



STANDARD OPERATION, INSPECTION, AND MAINTENANCE PROCEDURES OF PRECLINICAL TEACHING LABS' EQUIPMENT

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1. Purpose

To ensure consistency and process optimization in operating, inspecting, and maintaining the equipment of the Preclinical teaching laboratories (hereby referred as “labs”) of College of Health Sciences.

2. Scope

Scope of application: All faculty, teaching assistants, technicians, research assistants, internal and external collaborators, students, and operating officers (hereby referred as “users”) who use the labs are required to strictly follow the standard procedures in this document to ensure the safety for human health, properties, and the working environment.

3. Regulation Principles

The following regulation principles apply:

- 3.1.** Prioritize the safety of students, laboratory personnel, the environment, and the public.
- 3.2.** Promote efficient utilization of equipment.

4. Specific Processes

4.1. Standard operating procedures

The teaching lab department constructs, trains personnel, and deploy the procedures according to Appendix 01.

4.2. Inspection and maintenance of equipment

- 4.2.1.1. The teaching lab department constructs, executes according to plan, self-inspects, and periodically maintain lab equipment, emergency equipment to prevent chemical and biological accidents according to Appendix 02.
- 4.2.1.2. The laboratory department actively prepares plans and measures to overcome the shortcomings after inspection.

4.3. Statistics and reports

The lab department investigates, evaluates, and announces compliance with standard operating procedures, inspection and equipment maintenance to the head of laboratory and submits to other units, departments and agencies when request.

4.4. Penalties and compensation

Users who wrongly manipulate and operate equipment that cause consequences will have to compensate after the laboratory department considers and evaluates the level of harm at the time of arising.

5. Roles and Responsibilities

Department	Responsibilities
Teaching Lab CHS	Guide and explain procedures to users in the laboratory.
User	Follow the procedure for each specific task as detailed in Appendix 01 and Appendix 02.

6. Related Documents and Forms

Appendix 01 – Standard Operation Procedures for Equipment of the Preclinical Teaching Laboratories

Appendix 02 – Scope and Frequency of Inspection and Maintenance of the Labs' Equipment

APPENDIX 1 – STANDARD OPERATION PROCEDURES FOR EQUIPMENT OF THE PRECLINICAL TEACHING LABORATORY

No.	Item	Standard operation procedures
1	Emergency shower and eyewash station	<ul style="list-style-type: none"> - Only use in emergency situations such as chemical exposure via skin, eyes, clothes, or during the scheduled inspection and maintenance. - For the emergency shower: pull the full range of motion of the shower handle. Users can hold the handle until the shower is over or release the handle to let the shower run through its full cycle. - For the eyewash station: push the full range of motion of the eyewash station handle and hold until finish using. - Contact the housekeep service to require supports for cleaning, making sure there is no water left on the floor after use.
2	Chemical fume hood	<ul style="list-style-type: none"> - Turn on the main exhaust fan system of the entire lab (at the door of Locker room - G304). - Turn on the one-way air valve for each fume hood. - Press the "I" button on the control panel of the fume hood and wait 10 seconds for the fume hood suction sensor to work. The fume hood must achieve a suction capacity of at least 0.3m³/s at the highest safe position of the glass door. - Press the "Enter" button to temporarily mute the low suction power alarm if the user actively raises the glass door higher than the maximum safety threshold. - Press the "I" button again to turn off the fume hood's suction sensor after use, the proceed to turn off the one-way air valve and the main exhaust fan system. Note that only turn off the main exhaust fan system is there is no one using the lab after.
3	Autoclave (Brand: Benchmark – Model: B4000-16-E)	<ul style="list-style-type: none"> - Turn the device on/off using the junction box on the back of the machine and the switch button on the front, below the control panel. - Distilled water tank is located at the top of the device. After the tank is full, the device will beep, telling the user to stop adding water. In any case, if the signal to refill water flashes, the user must add distilled water in time. - Arrange different samples/materials in different trays, or at least 5cm apart. Avoid direct contact of different materials. - After placing the sample/material inside the chamber, close the door tightly and turn the doorknob lock clockwise. Choose between two sterilization modes at 121°C or 134°C. Make sure to open the water inlet valve at the front, under the door. - Press the "START" button to start the sterilization cycle. After the sterilization cycle is over and the pressure equalizes, the door can be opened, and the contents removed. Wipe the door seal with a clean cloth soaked in distilled water after use.

