KULLIYYAH OF SCIENCE

LABORATORY MANAGEMENT HANDBOOK

1.0 INTRODUCTION

Kulliyyah of Science consists of 7 departments, and a research station;

- Department of Biotechnology,
- Department of Physics,
- Department of Chemistry,
- Department of Computational and Theoretical Sciences,
- Department of Plant Science,
- Department of Marine Science,
- Department of Central Research & Animal Facility (CREAM) and;
- Institute of Oceanography and Maritime Studies (INOCEM) Research Station

Laboratory Management is a sub organization under Kulliyyah of Science which provides services mainly to the students in terms of practical learning process.

The Laboratory Management consisting of Head of Laboratory (HOL), Science Officers (SO) and Assistant Science Officers (ASO) are the key personnel assisting lecturers and students in laboratory practical classes and research works.

Laboratory Management staff are experience analytical instrument operators and possess vast knowledge in various research methodologies.

Laboratory Management is currently heading towards Health, Safety and Environmental Management System (HSEMS) certifications.

HSEMS provides the framework to allow Laboratory Management to achieve zero incidents, injuries, illnesses and property damage. In addition, by following the principles of operating excellence, Laboratory Management will minimize the potential impact to the environment.

Attachment A: Laboratory Management Organization Chart

2.0 PURPOSE

The purpose of this handbook is to serve as a general guideline to all laboratory users when dealing with Laboratory Management,

Contents of this handbook mainly emphasize on the direction of Laboratory Management through administration control to reduce the risk elements associate with safety, health and environment when involving activities related to the laboratory.

It is also intended to generally brief laboratory users on criteria related to HSEMS adopted at certain area in Kulliyyah of Science.

3.0 SCOPE

Laboratory Management rules, regulations, procedures and existing guideline are applied to laboratories personnel, lecturers, students and any other involve parties when dealing with laboratory staff or utilizing facilities at Kulliyyah of Science laboratories.

4.0 GENERAL RULES

4.1 Operational Hours and Common Rules

Operational Hours

During weekdays, laboratory normal operation hours are;

Day	Operation Hours
Monday - Thursday	0800 hour – 1300 hour 1400 hour – 1700 hour
Friday	0800 hour – 1215 hour 1445 hour – 1700 hour

Laboratory will be closed during weekends and on public holidays.

It is understandable that the nature of research activity may require working beyond normal office working hour.

Any other requirements to facilitate either laboratory facilities or staff beyond normal working hours or during weekends / public holiday require further approval from the relevant personnel.

Common Rules

Laboratory safety and health depend mostly on laboratory user. Efforts have been made to address situations that may pose a hazard in the laboratory but the information and instructions provided cannot be considered all-inclusive.

Good common sense is needed for safety in a laboratory. It is expected that each laboratory user will work in a responsible manner and exercise good judgement and common sense.

At any time if users are not sure how to handle a particular situation, always seek further clarification from laboratory staff.

Wearing laboratory coat with fully covered shoes is mandatory when entering the laboratory. Long hair, dangling jewelry, and loose or baggy clothing are a hazard in the laboratory. Long hair must be tied back, and dangling jewelry and baggy clothing must be secured.

Foods and drinks are strictly not allowed to be brought into the laboratory.

The usage of mobile phone while working in the laboratory is not encouraged by Laboratory Management. The act may lead to incident occurrence due to the possibility of distraction of user's attention on the present hazard in the laboratory.

4.2 Laboratory Access

Laboratory is considered as an area where accidents could take place easily based on high risk routine activities conducted there. It has become necessary for Laboratory Management to control and monitor access into the laboratory.

Laboratory can be accessed only by authorized personnel, who have been granted an access card. Laboratory usage will be monitored using centralized automatic log in/log out access door system data.

Authorized personnel will be given sufficient information on Laboratory Management where he/she is reliable towards adherence of laboratory rules and regulations.

It is considered as a serious offence when accessing the laboratory without official authorization. The Laboratory Management shall not be liable for any claims in the event of any untoward incident to unauthorized laboratory user.

Each issued access card from Laboratory Management is solely to be used by those particular approved requester.

