



RESEARCH LABORATORY MANUAL



SCHOOL OF PHARMACEUTICAL SCIENCES



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1.0 SAFETY

- 1.1 GENERAL SAFETY AND OPERATIONAL RULES
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Policy Statement

It is the policy of the School of Pharmaceutical Sciences (SPSUSM) to provide a safe working and learning environment.

The School of Pharmaceutical Sciences (SPSUSM) Laboratory Safety Committee has developed this manual as a guidance document to familiarize staff, students and visitors with the policies and procedures for the safe use of hazardous chemical and other material at the University and its affiliates. When these policies and procedures are followed, the risk of occupational exposures to chemicals and physical hazards as well as the risk of accidental environmental release of hazardous materials is minimized.



Introduction

The School of Pharmaceutical Sciences (SPSUSM) Health and Safety Committee has developed this manual to assist in the recognition, evaluation and control of chemical, biological and physical hazards associated with University laboratory operations. This manual is intended to establish the basic safe operating practices so that laboratory staff and students may carry out effective teaching and research programs in a safe environment.

This safety manual provides specific information on hazard assessment, training requirements, exposure monitoring procedures and accident record keeping and reporting. A laboratory specific safety manual must be available in each laboratory. The safety manual will require laboratory specific procedures to be developed and trained to staff and students. This manual is not intended to be a complete listing of laboratory hazards or safe practices.

1.1 General Safety and Operational Rules

1. SAFETY FIRST - USE COMMON SENSE to avoid accidents.
2. No student is allowed to work in a laboratory unless Laboratory Supervisory Personnel (Assistant) is present. DO NOT ENTER LABORATORY unless your assistant is present in the lab.
3. Any student who endangers the safety of others, or his or her own safety, will be dismissed from the laboratory.
4. All students must wear goggles when necessary.
5. Shoes (no sandals) must be worn at all times. Bare feet or open shoes (front or back) are not permitted in the laboratory.
6. All students must wear lab coats at all times.
7. No eating, drinking, or smoking is permitted in the laboratory.
8. Only authorized experiments may be performed. Equipment should be used only for its intended purpose.
9. No chemicals or equipment may be removed from the laboratory.
10. Do not bring or permit unauthorized individual into the laboratory.
11. Any student who is pregnant should not perform laboratory experiments.



12. If you or a student near you is injured or if any type of accident occurs, IMMEDIATELY call the laboratory staff in-charge for assistance. If accident happens after office hours, the student can refer to Security Department (ext 4333/4999).
13. Place jackets, coats, bags, pocketbooks, etc. in or on the designated area. Ask your laboratory assistant for help if needed.
14. Keep your work space clean and tidy. The work space, desk drawers, cabinets, instruments must be kept neat and clean at all times.
15. When lab work is completed, all materials must be returned to their proper places and used benches, instruments and glassware must be cleaned up.
16. Switch off lightings, fans, instruments, electrical equipments, check the taps, secure the windows and doors when leaving the laboratory.
17. Label all chemicals, including waste chemicals clearly and properly. Follow the instruction of waste disposals. Never discard chemicals down the sink or into regular trash and follow the proper waste disposal procedure of the University Occupational Safety & Health Unit (UKKPU).
18. All accidents must be reported and investigated. Any injury must be treated immediately.
19. When a fire alarm is sounded, place the chemical and equipment safely to the nearest possible table/bench, exit the building calmly and go to the designated area outside. When the "all clear" signal is received, return to the laboratory.



1.2 Safety Facilities

The laboratory is equipped with various safety facilities. Students working in the lab must familiarize themselves with the location and proper use of these facilities.

Eye wash

How to use emergency eye wash:

- Immediately flush eyes for at least 15 minutes. Keep the eyes open and rotate the eyeballs in all directions to remove contamination from around the eyes. An injured person needs help to hold the eyelids open.

Emergency Shower

How to use emergency shower:

- Immediately flush the affected area with copious quantities of water for at least 15 minutes. Protect the eyes from inadvertent contamination.
- Remove contaminated clothing, jewellery, and shoes. Don't let modesty slow you down. Every second counts. Use a clean lab coat to provide the victim with privacy and warmth.

First aid boxes

- Use when necessary. Do not misuse the items in the first-aid box.

Fire Extinguisher

- Use CO₂ fire extinguisher to put out small fires resulting from chemical incidents. Halo hydrocarbons extinguishers should be used only when no chemicals are involved in the fire.
- An "A-B-C" fire extinguisher can be used on all fires. Other types of extinguishers work only on a certain class of fire. Check the chart below to match extinguishers to a particular class of fire.

Class of fire	Types of extinguishers to use
Class A: Ordinary combustible materials, such as wood, cloth, paper, etc.	<ul style="list-style-type: none">• "A-B-C"• Pressurized water
Class B: Flammable liquids, such as oil, gasoline, kerosene, etc.	<ul style="list-style-type: none">• "A-B-C"• "B-C" dry chemical• Carbon dioxide
Class C: Presence of energized electrical circuits (e.g., Electronic motors, electrical wiring, etc.)	<ul style="list-style-type: none">• "A-B-C"• "B-C" dry chemical• Carbon dioxide



1.3 Sharps And Laboratory Glass

Definitions

Sharp:

Any device/item having corners, edges, or projections capable of cutting or piercing the skin.

Infectious Waste Sharps:

Sharps, including hypodermic needles, syringes (with or without the attached needle), Pasteur pipettes, scalpel blades, blood vials, needles with attached tubing, culture dishes, suture needles, slides, cover slips and other broken or unbroken glass or plastic ware that have been in contact with infectious agents or that have been used in animal or human patient care or treatment, in medical, research or industrial laboratories, (please refer to 1.8 to dispose).

Laboratory Glass

Any item that could potentially pose a hazard to waste handlers must be handled properly. This includes non-infectious slides, cover slips, vials, Pasteur pipettes, empty chemical reagent bottles and broken or fragile glass or plastic.

Broken or contaminated glass should be discarded in special glass disposal bins, (please refer to 1.8 to dispose)



APPENDIX

LABORATORY SAFETY NOTICE

1. ALL students, prior to commencing work must ensure that they have read the Safety Manual and signed the acceptance form.
2. ALL students, prior to commencing work must fill in the risk rating form and obtain authorization from their supervisors, and submit to the Lab Officer in-charge.
3. ALL students MUST familiarize themselves with the emergency procedures in the laboratory. If in doubt ASK a Lab Officer or your Supervisor.
4. ALL students, prior to commencing work, must ensure that they obtain a long sleeved laboratory coat. This MUST be worn at ALL times when working in the laboratory.
5. ALL students must wear protective eyewear, gloves, aprons, etc when handling solvents, acids and other harmful chemicals. ALL such chemicals should be handled in the fume cupboard. Protective eyewear must also be worn when working with glassware under vacuum or pressure.
6. ALL chemicals when transported around the laboratory MUST be adequately supported and contained. All chemicals must be transported in closed containers.
7. No food and/or drink in the laboratory.
8. No wearing of sandals or uncovered shoes. No shorts and (ladies) wear pants, not skirts where possible.
9. DO NOT obstruct common passage ways (with stools, equipment, etc.). They must be kept clear at ALL times.
10. Students are responsible for the cleanliness of the lab. Make sure that you have removed and cleaned ALL glassware at the end of the day – leave the work place TIDY.

Additional Note:

These rules will be enforced on a DAILY basis by Lab Officers and staff. Non-conformance **WILL** result in penalties to the student and, if necessary, more serious disciplinary procedures.

Signed/Date:

Supervisor:



1.4 Guidelines For Handling Accidents

During Office Hours

- The students or lab partner(s) should first lodge a report to the lecturer/lab assistant present in the laboratory.
- If the accident is not serious, the lecturer/lab assistant should then provide first aid treatment.
- If necessary, the lecturer/lab assistant should send the student to the clinic. (If there is more than one lecturer on duty, then one of them should assume that responsibility. However, if there is only one lecturer and more than one lab assistant present, then the responsibility will be taken over by one of the lab assistants).
- If the accident is serious, the lecturer/lab assistant should call for an ambulance through the emergency line (USM CLINIC 3999 or 2381).
- The lab assistant should contact the lecturer on duty by phone if he/she is not present when the accident occurs. If the lecturer concerned has to leave the laboratory during a practical session, he/she is required to provide his/her contact number where he/she can be reached.
- If fails, the lab partner should contact the school assistant science officer or discipline senior lab assistant to assist in reporting this accident to the student course advisor/supervisor.
- A lecturer/lab assistant /the lab partner is required to accompany the injured student in the ambulance to the clinic, in case that the injured is referred to a hospital, the accompanying person should also follow to provide further assistance.