4	Furnace (Brand: Daihan – Model: FHX- 12)	<ul style="list-style-type: none"> - Turn on/off the appliance before and after use by using the equipment's junction box and on/off switch. - During operation, users must wear heat-insulated gloves, use cup tongs and crucibles designed for use in furnace. - Chọn thiết lập thời gian 00:00 nếu muốn cho thiết bị chạy liên tục. After turning on the device, set the operating time of the machine (blue timer LED is on). Choose to set the time 00:00 if users want the device to run continuously. - Press “MAIN” button to set heating temperature after setting operating time (red heat LED is on). Use the knob to set the temperature from 300 °C to 1200 °C. - After setting the operating time and temperature, press the “PUSH” button to start the furnace. - In case of emergency, flip the furnace's switch to stop the equipment.
5	Drying oven (Brand: Mettler – Model: UN110)	<ul style="list-style-type: none"> - Turn on/off the device with the “ON/OFF” button. The user must wear insulating gloves to remove the hot items from the drying oven. - To set the temperature, touch the “TEMP” button. Then use the knob to adjust the desired temperature setting. Press the knob to confirm. - With the similar operation, it is possible to set the time (TIMER), flap position (FLAP), fan speed (FAN) to suit the needs. - Do not use the same drying oven to dry chemicals and tools. In case of emergency, press the “ON/OFF” button to stop the device.
6	Vacuum drying oven (Brand: Mettler – Model: VO- 29)	<ul style="list-style-type: none"> - Turn on/off the device with the “ON/OFF” button. - To open the vacuum drying oven's door, turn the door knob clockwise. The user is required to release the pressure valve to balance the pressure inside and outside the oven before opening the door after drying according to the instructions below. - To set the temperature (TEMP) and time (TIMER), follow the same operating instructions as for the conventional drying oven. - To set the pressure (VACUUM), touch the “VACUUM” button and follow the same operating procedures as when adjusting the temperature. If the pressure value is set higher than 1100mb, the display will show the word “open” indicating that the door will be opened after confirming the set pressure level. If the pressure value is set lower than 5mb, the display will show "low" indicating the low pressure setting level; then the pump will operate at full capacity and no longer control the pressure, so the actual pressure will depend on the pump capacity. - The user ensures that the sample is tightly closed and has an opening gap/hole, carefully checking if the chemical is likely to change in the environment of the oven. - In case of emergency, press the “ON/OFF” button to stop the device

7	Technical scale (Brand: Sartorius – Model: Entris 822-1S)	<ul style="list-style-type: none"> - Before using the technical balance, make sure that the scale is in the level position to ensure accurate measurement. If not, adjust the two swivel feet at the bottom, in front of the scale to adjust the scale to a level position. - Turn on/off the balance with the “I/O” button. - Place the sample container on the weighing pan and press the “TARE” button to return the scale reading to “0.00 g”. - Put the sample on the sample container for weighing. Note, the scale can only measure up to 820g. - After use, make sure that the scale is kept clean. Clean with tissue or soft brush if necessary.
8	Analytical scale (Brand: Sartorius – Model: Secura 224- 1S)	<ul style="list-style-type: none"> - Turn on/off the analytical balance with the “I/O” button. - Before the instrument can be used, the user must follow the instructions displayed on the scale screen by adjusting the two swivel stands at the bottom, in front of the scale to balance the scale. - Open the glass door, place the sample container on the scale and press the “TARE” button to return the reading on the scale to “0.0000 g”. - Put the sample on the sample container and close all the glass doors for weighing. Note, the scale can only measure up to 220g. - use, make sure that the scale is kept clean. Clean with tissue or soft brush if necessary.
9	pH meter (Brand: Mettler – Model: S210)	<ul style="list-style-type: none"> - Turn on the pH meter by pressing the “On/Off” button. To turn off the machine, hold the button for two seconds. - The probe is always immersed and protected with the protective solution available with the probe. To use, remove the protective cap of the probe, press the “Read” button and submerge the probe into the liquid sample for accurate measurement results. The measurement results will be statically displayed on the screen after the correct results are available. - After each use, rinse the probe with distilled water and close it with the protective cap. Turn off the device after the measurement is complete.
10	Centrifuge (Brand: Hermle – Model: Z206 A)	<ul style="list-style-type: none"> - General requirements when using centrifuges: it is strictly forbidden for users to centrifuge toxic or pathogenic materials without taking preventive measures (test tube seal is broken/not sealed, ...). It is the responsibility of the users to implement appropriate sterilization procedures in the event that hazardous substances have contaminated the centrifuge and/or its accessories. The arrangement of test tubes in the machine must be counterbalanced and symmetrical to protect the instrument. During operation the machine does not make strange noises; if yes, the user is required to stop the machine in an emergency by pressing the “Stop” button.