Any abuse of the access card as outlined will cause the feasibility of using the laboratory by the offender to be reviewed and appropriate action will be taken.

Currently, laboratories main users are categorized into 3;

User Category	Access Category
Lecturers & Staff	Unlimited Area and Occasion
Post Graduate Student	Limited Area, Unlimited Occasion
Under Graduate Student	Limited Area and Occasion

Users from other kulliyyah (lecturer/student) are not allowed to utilize any laboratory prior to approval from the Dean Kulliyyah of Science.

4.3 Instrumentation

Utilization Consensus

Prior to utilizing any instrument available at Kulliyyah of Science, consensus from the custodian of the instrument is required.

No person shall operate any instrument without sufficient knowledge. It is always best practice to seek help from the instrument operator pertaining relevant information of the instrument's operational procedures prior to use the instrument.

Only competent person is allowed to operate certain high end instruments.

High risk instruments or machines such as autoclave, and air compressor are only to be operated by well trained staff. Early arrangement is required between the user and operator to avoid any inconvenient situation.

Instrument Handling

It is a part of user responsibility to cautiously handle and operate each instrument according to manufacturer's manual or other provided internal procedures.

Appropriate instrument handling and maintenance not only benefits in terms of safety matters, but also help to maintain instrument reliability of analytical integrity.

Instrument Failure

For any instrument failure, user shall notify immediately to laboratory staff. User shall never attempt to fix the problem because it possibly could harm user and others.

Instrument Location

Neither instrument shall be removed nor taken out from its initial pre determined location unless officially been agreed by the current instrument custodian and Head of Laboratory (HOL).

Service Charge

Service charges are imposed on several selected instruments utilization within Kulliyyah of Science. (Attachment B: Instrument Utilization and Laboratory Services Charging Rate)

4.4 Facilities, Chemicals, Consumables, Glassware and Other Request / Booking

In general, Kulliyyah of Science will provide all teaching and learning materials related to the laboratory activities, including chemicals, consumables, glasswares and basic facilities especially for registered Undergraduate Students - Final Year Project (FYP).

Facilities Booking

In order to use facility such as Greenhouse Nursery Complex (GNC), arrangement through Science Officer is needed prior to utilization.

Research Laboratory Facilities currently are not within Laboratory Management provision. Access to these Research Laboratories is usually controlled by the respective principle researcher. Anyhow, relevant rules and guidelines which have been stipulated in this handbook shall not be breached at any times while working at each research laboratory.

Chemicals, Consumables and Glassware Request

Request should be made in advance by the FYP students or their project supervisors to Laboratory Management for further arrangement.

It is advisable for the FYP students, together the project supervisors to plan their research needs and requirements as to align with the current facilities and available resources at laboratories.

In the event where further procurement processes are needed (e.g. requested items out of stock), it is advisable to submit any request 3 months in advance.

Post Graduate students are not eligible to utilize teaching materials (chemicals, consumables, glassware) provided by Laboratory Management as usually the enrollment of post graduate students are based on academician's research fund/grant.

However, utilization of instruments available at Kulliyyah of Science is allowed for Post Graduate Students when certain terms and conditions are agreed between both parties.

Clearance Form

Undergraduate students (FYP) and Post Graduate Students are required to submit Clearance Form once laboratory work is done (together with thesis submission). Clearance Form needs the signatories of relevant laboratory person in charge where upon his/her satisfaction that those students have taken the necessarily actions clearing all their research work leftover at their respective laboratory working area.

4.5 Field Sampling / Out Campus Teaching Activities

Teaching and learning process usually requires hands on activities which will take place outside the campus perimeter.

Although the activities will be conducted outside the campus, frequently, involvement of laboratory staff, instruments and facilities utilization will be necessary.

In such cases, safety matter will always become the first priority to the Laboratory Management.

Official request needs to be submitted to HOL for each Field Sampling / Out Campus Teaching Activities together with all the needs and requirements list for such occasion for further arrangements.

Each participant (staff and student) involved during the activity, must ensure safety measures are followed at all times.

Laboratory Management will assume that each involved party (organizer) is aware with regards to safety matters. All pre determine hazards and risks associate to each planned activity should be taken into consideration.