After Office Hours

- Students are advised to work with another person around when performing a dangerous experiment in the laboratory.
- The USM clinic is open after office hours from 5.00-7.00pm. Please contact the security department at extension 4333 or 4999 if an accident occurs or if you require transportation to the USM Clinic.
- If the accident occurs after 7.00pm, then this should be referred to a hospital or a panel doctor. Please contact security department through extension number 4333 or 4999 if you require transportation.
- The student or the accompanying person should contact and report the incident to the student's supervisor whose contact number is found in the list displayed in every laboratory for students working after office hours.



For better understanding, students are encouraged to refer to all websites below.

References:

Environmental Health & Safety (Safety In The Work Place)

By: University of Florida

Chemical and Radioactive Waste Disposal

<http://www.ehs.ufl.edu/programs/os/>

Environmental Health & Safety (Safety In The Work Place)

By: University of Florida

Radiation Safety EH& S Radiation Control

http://www.ehs.ufl.edu/programs/chemrad_waste/

Environmental Health & Safety (Safety In The Work Place)

By: University of Florida

Biological Safety

<http://www.ehs.ufl.edu/programs/bio/>

Environmental Health & Safety (Safety In The Work Place)

By: University of Florida

safety in the work place

<http://www.ehs.ufl.edu/>

Institutional Animal Care and Use Committee

By: University of Florida

<http://www.iacuc.ufl.edu/>

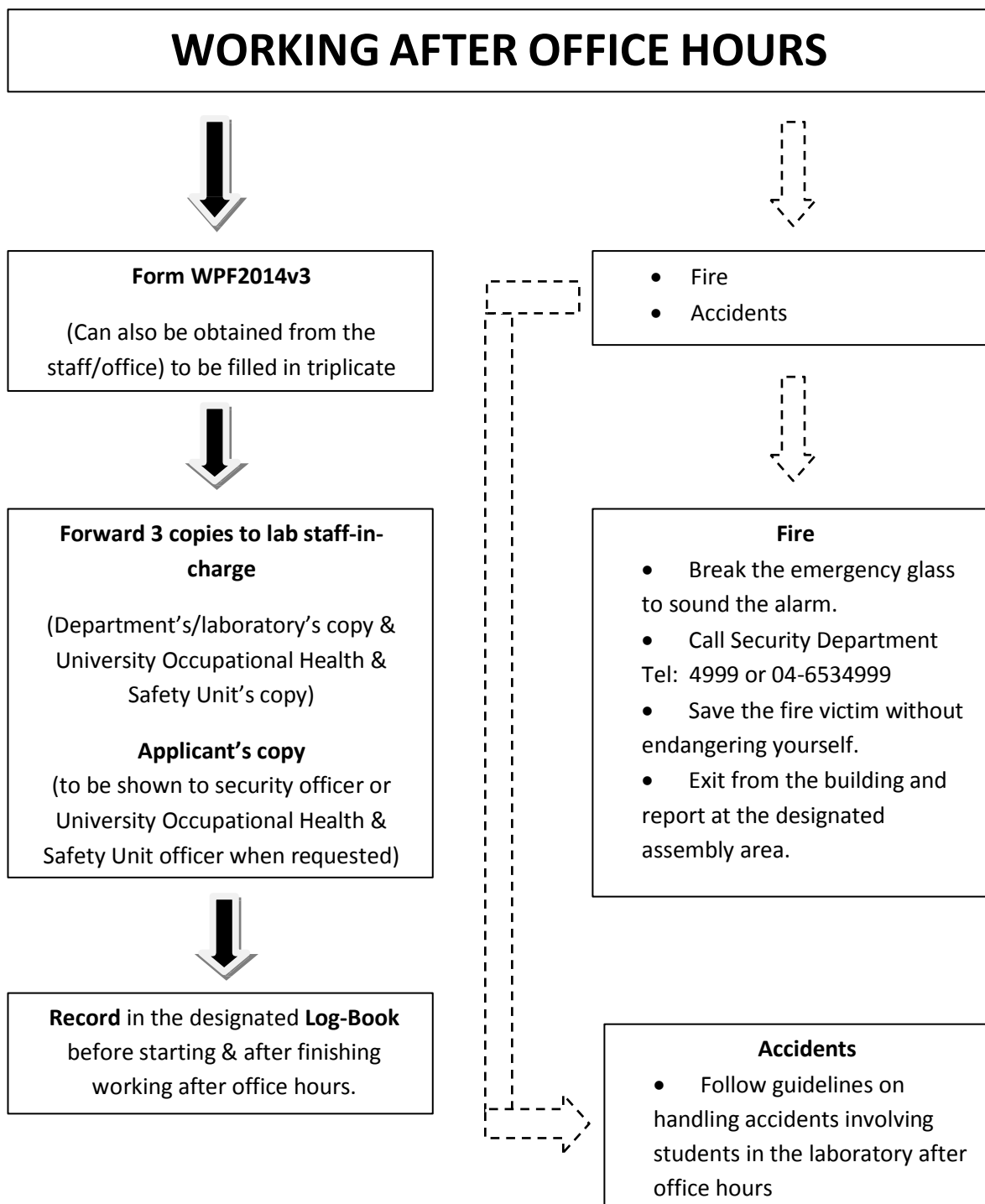


1.5 Working After Office Hours

There are special risks from working in a laboratory in the School outside normal working hours (8.10 am-5.10 pm, Monday to Friday) as help may not be available in the event of an accident. It is the duty of all Research Supervisors to be aware of the work being undertaken by their students and to ensure that out of hours work is properly regulated. The following rules apply out of normal hours:-

- Permission is required for working after office hours. Fill form WPF2014v3 in triplicate (also available from the laboratory staff-in-charge or the office). Pass up two copies to the laboratory staff-in-charge.
- A copy of the permission must be shown to the USM Security Personnel when requested when working after office hours.
- Record in the log-book (located in front of the Physiology/Neuroscience/Clinical Research Laboratory).
- Working alone is forbidden. Make sure there is always someone within calling distance.
- Experiments that involve any measure of risk must be carried out during normal working hours. No work involving Autoclaves, Cyanides or HF may be carried out outside normal working hours.

PROCEDURE FOR WORKING AFTER OFFICE HOURS IN THE LABORATORY





UNIT KESELAMATAN DAN KESIHATAN PEKERJAAN
OCCUPATIONAL SAFETY AND HEALTH UNIT

LAMPIRAN A

**BORANG KEBENARAN BEKERJA DI DALAM MAKMAL/BENGKEL
SELEPAS WAKTU PEJABAT**
(Setiap Borang Hanya Untuk Seorang Pelajar Saja)

A. BUTIR-BUTIR PERMOHONAN

1. Nama Pemohon: _____
2. No. Matrik: _____
3. PTJ/Jabatan: _____
4. Tahun Pengajian: _____
5. Kursus: _____
6. Nama dan No. Bilik Makmal/Bengkel: _____
7. No. Bangunan: _____
8. Ringkasan eksperimen atau kerja yang dijalankan: _____

9. Nama rakan yang berhampiran semasa bekerja (jika perlu) [PERATURAN 3.5]

10. Saya bersetuju mematuhi peraturan-peraturan bekerja di dalam makmal/bengkel selepas waktu pejabat dan juga peraturan-peraturan keselamatan makmal/bengkel:

Tandatangan: _____ Tarikh: _____

B. BUTIR-BUTIR KELULUSAN PENYELIA ATAU PENSYARAH

1. Saya dengan ini membenarkan pemohon/pelajar di atas bekerja di dalam makmal/bengkel selepas waktu pejabat yang dipohonnya untuk tarikh mulai dari _____ hingga _____ [Tidak melebihi 6 bulan – PERATURAN 3.4]
 2. Sila hubungi saya di alamat berikut sekiranya berlaku kecemasan:
 - a) Alamat selepas waktu pejabat: _____
 - b) No. telefon selepas waktu pejabat: _____
 - c) Catatan (jika ada): _____

- Tandatangan: _____ Tarikh: _____
- Nama dan Cop Rasmi: _____

ARAHAN KEPADA PELAJAR :

- 1) Sila simpan borang kebenaran ini untuk tujuan pemeriksaan oleh pihak berkuasa Universiti
- 2) Sila buat salinan pendua untuk:
 - (i) Dikemukakan/kirim ke UKKP
 - (ii) Simpanan fail PTJ



1.6 Rules for Unattended Experiments

Experimental work left running unattended poses special risks in terms of fires and flood and must be carefully controlled. The following rules apply:

- Unattended running of experiments may be carried out only when it is absolutely necessary.
- Experiments involving overnight refluxing of solvents must be done inside a ducted fume hood. The plug of the heating mantle or hot plate must be within reach to be switched off in case the water flow fails. All water lines must be fixed securely and free from leakage.
- All experiments left on must have a notice on yellow card (available from the laboratory staff-in-charge) saying **Experiment in Progress. Please Leave On.**
 - o and indicating **potential hazards in plain English**, e.g. “Flammable solvent”, “Contains Toxic Material” – this is for the benefit of the night security staff who are not chemists.
 - o and the **name and telephone number** of the person who is responsible for it. This must be **a realistic telephone number where you can be contacted at all times** because **you** may be called out at any time to deal with **your** experiment.
- If at all possible, this information should be posted in a prominent position external to the laboratory.
- If an unattended experiment is set up in a fume hood, the lighting for that fume hood should be switched on.
- Not all fume hoods may be appropriate for unattended work. Approval of the fume hood must be obtained from the laboratory staff-in-charge before any such work is carried out.
- Electrical equipment left on should carry a **Do Not Switch Off** notice in yellow card giving the name of the person leaving the equipment and a contact phone number.

