: none"> <li>- Clean machine and work area, remove chips</li> <li>- Chuck: Inspect jaws, clean inside and out (Blow out chips regularly)</li> <li>- Tool turret: Check for proper indexing and cleanliness (Wipe down, remove chips)</li> <li>- Lubrication/coolant system: Check level and quality (Refill/replace if needed). Check gibs, leadscrew backlash, lubricate slides.</li> <li>- Power On: Run a 20-minute Warm-up program</li> <li>- Annual maintenance: according to manufacturer's recommendations</li> </ul>	CECS lab

25.	Surface grinder	Inspection: Monthly Maintenance: 1 time/year	<ul style="list-style-type: none"> <li>- Clean machine and work area, remove chips</li> <li>- Check lubrication and hydraulic levels.</li> <li>- Power On: inspect the operation of magnetic chuck, hydraulic system, spindle and run a 20-minute warm-up program</li> <li>- Annual maintenance: according to manufacturer's recommendations</li> </ul>	CECS lab
26.	Manual Milling and Drilling	Inspection: Monthly Maintenance: 1 time/year	<ul style="list-style-type: none"> <li>- Clean machine and work area, remove chips</li> <li>- Tool holders &amp; tools: Inspect for wear or damage</li> <li>- Vise: check for damage, remove chips, clean and lubricate.</li> <li>- Lubrication/coolant system: Check level and quality (Refill/replace if needed), check for loose gibs, lubricate lead screws and ways</li> <li>- Power On: run a 20-minute warm-up program</li> <li>- Annual maintenance: according to manufacturer's recommendations</li> </ul>	CECS lab
27.	Semi Auto Bandsaws	Inspection: Monthly Maintenance: 1 time/year	<ul style="list-style-type: none"> <li>- Clean machine and work area, remove chips</li> <li>- Check blade tension and sharpness, clean chip tray, lubricate guides, inspect hydraulic system.</li> <li>- Power On: inspect the operation of clamping function and cooling system, run a 20-minute warm-up program</li> <li>- Annual maintenance: according to manufacturer's recommendations</li> </ul>	CECS lab
28.	Vertical bandsaw	Inspection: Monthly Maintenance: 1 time/year	<ul style="list-style-type: none"> <li>- Clean machine and work area, remove chips</li> <li>- Inspect blade alignment and tension, check and lubricate guide bearings, inspect drive belt.</li> <li>- Power On: run a 20-minute warm-up program</li> <li>- Annual maintenance: according to manufacturer's recommendations</li> </ul>	CECS lab
29.	Hydraulic press	Inspection: Monthly Maintenance: 1 time/year	<ul style="list-style-type: none"> <li>- Clean machine and work area</li> <li>- Check hydraulic fluid level, inspect hoses and fittings for leaks, test pressure gauge and lubricate moving parts.</li> <li>- Power On: run a 20-minute warm-up program</li> <li>- Annual maintenance: according to manufacturer's recommendations</li> </ul>	CECS lab
30.	Rotary Screw Air Compressor	Inspection: Monthly Maintenance: 1 time/year	<ul style="list-style-type: none"> <li>- Clean machine and work area</li> <li>- Drain water from tank, Check oil level, inspect belts</li> <li>- Power On: run a 20-minute warm-up program (Listen for unusual sounds)</li> <li>- Annual maintenance: according to manufacturer's recommendations</li> </ul>	CECS lab
31.	3D Printer (Fusion3 F410/UltiMaker S3/Bambu X1E)	Inspection: Monthly Maintenance: 1 time/year	<ul style="list-style-type: none"> <li>- Clean machine and work area, remove chips</li> <li>- Clean nozzles and build plate, Check belts and pulleys, inspect fans, lubricate moving parts.</li> <li>- Power On: run a 20-minute warm-up program update firmware (if needed)</li> <li>- Annual maintenance: according to manufacturer's recommendations</li> </ul>	CECS lab
32.	SIF-400	Inspection: Monthly Maintenance: when incurred	<ul style="list-style-type: none"> <li>- Clean machine and work area</li> <li>- Air compressor: Drain water from tank and filter, adjust air pressure (~ 4-6 bar)</li> <li>- Check hoses and valves for leaks, test actuators and sensors, inspect wiring and connections.</li> <li>- Power On: check the operation of all stations (automatic and manual mode)</li> </ul>	CECS lab