It is also important to ensure, each instrument/facility used during the activities, will remain intact, handled in appropriate manner and well maintained throughout the process.

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4.6 General Good Laboratory Practice (GLP)

As part of integrating quality element in Laboratory Management, it is essential to each laboratory user at all times, without compromise to follow all available procedures in order to achieve university's quality objectives.

In general, GLP helps Laboratory Management in ensuring the uniformity, consistency, reliability, reproducibility, quality, and integrity of research analytical testing.

Laboratory Management is committed for continuous improvement subject to quality management.

Should there is any complaint from laboratory users which will lead to the deviation from the university quality objectives, the users could lodge the complaint to Laboratory Management for corrective action to be taken.

4.7 Laboratory Housekeeping

In general, all laboratory users should;

- ensure that the floors to be free of hazards. Never discarded objects, dropped objects, or spilled material on the floor.
- always keep tables, chemical hoods, floors, aisles, and desks clear of all material that are not being used.
- be aware of two clear passageways to exits.
- ensure that a clear space around safety showers or eyewashes, fire extinguishers, and electrical controls.
- ensure that any frequently used bench apparatus to be kept well away from any edges and secured whenever possible.
- Clean the work areas upon completion of an experiment or at the end of each day.
- ensure the bench tops and bench liners are free of visible contamination.
- reduce the risk of slips, trips, and falls by cleaning up liquid or solid spills immediately, keeping doors and drawers closed and passageways clear of obstructions.
- ensure the sharp or pointed tools are properly sheathed or stored.
- hang any clothing in proper locations and not draped over equipment or benches.
- keep the less commonly used equipment in storage.
- not store chemical containers on the floor/fume hood.
- not store excess cardboard boxes, equipment boxes, Styrofoam, etc. under lab benches, on shelves, or above shelves/cabinets throughout the lab. This can be a safety as well as a fire hazard.
- put away clean glasswares that are not being used. Avoid accumulating large amounts of dirty dishes on lab benches and by sinks. Clean them when your experiment is done. Never leave glasswares in the sink because it can easily break.
- regularly check glasswares for star cracks, chips, or cracks, and promptly discard or repair any unsafe glassware.
- discard disposable pipettes and pipette tips immediately after use.
- properly secure and label all containers of chemicals/experimental intermediates.

Upon completion of laboratory work, Laboratory Management will ensure each working area is cleaned and all other materials (glassware, unused consumables and excess chemicals) are returned accordingly.

5.0 GENERAL HEALTH, SAFETY AND ENVIRONMENTAL MANAGEMENT SYSTEM

Laboratory users are exposed to variety of hazards that may affect their health and safety. Awareness of occupational health and safety (OHS) is important in an organization to prevent occupational injuries and diseases at workplace.

Occupational Health and Safety Management System implemented at Kulliyyah of Science is based on BS OHSAS 18001:2007 standards.

The model for the OHSAS standard basically includes;

- OHS Policy
- Planning
- Implementation and Operation
- Checking and Corrective Action
- Management Review
- Continual Improvement

This standard is based on methodology known as **Plan-Do-Check-Act** (PDCA). PDCA can be briefly described as follows;

Plan: establish the objectives and processes necessary to deliver results in accordance with the organization's OH&S policy

Do: implement the processes

Check: monitor and measure processes against OH&S policy, objectives, legal and other requirements and report the results

Act: take actions to continually improve OH&S performance

5.1 Kulliyyah of Science HSE Policy

The HSE policy statement is the foundation of the HSE objectives, targets and plan. This statement can be the driving or destructive force for the entire HSE plan.

It is imperative that the statement to be approved by the IIUM's top officials and disseminated to entire IIUM.

Without such a commitment, the HSE plan may just be compromised by any opposing viewpoint of any lower tier manager.

The policy statement must be seen as a policy of the entire organization and not just of the HSE person, the human resource department, or any individual.

Under the requirements of the Occupational Safety and Health Act of 1994, it is the duty of every employer and every self employed person to prepare and as often as may be appropriate, revise any written statement with respect to the safety and health of his employees and organization as a whole including necessary arrangements to ensure the implementation of any safety and health provisions and to bring the statement and any revision of it to the notice of all employees

Environment Management is also part of Laboratory Management main agenda in order to maintain sustainable environment throughout the Kulliyyah of Science.