	<p>Eksperimen sedang dijalankan... Tolong jangan matikan suis & air! (Experiment in Progress... Please leave on!)</p> <p>Hazad: *Pelarut Mudah Terbakar/Kandungan Bahan Toksik (Hazard: *Flammable Solvent/Contains Toxic Material)</p>
<div><p>Nama (Name) : _____</p><p>H.p/Tel : _____ samb. (ext.) : _____</p><p>Saya berada di *bangunan/alamat (I can be contacted at *Building/address): _____</p><p>_____</p></div>	
<p>*Potong yang tidak Berkenaan (*delete the unapplicable)</p> <p>Pusat Pengajian Sains Farmasi, Universiti Sains Malaysia, 11800 USM, Penang, Malaysia</p>	



1.7 Chemical Waste Disposal

Waste Chemicals

At the end of research projects it is necessary to dispose of all unwanted products or other chemicals and researchers are required to follow the instruction for laboratory clearance.

The disposal of waste chemicals is controlled by strict regulations regarding identification, segregation, packaging and transport of waste. The Occupational Safety & Health Unit, USM has a Code of Practice on the Chemical Waste Management and Disposal Procedure (refer to Appendix Section), and the following guidelines indicate how this Code is interpreted within the School of Pharmaceutical Sciences. If you are in doubt as to whether a substance needs to be treated as a waste chemical refer to Chemical Waste Disposal Committee (refer to Appendix Section) or please contact Mr. Roseli Hassan 04-6532253 or email at roseli@usm.my for advice.

Waste Classification Code

A	MINERAL OIL WASTE Waste containing lubricating oil, hydraulic oil, oil contaminated soil etc
B	ORGANIC CHEMICAL WASTE CONTAINING HALOGEN AND/OR > SULPHUR 1% Freon, PVC wastes, chloroform, solvents, capacitors and transformers containing PCB etc
C	WASTE SOLVENTS CONTAINING HALOGENS AND/OR SULPHUR <1% Acetone, alcohol (e.g. ethanol, methanol), benzene, turpentine, xylene etc. Waste should be pumpable, containing <50% water and 18J/kg calorific value
H	ORGANIC CHEMICAL WASTE CONTAINING HALOGENS AND /OR SULPHUR < 1% Glue, latex, panit, phenol, printing ink, synthetic oil, soap, epoxy etc
K	WASTE CONTAINING MERCURY Mercury, vapour lamps, COD-Fluids, mercury batteries etc
T	PESTICIDE WASTE Insecticides, fungus and weed killers, rat poison etc
X	INORGANIC WASTE Acid, alkaline, sodium hypochlorite, inorganic salt, metal hydroxide sludge, chromate, and cyanide waste etc
Z	MISCELLANEOUS Medicine waste, lab-packs, asbestos waste, mineral sludge, isocyanate (MDI,TDI), batteries etc



Procedure within the School

If you need to dispose of waste chemicals please refer Chemical Waste Disposal Committee staff. Mr. Roseli Hassan (ext. 2253), Mr. Mohd Fadzli Ghazali (ext. 6006), Mr. Azizul Abu Zaid Bukhari (ext. 6005), Mr. Ahmad Nizam Adol (ext. 3297), Mr. Mohd Shahrul Ridzuan Ismail (ext. 4590).

All substances need to be disposed, if possible, be identified by chemical name and molecular formula. If this is very difficult because there is mixed chemical waste, then the character of the mixture must be reasonably accurately defined before it can be accepted. Incompatible chemical waste must not be mixed or combined in the same container.

The term “incompatible chemicals” refers to chemicals that can react with each other violently; with evolution of heat; or to produce flammable products or toxic products. Incompatible chemical must not be placed in the same lab pack for transport or landfill disposal and must always be handled, stored and packed so that they cannot accidentally come in to contact with each other. Guidelines for the segregation of common laboratory chemicals that are incompatible are presented in Tables E.1 and E.2. Table E.1 contains general classes of compounds that should be kept separated; Table E.2 lists specific compounds that can pose reactivity hazards. Chemicals in each grouping in columns A and B of each table should be kept separate. Further information on specific chemical reaction hazards can be found in Bretherick, (1986 & 1990).

<http://eng.monash.edu/materials/assets/documents/resources/ohs/bretherick-vol1.pdf>

List of Incompatible Chemicals

Table E.1 General Classes of Incompatible Chemicals	
Column A Acids and oxidizing agents ^a	Column B Bases, metals and reducing agents ^a
Chlorates(VI)	Ammonia, anhydrous and aqueous
Chromates(VI)	Carbon
Chromium(VI) oxide	Metals
Halogens/Halogenating agents	Metal Hydrides
Hydrogen Peroxide	Nitrates(III)
Manganates(VII)	Organic compounds in general
Nitric(V)acid/Nitrates(V)	Phosphorus
Peroxides	Silicon
Sulfates(VII)	Sulfur

^aThe examples of oxidizing and reducing agents are illustrative of common laboratory chemicals. The listings are not intended to be exhaustive.

Table E.2 Specific Chemicals Incompatibilities	
Column A	Column B
Acetylene, monosubstituted acetylenes	Group IB and IIB metal and the their salts
	Halogens/Halogenating agents
Ammonia, anhydrous and aqueous	Halogens/Halogenating agents
	Mercury
	Silver
Alkali and alkaline earth Carbides Hydrides Hydroxides Metal Oxides/peroxides	Water
	Acids
	Halogenated organic compounds
	Halogenating agents
	Oxidizing agents ^a
Azides, inorganic	Acids
	Heavy metals and their salts
	Oxidizing agents ^a
Cyanides, inorganic	Acids/Strong bases
Mercury and its amalgams	Acetylene
	Ammonia, anhydrous and aqueous
	Nitric(V) acid
	Sodium azide
Nitrates(V), inorganic	Acids
	Reducing agents ^a
Nitric(V) acid	Bases
	Chromic(VI) acid
	Chromates(VI)
	Metals
	Manganates(VII)
	Reducing agents ^a
	Sulfides
	Sulfuric acid
Nitrates(III), inorganic	Acids
	Oxidizing agents ^a
Organic compounds	Oxidizing agents ^a
Organic acyl halides	Bases
	Organic hydro and amino compounds
Organic anhydrides	Bases
	Organic hydroxyl and amino compounds

Table E.2 Specific Chemicals Incompatibilities	
Column A	Column B
Organic halogen compounds	Group IA and IIA metals
	Aluminium
Organic nitro compounds	Strong bases
Oxalic acid	Mercury and its salts
	Silver and its salts
Phosphorus	Oxidizing agents^a
	Oxygen
	Strong bases
Phosphorus(V) pentoxide	Alcohols
	Strong bases
	Water
Sulfides, inorganic	Acids
Sulfuric acid (concentrated)	Bases
	Potassium manganate (VII)
	Water

^aSee list of the example in Table E.1

It is very important if there are known hazards associated with the waste; these should be stated on the label (see below).

All substances to be disposed of must be put into leak-proof containers that are clearly labelled with the identity or categorization of the contents, any known hazards, some indication of boiling point range and the number of the lab of origin (suitable labels are available from Laboratory staff-in-charge). Substances identified only by a trade name will also not be accepted – there has to be some indication of the chemical nature.

The same information as on the labels, together with an indication of the quantity of waste, must be written legibly on the waste disposal form, copies of which can be obtained from Laboratory staff-in-charge. The form must accompany the waste.

General

If material is packed into used boxes, ensure that old labels are obliterated and the container is marked “this way up”. The total weight should not exceed 5 kg and the dimensions should be about one foot cube. Organic or aqueous liquids should be in glass or plastic containers, solids in metal drums or plastic tubs. If large amounts of material have to be packed, approved containers may be obtained from the Chemical Waste Disposal Committee.