		<ul style="list-style-type: none"> - The power button of the device is located on the bottom left the device. After turning on the machine, the users open the lid of the device by pressing the "Lid" button before operating the centrifuge process. The lid of the machine is always closed during operation. - With high g-values, the rate of glass tube breakage increases. Glass splinters have to be removed immediately from rotor, buckets, adapters and the rotor chamber itself. Fine glass splinters will scratch and therefore damage the protective surface coating of a rotor. If glass splinters remain in the rotor chamber, fine metal dust will build up, due to air circulation. This very fine, black metal dust will severely pollute the rotor chamber, the rotor, the buckets, and the samples. If necessary, replace the adapters, tubes and accessories, to avoid further damage. Check the rotor bores regularly, for residue and damage. - Clean the device with neutral cleaning solutions (pH 6-8), it is strictly forbidden to use alkaline solutions (pH > 8). The rotor made of metal and polypropylene (PP) can be sterilized at a maximum temperature of 121 °C and 20 minutes. It is strictly forbidden to sterilize the tube holder made of PP at 134 oC.
11	Deep freezer (Brand: Esco – Model: HF3-400S-1), Chemical freezer (Brand: Artiko – Model: LRE 440), and Sample freezer (Brand: Artiko – Model: PR500)	<ul style="list-style-type: none"> - The user checks the temperature inside the refrigerator daily to ensure samples and chemicals are stored at proper temperature. - Arrange items inside the cabinet neatly, do not block the blower fan to interrupt the air circulation in the cabinet. All samples and chemicals must be closed and labeled according to the safety regulations of the laboratory. It is strictly forbidden to store chemicals that can react violently with each other. - The user must ensure that the freezer's door is closed tightly after use.
12	Plastinated specimen preservation cabinet	<ul style="list-style-type: none"> - The user always ensures that the cabinet maintains the environment at a temperature below 25 °C and humidity below 50%. The cabinet's door is always tightly closed by the electrical switch. - If the power is out for more than 30 minutes, the user turns the cabinet back on by the main control screen (Touch the "Operation Screen", then touch the "Start" button). - Only move the models out at the request of the lecturer, or in the presence of the laboratory's staff/faculty/teaching assistant during office hours.
13	UV -VIS Colo NOVEL-102S	<ul style="list-style-type: none"> - Prepare samples and instruments: Use clean, unscratched cuvettes that are suitable for the wavelength range to be measured. Prepare sample solutions and blank solutions according to experimental requirements.