Standard used for managing Environmental Management at Kulliyyah of Science is MS ISO 14001:2004

Any laboratory activities which could lead to environmental pollutions and depletion of natural resources are systematically managed.

Kulliyyah of Science Health Safety and Environmental Policy

The Kulliyyah of Science has the vision to be a world class centre of science education and research with values and ethics. We shall provide and maintain a safe, healthy and clean working environment.
We are fully committed towards:

a) Compliance with applicable legal and other requirements.
b) Prevention of human injury, ill health environmental pollution and properties damaged.
c) Continual improvement in HSE management and performance.
d) Providing adequate resources, facilities and equipment for staff members, students and related personnel.
e) Providing sufficient information, instruction, training and supervision.
f) Awareness of HSE obligations.
g) Effective waste management.

ASSOC. PROF. DR. SHAFIDA ABD HAMID
Acting Dean
Kulliyyah of Science
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(1 August 2017)

5.2 HSE Objectives, Targets and Programme(s)

Objectives	Targets
To comply and maintain OSH legal and other requirements	100% compliance on relevant OSH legal and other requirements
To promote HSE activities for all relevant parties	90% participant of relevant parties
To prevent occupational injury	Zero Lost Time Injury (LTI)
To prevent occupational illness	Zero Lost Time Illness
To prevent environmental pollution	100% compliance on relevant environmental legal and other requirements

6.0 HEALTH AND SAFETY MANAGEMENT

6.1 Risk Management (HIRADC)

Hazard Identification, Risk Assessment and Determination Control (HIRADC)

Hazard identification and control are at the heart of the loss-control effort. According to BS OHSAS 18001:2007, hazard means source, situation, or act with a potential for harm in term of human injury or ill health, or a combination of these.

Meanwhile, risk means combination of the likelihood of an occurrence of a hazardous event or exposure(s) and the severity of injury or ill health that can caused by the event or exposure(s)

The methodology for hazard identification and risk assessment shall be defined with it respect to its scope, nature and timing to ensure it is proactive rather than reactive.

The procedure for identification of hazards and assessment of risk shall take into account;

- Routine and non routine (e.g. periodic, occasional or emergency) activities and situations
- Activities of all persons having access to the work place (e.g. customers, subcontractors, service contractors, visitor, delivery staff, staff and students.
- Human behavior, capabilities and other factors (the nature of the job, the environment, psychological capabilities)

Hazard identification should consider the different types of hazards in the workplace i.e. physical, chemical, biological, ergonomics and psychosocial

List of Possible Hazard

Hazards Type	Hazard
Physical	Slippery or uneven ground leading to slip or falls
	Work at heights, leading to falls
	Objects falling from heights leading to impacts on passers-by
	Inadequate space of work
Chemical	Inhalation (such as carbon monoxide); the hazard will be directly linked to the amount inhaled
	Contact with, or being absorbed through the body (such acids); the hazard will be linked directly to the strength and amount of an acid
	Ingestion (i.e. entering the body via the mouth
Biological	Biological agents such as bacteria or viruses that might be; • inhaled • transmitted via contact with bodily fluids (including needle prick injuries) • ingested, e.g. via contaminated food products
Ergonomic	Repetitive movement while handling bold and nuts
	Manual lifting heavy load
	Uncomfortable workstation height and poor body positioning
	Awkward movements, especially if they are repetitive
Psychosocial	Stress due to excessive workload, lack of communication or control
	Stress due to physical violence, bullying, or intimidation within workplace
	Post- traumatic stress due to an involvement in a major incident
	Sexual harassment at workplace

6.2 Legal and Other Requirements

Occupational health and safety is not the responsibility of the person but the responsibility of all. To ensure a formal and formal joint venture took place between the employer, employee management and organization at the highest level, the need has been provided for in the law.