Waste Solvents

The University is able to dispose of some common organic solvents by a mechanism that is less cumbersome and costly than for other waste chemicals. A list of solvents that can be accepted is given below (some other solvents may be acceptable but check with the Chemical Waste Disposal Committee first. Waste solvent containers are not dumps and may contain only approved waste organic solvents with limited amounts of solute. Reaction mixtures, oxidants or solutions of oxidants must never be put into the waste solvent containers.

No substances that are category 1 or 2 carcinogens may be put in the waste solvents in any form. Organic liquids acceptable as Waste Solvents (from Code of Practice on the Chemical Waste Management and Disposal Procedure)

Non-chlorinated

- Hydrocarbons: alkanes C5-C12, cyclohexane, toluene, xylene
- C1-C3 alcohols, ethylene glycol
- Diethyl ether and tetrahydrofuran
- Acetone, ethyl and n-butyl acetate

Chlorinated

- C1: dichloromethane, chloroform, carbon tetrachloride
- C2: trichloroethylene, tetrachloroethylene, 1,2-dichloroethane, 1,1,1-trichloroethane
- C3: 1-chlorobutane plus small amounts of non-chlorinated materials but no water

Other solvents may be acceptable, please check with Chemical Waste Disposal Committee staff first.

Containers-The accepted container for transfer of waste solvent to the Waste Store is a square section screw-capped 25 litre polythene carboy. No other containers are acceptable. The containers must be filled only to the 80% level with approved solvents, sealed with their original caps, not leaking vapour or liquid or contaminated on the outside. The Waste Store staff is not allowed to accept over-full, leaking or externally contaminated containers.

Labelling-The container must be labelled with the name, laboratory, type of chemical, date and accurately labelled Chlorinated (blue label) or non-Chlorinated (red label). Under no circumstances may this label be altered by laboratory users. Waste Store staff is not allowed to accept containers where the label has been altered.



Storage-Separate containers for Chlorinated and non-Chlorinated solvents should ideally be kept in the Waste Store. Large polythene containers of flammable solvents are extremely vulnerable in case of fire and must be kept away from all sources of heat, ignition and flame when not being used to receive waste solvent.

Collection-Waste solvent is accepted by Waste Stores during the hours set for solvent dispensing. Waste Stores are not allowed to accept containers which do not meet the criteria described under “Containers” above.

Empty Winchesters-Residues of drying agents, sodium wire and diethyl ether are particularly dangerous and must be emptied and treated. The empty bottles should be taken on a trolley or in a carrier to the Waste Store and NOT left by waste bins.



Samples of chemical waste labels:

1. Non-Halogenated Organic Waste Label [For waste Classification Code 'C']

SCHOOL OF PHARMACEUTICAL SCIENCES UNIVERSITI SAINS MALAYSIA CHEMICAL WASTE LABEL HALOGENATED ORGANIC WASTE		RED
Name of Lab	:	_____
Lab. Room No.	:	_____
Name of Waste	:	_____
(if it's mixture, name every component)		
Person Responsible	:	_____
Date Collection Started	:	_____

2. Halogenated Organic Waste Label [For waste Classification Code 'B']

SCHOOL OF PHARMACEUTICAL SCIENCES UNIVERSITI SAINS MALAYSIA CHEMICAL WASTE LABEL HALOGENATED ORGANIC WASTE		BLUE
Name of Lab	:	_____
Lab. Room No.	:	_____
Name of Waste	:	_____
(if it's mixture, name every component)		
Person Responsible	:	_____
Date Collection Started	:	_____



3. Toxic Waste Label [For waste Classification Code 'K', 'T' & 'X']

SCHOOL OF PHARMACEUTICAL SCIENCES UNIVERSITI SAINS MALAYSIA CHEMICAL WASTE LABEL TOXIC WASTE		WHITE
Name of Lab	:	_____
Lab. Room No.	:	_____
Name of Waste	:	_____
(if it's mixture, name every component)		
Person Responsible	:	_____
Date Collection Started	:	_____

4. Others Waste Label [For waste Classification Code 'A', 'Z']

SCHOOL OF PHARMACEUTICAL SCIENCES UNIVERSITI SAINS MALAYSIA CHEMICAL WASTE LABEL OTHERS		YELLOW
Name of Lab	:	_____
Lab. Room No.	:	_____
Name of Waste	:	_____
(if it's mixture, name every component)		
Person Responsible	:	_____
Date Collection Started	:	_____



1.8 Biological and Clinical Waste Disposal

1.8.1 DEFINITION

Biological Hazard refer to biological substances that post a threat to the health of living organisms, primarily that of humans. This can include medical waste or samples of a microorganism, virus or toxin (from a biological source that can affect human health). It can also include substances harmful to animals.

Clinical Waste refer to any waste which consists of human or animal tissues, blood or other body fluids, excretions, drug or other pharmaceutical products, swabs or dressings, syringes, needles or other sharp instruments, being waste which unless rendered safe may prove hazardous to any person coming into contact with it.

Other waste arising from medical, nursing, dental, veterinary, pharmaceutical or similar practices, investigation, treatment, care, teaching or research, or the collection of blood for transfusion, being waste which may cause infection to any person coming into contact with it.

To get better understanding of waste management, there is a need to have a common and internationally accepted definition for the waste generated in university facilities. The following are adapted definitions:

1. Hazardous research laboratories wastes
 - Biological (recognizable anatomical waste) and pathological waste, chemical, toxic or pharmaceutical waste including cytotoxic drugs (anti-neoplastics agents), sharps and radioactive waste.
2. Infectious research laboratories wastes
 - Waste that has been classified to have the potential transmitting infectious agents to humans or animals;
 - Discarded materials or equipments contaminated with blood and its derivatives, other body fluids or excreta from isolated infected animals or materials.
 - Laboratory waste (cultures and stocks with any viable biological agents artificially cultivated to significantly elevated numbers and infected animals from laboratories).
3. Sharps
 - All waste with sharps or parts able to cause an injury or an invasion of the skin barrier in the human body. Sharps from isolated infected animals are categorized as infectious waste.



1.8.2 IDENTIFICATION, CLASSIFICATION AND WASTE GROUP

1. Wastes from laboratories can be categorized into the following types:-
 - i. Clinical wastes
 - ii. Radioactive waste
 - iii. Chemical waste
 - iv. Pressure containers and
 - v. General waste
2. Clinical wastes are wastes containing:
 - i. Human or animal tissue
 - ii. Blood or body fluids
 - iii. Excretions
 - iv. Drugs
 - v. Pharmaceutical products
 - vi. Soiled swabs or dressings
 - vii. Syringes, needles, sharps
 - viii. Any waste that has come into contact or been mixed with any of the above types of wastes.
 - ix. Waste unless rendered safe may prove hazardous to any person coming into contact with it.
3. In Malaysia, clinical waste is classified as scheduled waste under the Environment Quality (Scheduled Wastes) Regulations, 2005 which includes:

SW 403	Discarded drugs containing psychotropic substances or containing substances that are toxic, harmful, carcinogenic, mutagenic or teratogenic
SW 404	Pathogenic and clinical wastes and quarantined materials
SW 421	A mixture of scheduled wastes
SW 422	A mixture of scheduled and non scheduled wastes

Presently, the following wastes have been included as scheduled wastes in the above regulations:

- Discarded drugs containing psychotropic substances or dangerous drugs;
- Wastes from the preparation and production of pharmaceutical product and discarded drugs containing substances that are toxic, harmful, carcinogenic, mutagenic or teratogenic; and



- Waste containing one or more hazardous substances or products that are explosive, oxidizing, flammable, toxic, harmful, corrosive, irritant, carcinogenic, teratogenic or mutagenic.
- The following classification is based on the major classification of clinical waste, but specified for practical use in healthcare centre. The classification can be adopted in teaching or research purposes.