		<p>Start the machine:</p> <ul style="list-style-type: none"> + Turn on the power: Turn on the power switch of the machine and wait for the machine to fully start. Some machines require a warm-up time before use. + Start the software: Open the control software on the computer connected to the spectrometer. Make sure the software correctly recognizes the device and is ready for measurement. <ul style="list-style-type: none"> - Set measurement parameters: <ul style="list-style-type: none"> + Select measurement mode: Select the appropriate measurement mode such as scanning, kinetics or photometric. + Set parameters: Set the wavelength range to scan (for example: from 200 nm to 800 nm). Select the scanning speed, slit width and other parameters according to the experimental requirements. - Calibrate the machine with blank solution: <ul style="list-style-type: none"> + Prepare blank solution: Pour blank solution into the cuvette and make sure there are no air bubbles. + Perform calibration: Place the cuvette containing blank solution in the sample compartment of the machine. Close the sample compartment lid to avoid the influence of external light. Press the "Auto Zero" or "Blank" button on the software to calibrate the machine to 0 absorbance. - Measure sample: <ul style="list-style-type: none"> + Prepare sample: Rinse the cuvette with sample solution several times before filling to ensure accuracy. + Perform measurement: Place the cuvette containing sample in the sample compartment of the machine. Close the sample compartment lid. Press the "Start" or "Measure" button on the software to start the measurement process. - Save and analyze data: <ul style="list-style-type: none"> + After measuring, save the data in a suitable format. + Use the software's analysis tools to process and interpret the results - Finish and clean: <ul style="list-style-type: none"> + Turn off the machine: After completing all measurements, turn off the machine according to the manufacturer's instructions. + Clean the device: Rinse the cuvette with a suitable solvent and dry it before storing. Wipe the machine surface and sample compartment with a soft cloth to remove dirt and remaining sample. - Weekly: Optical system check, heat dissipation system check - Monthly Check and replace power lamp, equipment calibration - Annual: Overall check, software update
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**APPENDIX 2: 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"> - The handle and lever operate smoothly with no signs of difficulty in pulling or pushing. - Normal flow capacity. - No water leakage before and after use. 	Lab
2	Chemical fume hood	Inspection: 01 time/month Maintenance: when incurred	<ul style="list-style-type: none"> - 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. - The suction capacity of the cabinet is at least 0.3 m³/s when the glass door is in the safe latch position. - The fume hood is kept clean. 	Lab
3	Plastinated specimen preservation cabinet	Inspection: 01 time/month Maintenance: 01 time/ 06 months	<ul style="list-style-type: none"> - The outside of the fumehood and its glass door is not distorted or broken. Glass door hinges and electric locks work properly. - Air conditioning system works well (temperature is lower than 25oC and humidity is lower than 50%). No water leakage. Compare the environmental parameters reported on the control panel and the meter independently. - Water tank has more than 50% capacity left - The lights work normally. 	Lab
4	Water filtration system	Inspection: 01 time /month Maintenance: 01 time / year	<ul style="list-style-type: none"> - The resistance of the device always reaches 15 ohm. - Water supply and drainage system works normally. - Annual maintenance: change the water filter when there is a warning displayed on the screen. 	Lab
5	Autoclave	Inspection: 1 time/month	<ul style="list-style-type: none"> - Standard temperature and pressure: 121 °C/134 °C & 76kPa-106kPa 	Lab

		Maintenance: as detailed in the scope of maintenance	<ul style="list-style-type: none"> - The water supply and drainage system works normally, no water leakage phenomenon. - Daily maintenance: clean the door gasket with a cloth soaked in distilled water and dry the autoclave chamber. - Weekly maintenance: clean the door gasket with a cloth soaked in distilled water and dry the autoclave chamber. - Annual maintenance: change the door gasket. 	
6	Technical scale	Inspection & maintenance: 1 time/month	<ul style="list-style-type: none"> - The scale is kept clean, the weighing plate is not distorted. - The scale reaches the equilibrium position. - Monthly maintenance: clean the scale. 	Lab
7	Analytical scale	Inspection & maintenance: 1 time/month	<ul style="list-style-type: none"> - The scale is kept clean. The glass door is not broken and its hinges work normally. The weighing pan is not distorted. - The scale reaches the equilibrium position. - Monthly maintenance: clean the scale. 	Lab
8	pH meter	Inspection & maintenance: 1 time/month	<ul style="list-style-type: none"> - The probe is protected by the protective cap containing the included protective solution. - Monthly BD: cleaning and calibrating the meter. 	Lab
9	Micropipette	Inspection: 1 time/month Maintenance: 01 time / year	<ul style="list-style-type: none"> - Micropipette is returned to the maximum suction volume value after use. - Annual maintenance: replacement of accessories, oiling, and calibration 	Lab
10	Deep freezer , Chemical freezer, and Sample freezer	Inspection: 1 time/day Maintenance: when incurred	<ul style="list-style-type: none"> - Make sure the temperature of the cabinet always reaches the set value. The screen shows no error. - Clean the storage compartment, tools/samples are arranged neatly, do not obstruct the air circulation in the fridge/freezer. 	Lab