Common Legal Requirements
Occupational Safety and Health Act 1994
Occupational Safety and Health (Safety and Health Committee) Regulations, 1996
Occupational Safety and Health (Prohibition of Use of Substance) Order, 1999
Occupational Safety and Health (Use and Standards of Exposure of Chemical Hazardous to Health) Regulations, 2000
Occupational Safety and Health (Notification of Accident, Dangerous Occurrence, Occupational Poisoning and Occupational Disease) Regulations, 2004
Occupational Safety and Health (Classification, Labeling and Safety Data Sheet of Hazardous Chemicals) Regulations, 2013
Factories and Machinery Act 1967
Factories and Machinery (Steam Boiler and Unfired Pressure Vessel) Regulations, 1970
Factories and Machinery (Fencing of Machinery and Safety) Regulations, 1970
Factories and Machinery (Safety, Health and Welfare) Regulations, 1970
Factories and Machinery (Notification, Certificate of Fitness and Inspection) Regulations, 1970
Factories and Machinery (Person In-Charge) Regulations, 1970
Factories and Machinery (Building Operations and Works of Engineering Construction) (Safety) Regulations, 1986
Factories and Machinery (Electric Passenger and Goods Lift) Regulations, 1970
Factories and Machinery (Noise Exposure) Regulations, 1989

6.3 Operational Control

6.3.1 Chemical Management

Chemical usage has been determined as the main hazard presence at Kulliyyah of Science. As part of administration control, Chemical Management becomes one of vital element to control all identified significant risk while dealing with chemicals.

It always becomes laboratory user responsibility when handling any activity involving chemical usage in the laboratory as per requirements.

Any usage of chemicals hazardous to health mainly required to abide;

- *Occupational Safety and Health (Use and Standards of Exposure of Chemicals Hazardous to Health) Regulations 2000 and;*
- *Occupational Safety and Health (Classification, Labelling and Safety Data Sheet of Hazardous Chemicals) Regulations 2013*

Prior to any use of chemical, to begin with, user should always refer to the Safety Data Sheet (SDS) to utterly understand all significant hazard and risk associated to the chemicals.

In general, SDS will provide all the information with regards to hazards of the product, how to use the product safely, what to expect if the recommendations are not followed, how to recognize symptoms of exposure, and what to do if emergencies occur.

6.3.2. Personnel Protective Equipment (PPE)

Personal protective equipment, commonly referred to as "PPE" is an equipment worn to minimize exposure to hazards that can cause serious workplace injuries and illnesses. These injuries and illnesses may result from contact with chemical, physical, electrical, mechanical, or other workplace hazards.

It is responsible for every laboratory user at any time to wear appropriate PPE when working in the laboratory. Additional PPE to be worn

depends on activities being conducted by the specific user. Usually, the type of PPE to be used has been determined earlier during risk assessment process.

For instance, when handling corrosive chemical, appropriate nitrile glove and safety goggle should be worn. Other consideration to bear in mind is when handling volatile chemicals which should always be done in provided fume hood.

Some of used disposable PPE (latex glove, nitrile glove) may be considered as a scheduled waste which should be disposed according to the existing legal, regulations and procedures.

6.4. Incident Investigation

All incidents need to be investigated and reported. According to BS OHSAS 18001:2007, an accident is work related event(s) in which an injury or ill health (regardless of severity) or fatality occurred, or could be occurred (near miss).

Incident shall be reported using standard provided Incident Notification Form within 24 hours of occurrence.

6.5 Emergency Preparedness and Response

One of critical element in risk assessment is the capability of managing people during all possible emergency situations.

Through briefings, notice, signage and assessment, by all means, approved laboratory users are expected to know all the locations of nearest;

- Assembly Point / Fastest Escape Route
- Fire Extinguisher / Fire Blanket
- Emergency Shower / Eye Wash
- Chemical Spillage Kit
- First Aid Box and
- Emergency Button / Fire Alarm

when facing any emergency situations.

Immediate necessary action taken by first responder may reduce the risk impact associate with the specific emergency occurrence.

In any emergency case, before aiding others in needs, priority is to ensure your own safety first before proceeding with helping others.

Laboratory users shall always keep the emergency contact numbers at all times.