Table 1: Major classification of clinical waste and its recommended management guidance in School of Pharmaceutical Sciences, USM

Description	Waste management guidance	Collection Disposal Container
<p>1. Blood and body fluid waste</p> <ul style="list-style-type: none"> i) Soiled surgical dressings e.g. cotton wool, gloves, swabs. All contaminated waste from treatment area. Plasters, bandages, gloves which have come into contact with blood or wounds, cloths and wiping materials used to clear up body fluids and spills of blood. ii) Material other than reusable linen, from cases of infectious diseases (e.g. human biopsy materials, blood, urine, stools) iii) Pathological waste including all human tissues (whether infected or not), organs, limbs, body parts, placenta and human fetus, animal carcasses 	<p>Special requirement on the management from the viewpoint of infection prevention. These categories of waste must always be incinerated completely in an appropriate incinerator.</p>	<p>Yellow plastic bag biohazard.</p> <p>Yellow plastic bag biohazard.</p> <p>Yellow plastic bag biohazard.</p>

and tissues from laboratories and all related swabs and dressings.		
<p>2. Waste posing the risk of injury (“sharp”)</p> <p>All objects and materials which are closely linked with teaching or research activities and pose a potential risk of injury and/ infection, e.g. needles, scalpel blades, blades and saw, any other instruments that could cause a cut or puncture.</p>	Collected and managed separately from other waste. The collection container; must be puncture resistant and leak tight. This category of waste has to be disposed/ destroyed completely as to prevent potential risk of injury/infection.	Yellow sharp bin biohazard container.
<p>3. Infectious wastes</p> <p>Clinical waste arising from laboratories (e.g. pathology, hematology, blood transfusion, microbiology, histology) and post mortem rooms, other than waste included in category 1 waste.</p>	Special requirement on the management from the view point of infection prevention. This category of waste must always be incinerated completely in an appropriate incinerator.	Autoclavable plastic bags (need to autoclave before disposal).
<p>4. Pharmaceutical and Cytotoxic Pharmaceutical Wastes</p> <p>i) Pharmaceuticals which have become unusable for the following reasons :-</p> <ul style="list-style-type: none"> ● Expiry date exceeded ; ● Expiry date exceeded after the packaging has been opened or the ready-to-use 	<p>Class I – Pharmaceuticals such as chamomile tea, cough syrup, and the like which pose no hazard during collection, intermediate storage and waste management: Managed jointly with municipal wastes (into drain).</p> <p>Class II – Pharmaceuticals which pose a potential hazard when used improperly by unauthorized persons: managed in an</p>	

<p>preparation prepared by the user; or</p> <ul style="list-style-type: none"> • Use is not possible for other reasons (e.g. call-back campaign) <p>ii) Wastes arising in the use, manufacture and preparation of and in the oncological treatment of patients with, pharmaceuticals with a cytotoxic effect (mutagenic, carcinogenic and teratogenic properties).</p>	<p>appropriate waste disposal facility.</p> <p>Class III – Heavy metal which containing unidentifiable pharmaceuticals: managed in an appropriate waste disposal facility.</p> <p>Intermediate storage of these wastes takes place under controlled and locked conditions. For reasons of occupational safety, cytotoxic pharmaceutical wastes must be collected separately from pharmaceutical waste and disposed of in a hazardous waste incineration plant.</p>	
<p>5. Other infectious wastes</p> <p>All wastes that have potential of transmitting infectious agents to humans or animals. Used disposable bed-pan liners, urine containers, incontinence pads and stoma bags.</p>	<p>Disposed of in hazardous waste.</p>	<p>Yellow plastic bag biohazard.</p>



1.8.3 WASTE SEGREGATION

1. It is the responsibility of the student to ensure that segregation of clinical waste is carried out at source and that all clinical waste are deposited only in yellow bags and sharps in sharp bins only.
2. All students shall follow standard colour coding which is widely accepted:
 - (a) Black : General wastes
 - (b) Yellow : Clinical wastes for incineration only
 - (c) Light blue : Waste for autoclaving or equivalent treatment
3. Clinical waste requiring autoclaving, or other equivalent treatment, before disposal shall be stored in the light blue autoclave bags before such treatment but should be placed in the yellow plastic bags after treatment.

1.8.4 LABELLING AND MARKING

1. All bags and drum containers must be identified at the point of production and should be indelibly and clearly marked with biohazard symbol.
2. For storing of waste in container, appropriate label should be attached on the container. The date when the scheduled wastes are first generated, name, address and telephone number of the waste generator shall be included in the label.
3. Labelling can be done in a number of ways:
 - Writing the information on the bag or container.
 - Using pre printed tape.
 - Using pre printed self-adhesive address labels supplied on a peel-off roll.
 - Tie-on tag label, with information written on them.
 - Self-locking plastic tags, pre-printed with all the required information.



1.8.5 HANDLING, STORAGE AND INTERNAL TRANSPORTATION

1. At all times where manual handling of yellow clinical waste bags is required, the necks of the bags should be positioned to allow access for further movement of the bags when necessary. Manual handling of waste bags should be minimized wherever possible.
2. All clinical waste bags should be handled by the neck only.
3. Specific areas for the initial storage of clinical wastes, in the lab shall be made available and located adjacent to the sources of the waste. The bag and containers containing clinical wastes from the initial storage area shall be removed regularly.
4. Double yellow bags shall be used for clinical waste from high risk areas such as infectious diseases and isolation lab units and for heavy clinical wastes such as animal tissue.
5. Syringes with attached needles shall be discarded into sharps container as one unit.
6. Internal transports routes from lab to central storage (biohazard cabin) shall be designed to minimize the passage of waste through other clean areas.
7. Dedicated wheeled containers, trolley or carts shall be used to transport the waste containers to the main storage areas. These vehicles shall be reserved only for the transportation of clinical waste. They should be thoroughly cleaned and disinfected immediately following any spillage or accidental discharge.



Figure 1: Dedicated bin can be used in labs which generate large quantity of biohazard waste for temporary use. Please label the bin accordingly.



8. Wheeled containers, trolleys for transferring clinical wastes within lab shall be designed as such that ;
 - The surfaces of wheeled containers are smooth and impermeable.
 - Particles of waste are not easily trapped on the edges or crevices.
 - They shouldn't contain any leakage from damage containers.
 - Easily be cleaned, disinfected and drained.
 - Waste may be easily loaded, secured and unloaded.
9. All clinical waste bags shall only be handled by its neck and the movement of the clinical waste bags shall be kept to the minimum.
10. For waste that has high potential to spread infection, it must be put into two layers of yellow bags and tie it tightly.
11. Syringes with attached needles shall not be dismantled and recapped before discarding into sharp bins.
12. Dedicated trolleys or carts shall be used to transport the clinical waste bags to the collection point. They shall not be used for other purposes except for transporting clinical waste bags.

1.8.6 TEMPORARY STORAGE OF WASTE IN THE LABORATORY

1. All wastes shall be stored in containers which are compatible with the scheduled wastes to be stored, durable and which are able to prevent spillage or leakage of the scheduled wastes into the environment.

(Please refer table 1 for scheduled waste management) (1.8.2.4)

2. Containers containing scheduled wastes shall always be closed during storage except when it is necessary to add or remove the scheduled wastes.
3. Maximum time for store waste in the laboratories must not exceed two weeks.



Figure 2: Biohazard waste bin.

1.8.7 SPILL OR ACCIDENTAL DISCHARGE

1. Spills of clinical wastes or materials are probably the most common emergencies related to hazardous materials. Basically the same response procedures are applied, regardless of whether the spills are from material or waste. The response to emergencies should ensure the following:
 - i) Inform laboratory staff-in-charge as soon as possible.
 - ii) The waste management plan should be followed.
 - iii) Contaminated areas should be cleared and if necessary disinfected.
 - iv) The exposure of workers should be limited as much as possible during the operation.
 - v) The impact on the environment should be limited to the best extent possible.
 - vi) The person in charge should be prepared for emergency response and required equipment should be easily available at all points in time and within reasonable distance to ensure that adequate response can be carried out safely and routinely. For dangerous spills, clean up should be carried out by designated, specially trained personnel. Please refer to laboratory staff in-charge.



2. All spills shall be cleared and disinfected immediately. The laboratory management is responsible to arrange for cleaning and disinfecting spills done to the waste generated by their own laboratory. Please report any spills immediately.

If you need to dispose of Biohazard waste please refer Biohazard Waste Disposal Committee staff:

Name	Ext. number
Mrs. Che Gayah Omar	4736
Mr. Fisal Jamaludin	4713
Mrs. Nuridah Ahamed	4736
Mrs. Salida Ibrahim	2234

To dispose of autoclave waste please contact:

Name	Ext. number
Mr. Amiruddin Mat Jalil	2231



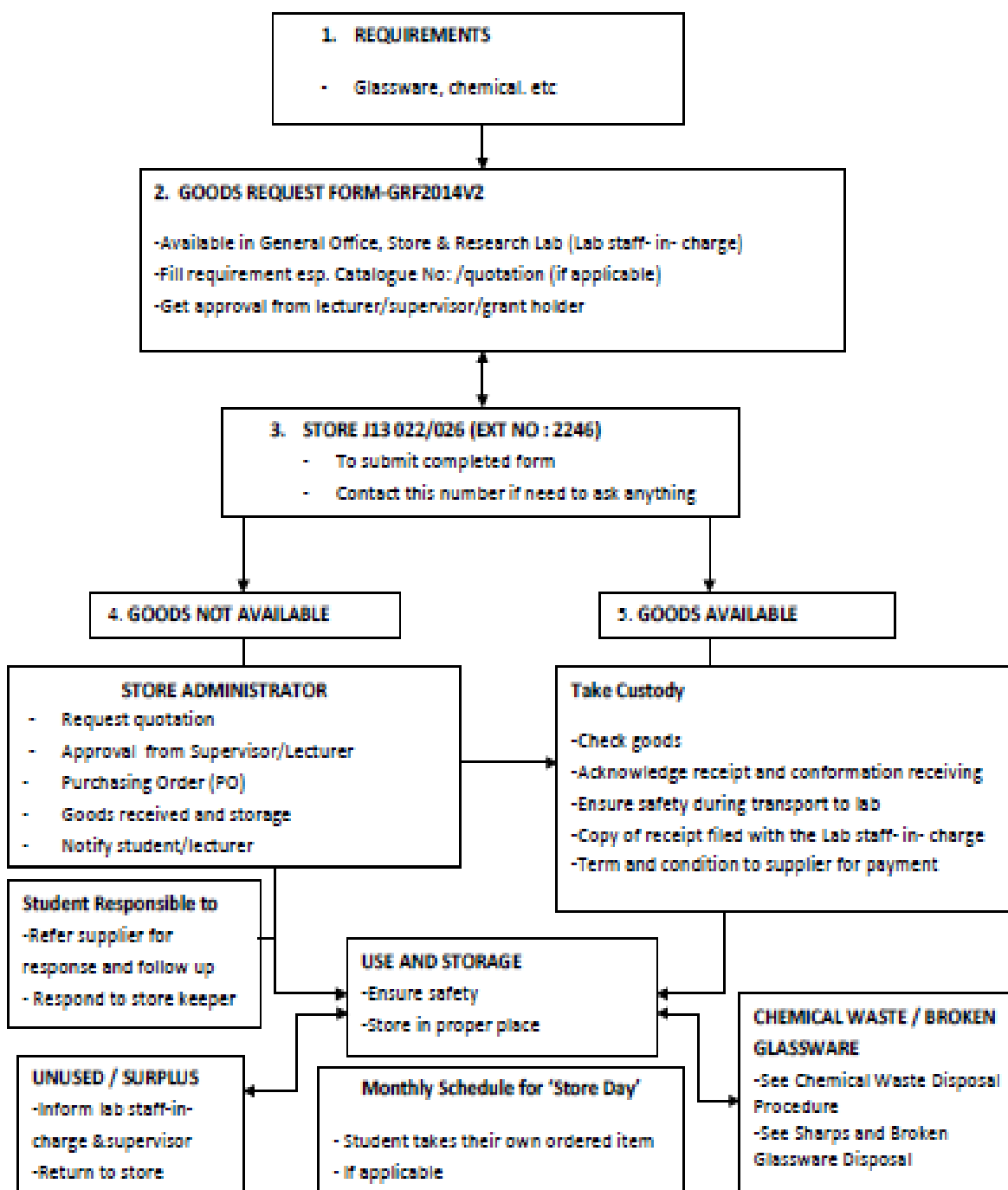
2.0 LABORATORY FACILITIES

2.1 PROCEDURES FOR LABORATORY SUPPLIES REQUEST

2.2 PROCEDURES FOR USE OF EQUIPMENT

2.3 COMPUTER, INTERNET AND CAI LABORATORY

2.1 Procedure for Laboratory Supplies Request





PUSAT PENGAJIAN SAINS FARMASI
SCHOOL OF PHARMACETICAL SCIENCES

PURCHASING APPLICATION FORM

REFERENCE NO:

P.O/Q-FORM:

DATE:

NO	DESCRIPTION	CAT. NO.	QUANTITY	PRICE (RM)/UNIT	TOTAL (RM)

* attach another file if not enough space.

APPLICANT'S NAME:

DISCIPLINE:

PHONE/EXT. NO:

EMAIL:

APPROVAL BY PROJECT LEADER/SUPERVISOR

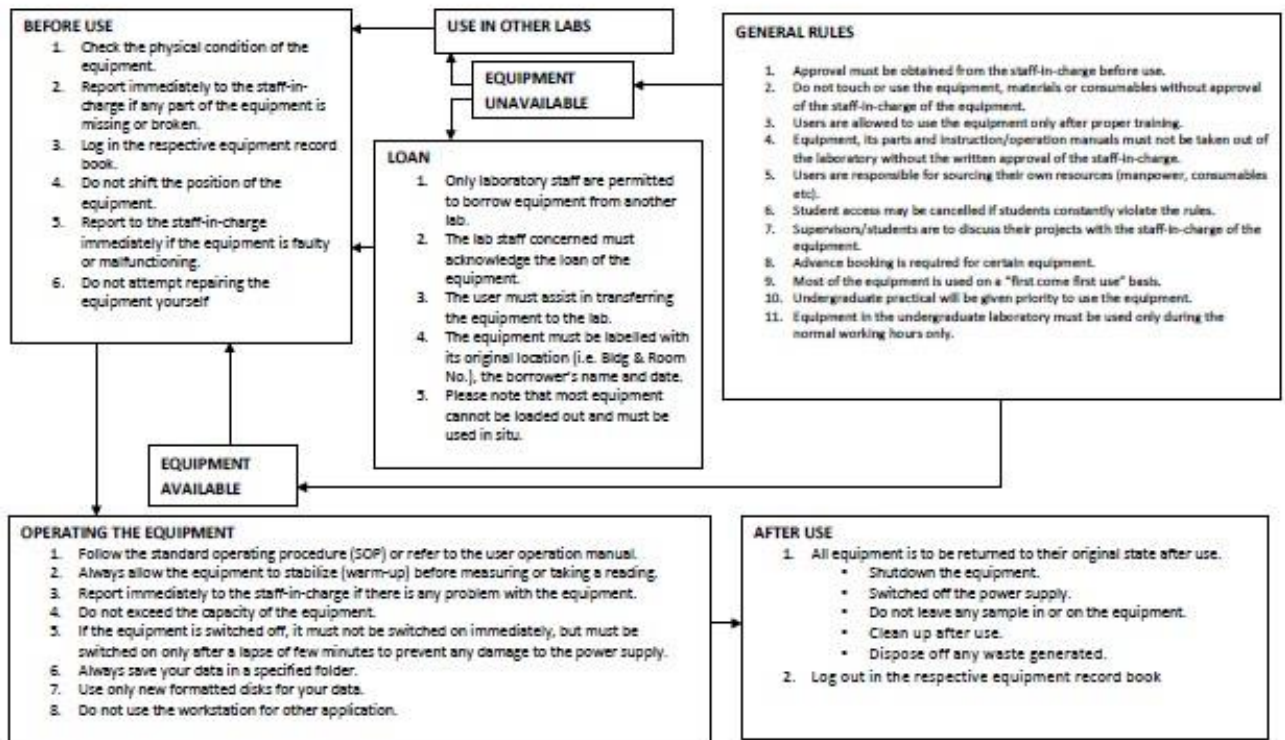
NAME:

EXT NO:

Grant No:

SIGNATURE:

2.2 Procedures For Use Of Equipment





2.3 Computer, Internet And Computer Aided Instruction (CAI) Laboratory

The computer laboratory is located on 2nd floor of Block J12

Person-in-charge:

- | | |
|--------------------------------|------------|
| 1. Mrs. Noor Sima Shaik Daud | Ext.: 2161 |
| 2. Mr. Santhus Stanley Francis | Ext.: 5007 |

RULES AND REGULATIONS FOR THE USE OF THE CAI LABORATORY AFTER OFFICE HOURS.

1. The CAI laboratory will be open from 6 - 10 pm, Monday to Friday except public holidays.
2. The CAI laboratory will be closed after office hours during the semester break.
3. The CAI laboratory is ONLY meant for the undergraduate and postgraduate pharmacy students.
4. Each user must present his/her student ID to the technician on the duty before entering the CAI laboratory.
5. Each user must record his/her particulars in the CAI Evening Record Book when using the CAI laboratory facilities.
6. The maximum allowable usage time person is one hour, unless no other user is waiting in line.
7. Printing service is provided here. Minimum charge as low as 5 cents per page is imposed. The printing paper is to be supplied by the individual user. All printouts are to be shown to the technician on duty for payment purposes.
8. Neither eating nor drinking is allowed in the CAI laboratory.
9. Unauthorized individuals are not allowed to enter the CAI Laboratory.





3.0 GRADUATING AND LEAVING THE LABORATORY

3.1 CLEARANCE PROCEDURE

3.2 LABORATORY CLEARANCE FORM



3.0 Graduating and Leaving the Laboratory

3.1 Clearance Procedure

The School of Pharmaceutical Sciences requires that when postgraduate students or researchers leave, all chemicals, glassware, animal house supplies or other potentially hazardous material or equipment, must be cleaned and returned or disposed of properly by them. Later users of a laboratory should never be left with a legacy of abandoned and potentially hazardous material or equipment.

The Head of Department/Dean will not allow Theses to be processed to *viva* without a completed and fully signed copy of the Laboratory Clearance Form (CF2014v3).