IIUM Kuantan Campus
Emergency Contact Numbers

Department	Contact No.
General Emergency Number	999
IIUM Kuantan Security	09 – 570 4170 09 - 570 5555
IIUM Kuantan Primary Care Clinic (PCC)	09 - 570 4444
Police (IPD Kuantan)	09 - 513 2222 09 - 513 2512
Bomba (Indera Mahkota)	09 - 573 9994
General Hospital (HTAA)	09 - 513 3333 09 - 513 3334

7.0 ENVIRONMENTAL MANAGEMENT

7.1 Risk Management (EAIIEDC)

Environmental Aspect Identification, Impact Evaluation and Determining Control (EAIIEDC)

Identification and evaluation of significant environmental aspects, especially in the planning phase, is the most fundamental part of MS ISO 14001:2004.

To understand the environmental aspects and impacts is one of the key success factors of implementing an MS ISO 14001:2004.

In the language of ISO 14001:2004, "an environmental aspect is an element of an IIUM's activities, products, or services that has or may have an impact on the environment."

What exactly is an environmental aspect?

An environmental aspect is the way your activity, service, or product impacts the environment. For example, one of the environmental aspects of car washing may be a cleaning agent that has potential for water pollution (this pollution is the environmental impact).

Example List of Possible Activities/Services, Environment Aspect and Impact

Activity / Service	Environmental Aspect	Environmental Impact
Car washing	Cleaning agent in wastewater	Potential water pollution
	Use of water	Impact to natural resources
Heating substance	Emission from boiler	Air pollution
Storage of chemicals	Potential leakage and spill	Contamination of soil

7.2 Legal and Other Requirements

Common Legal Requirements
Environmental Quality Act, 1974
Environmental Quality (Licensing) Regulations, 1977
Environmental Quality (Compounding Offences) Rules, 1978
Environmental Quality (Clean Air) Regulations, 2014
Environmental Quality (Scheduled Waste) Regulations, 2005
Environmental Quality (Refrigerant Management) Regulations, 1999

7.3 Operational Control

7.3.1 Scheduled Waste Management

Under Environmental Quality Act 1974 (EQA, 1974) Kulliyyah of Science in general subscribes to Environmental Quality (Scheduled Wastes) Regulations, 2005

According to these regulations, "scheduled wastes" means any waste falling within the categories of waste listed in the First Schedule.

Any person who generates scheduled waste is considered as waste generator. Every waste generator in general, shall ensure that the

scheduled waste generated are properly stored, treated on-site, recovered on-site for material or product from such scheduled wastes or delivered to and received at prescribed premises for treatment, disposal or recovery of material or product from scheduled wastes.

In addition, the waste generator shall ensure that scheduled wastes that subjected to movement or transfer be packaged, labeled and transported in accordance with the guidelines prescribed by the Director General.

7.3.2 Non Scheduled Waste Management

Non scheduled waste usually refers as general waste that can be recycled. Non scheduled waste should be managed properly to reduce the use of natural resources. Plastic, papers, glass bottle and machinery dismantling are most common waste generated by laboratory. Waste segregation becomes more important to help kulliyyah manage its non scheduled waste efficiently.

7.3.3 Resources Management

Prior to leaving laboratory, users should ensure every unused electrical instrument/appliance including light and air conditioner system are switched off. Each faucet to be closed properly and any leakages should be promptly reported.

TERMS AND DEFINITIONS

ASO	Assistant Science Officer
BS OHSAS 18001:2007	British Standard Occupational Health and Safety Assessment Series (Occupational Health and Safety Management System)
EAIIEDC	Environmental Aspect Identification, Impact Evaluation and Determining Control
FYP	Final Year Project
GNC	Green House Nursery Complex
HIRADC	Hazard Identification, Risk Assessment and Determination Control
HOL	Head of Laboratory
HSE	Health, Safety and Environment
HSEMS	Health, Safety and Environmental Management System
HTAA	Hospital Tengku Ampuan Afzan
IIUM	International Islamic University Malaysia
INOCEM	Institute of Oceanography and Maritime Studies Research Station
IPD	Ibupejabat Polis Daerah
MS ISO 14001:2004	Malaysian Standards International Organization for Standardization (Environmental Management System)
PDCA	Plan – Do – Act - Check
PCC	Primary Care Clinic IIUM Kuantan
PPE	Personal Protective Equipment
SO	Science Officer
OHSAS	Occupational Health and Safety Assessment Series