The following procedures are to be followed by anyone completing laboratory research work in the School of Pharmaceutical Sciences from undergraduates involved in projects to major research groups.

1. Chemicals & Natural Products

- Ensure that all containers of chemicals are labelled with their chemical name (not just a sample code) and are securely closed.
- Extracts or purified products are labelled with sample code/name, researchers and supervisor's name, date and are securely closed. Extracts or purified products must be stored in bottles or vials and not in flasks, beakers, evaporating dishes or crucibles.
- Empty and clean and, if necessary, return to Laboratory staff in-charge/Store all beakers, flasks and other glassware.
- Check refrigerators, freezers, fume hoods and bench tops as well as cupboards for chemicals and natural products. Give particular attention to shared storage areas.
- If chemicals, extracts or natural products are useful, then responsibility for them can be transferred to another person who is willing to accept the responsibility and who has indicated such willingness in writing. If no such person can be found, dispose of the material in the proper way.
- Prepare for disposal all chemicals that are not to be removed or that are not accepted by another person. Detailed instructions for this are given here and in Chemical Waste Management & Disposal Procedure which is included in the code of Practice of the University Safety Office. Approved containers are available from the Laboratory staff in-charge and if the quantity of chemicals, extracts or natural products to be cleared is large, contact Mr. Roseli Hassan (ext. 2253) at an early stage. The process of disposal can take some time so begin the procedure some weeks before



departure from the laboratory. Complete the actual removal of the chemicals before the laboratory is vacated.

- Clean and tidy up your work area.
- Complete the Clearance Check List including the appropriate signatures.
- Inform your Research Supervisor and/or the Head of Section when the laboratory has been cleared and record his/her approval.

2. Microorganisms, Cultures and Blood Products

- Ensure that all containers of microorganisms are properly labelled and secure.
- Decontaminate waste material by autoclaving and dispose of properly. Refer to the University Code of Practice “Biological Safety and Genetic Modification”.
- Clean glassware, incubators, drying or curing ovens, refrigerators and freezers.
- If samples are to be kept, then responsibility for them can be transferred to another person who is willing to accept the responsibility and who has indicated such willingness in writing. If no such person can be found, dispose the material in the proper way.
- Clean and tidy up your work area including the removal of any redundant biohazard signs.
- Complete the Clearance Check List including the appropriate signatures.
- Inform your Research Supervisor and/or Head of Section when the laboratory has been cleared and record his/her approval.

3. Animal House Supplies

- Ensure that all experimental animals, used or unused are returned to the Animal House.
- Surplus animal feed and bedding materials that are in good condition are to be returned to the Animal House.
- Empty and clean all cages, animal holders, water feeding bottles and other animal house supplies and return them to the Laboratory staff-in-charge of the Animal House.
- Check refrigerators and freezers, for stored animal tissue, organs or carcass. Give particular attention to shared storage areas.
- If preserved animal tissue, organs or carcass are useful, then responsibility for them can be transferred to another person who is willing to accept the responsibility and who has indicated such willingness in writing. If no such person can be found, dispose of the material in the proper way.
- Prepare for disposal all animal tissue, organs or carcass that are not to be removed or that are not accepted by another person. Detailed instructions for this are available from the Laboratory staff-in-charge of the



Pharmacology/Physiology Laboratory or contact Mr. Roseli Hassan (ext. 2253).

- Clean and tidy up your work area.
- Complete the Clearance Laboratory Check List Form including the appropriate signatures.
- Inform your Research Supervisor and/or the Head of Section when the laboratory has been cleared and record his/her approval.

4. Radioactive Material

- In normal operation, radioactive materials are carefully recorded and disposed of regularly. Carefully label and make secure any remaining material e.g. stock vials, sealed sources etc. Ensure that each item has an associated Stock Card. If it does not have, start one.
- Dispose of waste material according to the procedures outlined in the University Code of Practice "Work with Ionizing Radiation". Advice and assistance can be obtained from the University Occupational Safety & Health Unit. As radioactive materials are disposed, the Stock Cards must be signed off and sent to the University Occupational Safety & Health Unit.
- If samples are to be kept, then responsible person must be stated clearly in written document. If no such person can be found, please dispose the material in the proper way. Record such transfers and disposals on the appropriate Stock Card.
- It is essentially important that radioactive material is not abandoned by departing research groups. This can have serious and costly consequences. If material is to be left, inform the University Occupational Safety & Health Unit in writing and obtain their permission to do so also in writing.
- Check contamination and if necessary decontaminate, clean and tidy up the work area. Where significant activities have been held and used and the laboratory is to revert to non-radioactive use, the University Radiation Protection Adviser must confirm in the writing that the laboratory has been adequately cleared and decontaminated.
- Complete the Clearance Check List including the appropriate signatures.
- Inform your Research Supervisor and/or Head of Section when the laboratory has been cleared and record his/her approval.

5. Mixed Hazard

- For mixed hazard i.e. involving more than one of chemical, radioactive or biological materials apply all of the appropriate signatures.
- Complete the Clearance Check List including the appropriate signatures.
- Inform your Research Supervisor and/or Head of Section when the laboratory has been cleared and record his/her approval.

3.2 Laboratory Clearance Form

CF2014v3

LABORATORY CLEARANCE FORM SCHOOL OF PHARMACEUTICAL SCIENCES



Name of Researcher/Post Graduate: _____
 Email address : _____
 Contact number: _____
 Matric number: _____

Office use

No.	Laboratory Name	Block/ Room no.	Name of Lab staff-in-charge	Name of Supervisor/ Co- supervisor
1.				
2.				
3.				
4.				
5.				
6.				

Staff
confirmation

PROCEDURE FOR LAB CLEARANCE

Post-Grad check list

Staff check list

A. Chemical & Natural Products

1.	Return all borrowed items to all labs	
2.	Search out and evaluate all chemicals and label all containers	
3.	Prepare chemicals or microbiological wastes for disposal	
4.	Clean glasswares, refrigerators, oven and etc.	
5.	Clean working area	
6.	Transfer responsibility for material to:	

Name of Lab staff-in-charge: _____

Signed: _____

B. Radioactive Material (relevant/not relevant)*

1.	Label and secure material	
2.	Dispose all radioactive wastes	
3.	Transfer responsibility for material to:	

Name of Lab Staff-in-charge: _____

Signed: _____

		Office use
<u>Post-Grad check list</u>		<u>Staff check list</u>
C. Microorganisms, Cultures & Blood products (relevant/not relevant)*		
1.	Label and secure material	
2.	Autoclave wastes	
3.	Clean glasswares	
4.	Clean incubators and oven	
5.	Clean refrigerators	
6.	Transfer responsibility for material to:	
Name of Lab staff-In-charge: _____		
Signed: _____		
D. Anima Research and Service Centre (ARASC) Supplies (relevant/not relevant)*		
1.	Clean cages, animal holders, drinking bottles and return	
2.	Clean working area	
3.	Transfer responsibility for material to:	
Name of Lab staff-In-charge: _____		
Signed: _____		
E. Equipment and Keys (relevant/not relevant)*		
1.	Return equipment or apparatus loaned from other sections or labs	
2.	Update loan records and stock cards	
3.	Return keys to the person In-charge	
Name of Lab staff-In-charge: _____		
Signed: _____		
Signature of Researcher/Post Graduate : _____		
Date : _____		



Signature of Researcher Supervisor : _____
Name : _____
Date : _____

Signature of Co-Supervisor : _____
Name : _____
Date : _____

Comment:

~~*Delete the unnecessary~~
~~All clearing procedures have been completed~~

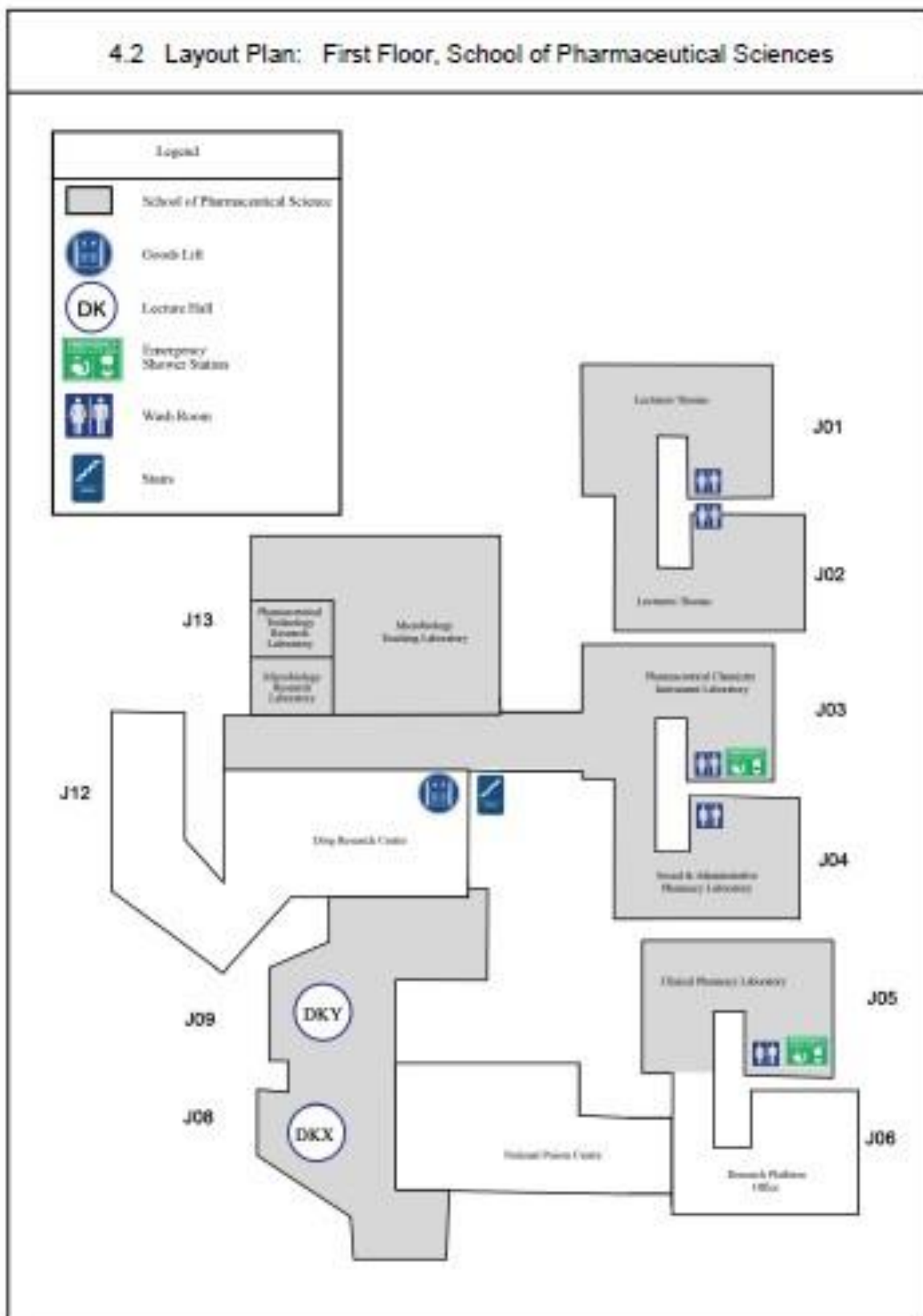
**A COPY OF THIS FORM COMPLETED AND SIGNED SHOULD BE RETURNED
WITH YOUR FINAL THESIS**

4.0 LOCATION OF OFFICE, LABORATORIES, LECTURE HALLS, CAFETERIA AND OTHER FACILITIES

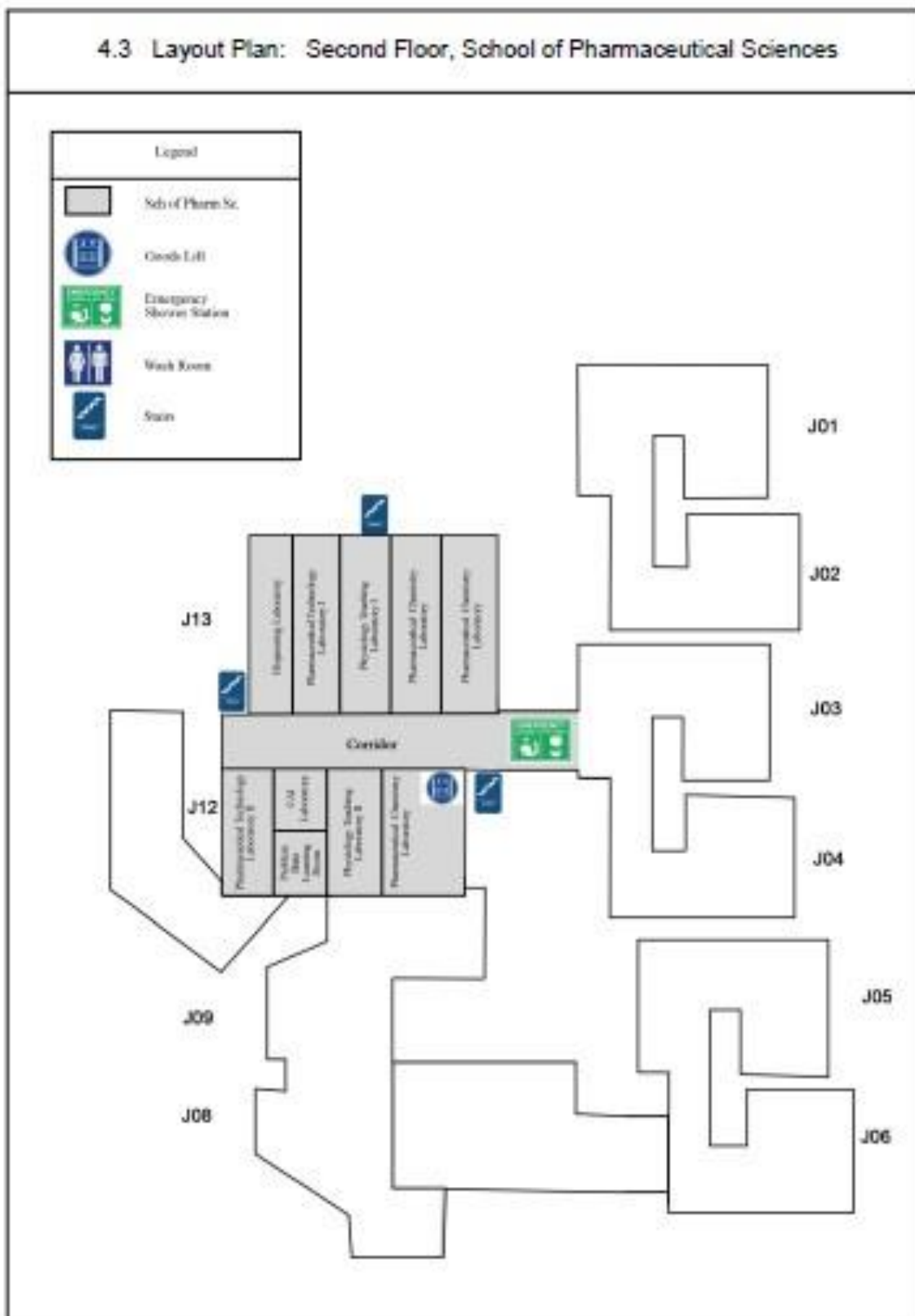
- 4.1 Layout Plan of Ground Floor
- 4.2 Layout Plan of First Floor
- 4.3 Layout Plan of Second Floor

4.1 Layout Plan: Ground Floor, School of Pharmaceutical Sciences

4.2 Layout Plan: First Floor, School of Pharmaceutical Sciences



4.3 Layout Plan: Second Floor, School of Pharmaceutical Sciences





5.0 HUMAN ETHICS & ANIMAL ETHICS



❖ Human Ethics

Research involving human subjects requires prior ethics review and approval by Ethics Committee.

- A human subject (in the context of research) is a living individual about whom an investigator obtains either data through
 - o intervention (e.g. Clinical trial) or
 - o interaction (e.g. Questionnaire in health survey) with the individual, or
 - o identifiable private information.

For students from the School of Pharmaceutical Sciences, Universiti Sains Malaysia (USM);

1. If the study involves USM grants and clinical researchers from USM, approval from JEPeM USM (Jawatan Kuasa Etika Penyelidikan Malaysia) has to be obtained prior to commencement of study:

<http://www.jepem.kk.usm.my/>

2. If the study involves Ministry Of Health Malaysia approval from MREC (Medical Research Ethics Committee) has to be obtained prior to commencement of study:

<http://nih.gov.my/web/mrec/>

3. If the study does not involve 1 nor 2, then approval may be obtained from Joint Ethics Committee of School of Pharmaceutical Sciences USM-Hospital Lam Wah Ee:

<http://usmhlwe.wix.com/jecusmhlwe>

For further information regarding Clinical Research In Malaysia (CRM), you may browse this website:

<http://www.clinicalresearch.my/>

❖ Animal Ethics

Any research involving animal subject requires prior ethic review and approval by ethics committee, please refer this website:

The Animal Research Ethics Committee of USM (JEHUSM)

<http://www.research.usm.my/default.asp?tag=10&f=1&k=1>

To dispose of the death bodies of animals, please contact:

Mr. Roseli Hassan (ext. no.: 2253)