Laboratory Safety Guideline

Section 1 - Background

(1) ACU is committed to providing safe working and learning spaces and continuously improving the safety of these spaces.

(2) Working and learning activities in laboratories often include the use of hazardous substances and materials (e.g. corrosive, flammable and poisonous chemicals, sharp objects, biological hazards, electricity and compressed gases). Any of these activities can be potentially hazardous unless they are conducted safely.

(3) The Procedures within these Guidelines, the Chemical Management Procedure and other risk management tools support Managers and other laboratory users to contribute to the maintenance of the University's safe learning spaces, including laboratories.

Section 2 - Compliance Resources

(4) The University is also committed to achieving Best Practice and complying with relevant legislation and other requirements to maintain its safe campuses.

> See References and Publications (Laboratory Safety) - Appendix 1 for a listing of compliance resources and the WHS Register of Compliance Obligations.

Section 3 - Responsibilities

(5) Everyone contributes to the maintenance of ACU's safe working and learning spaces.

Stakeholder	Contribution
ACU	• Committed to providing safe working and learning spaces; • Collaborates with laboratory users to maintain safe laboratories; • Provides laboratory users with tools and support to manage risk and respond to emergencies; and • Allocates sufficient resources to maintain safe spaces, including laboratories.
Managers / Supervisors / Deans / Heads of School	• Collaborate with staff, students, contractors and others to maintain safe laboratories; • Provide inductions for users of laboratories; • Ensure that significant risks are assessed and managed; • Develop safe systems of work and ensure that laboratory users are committed to and understand 'how to' apply these systems; • Allocate appropriate resources to assess and manage risk; • Prepared for emergencies; and • Ensure that incidents within are reported and managed in Riskware.

Stakeholder	Contribution
Laboratory Managers / Laboratory Technical Staff	• Motivate staff and others to maintain safe working and learning spaces, and use Personal Protective Equipment (PPE); • Collaborate with Facilities Management staff to develop, implement and regularly test emergency plans; • Develop and ensure safe working procedures are developed (informed by risk assessments), in collaboration with academic staff; • Collaborate with Facilities Management and contractors to ensure that all laboratory and safety equipment is tested and properly maintained; • Ensure laboratories are secured at the end of a learning session; and • Facilitate the reporting and management of Riskware incidents.
Academic Staff	• Motivate students to contribute to the maintenance of safe laboratories and learning spaces; • Ensure that students understand how to apply safe work procedures; • Oversee safe work practices, including the use and wearing of Personal Protective Equipment; • Ensure that safe work practices are informed by risk assessments, and risks are reassessed whenever new equipment and/or processes are applied in practical demonstrations; • Secure laboratories at the end of learning sessions. • Ensure that incidents are reported and managed within Riskware.
Contractors	• Engage in two-way dialogue with relevant University staff about hazards and risks; • Apply safe work procedures within laboratory spaces; and • Receive an induction prior to commencing works.
Undergraduate / Postgraduate Students and Visitors	• Committed to maintaining safe learning spaces; • Learn about and apply safe operating procedures, including using PPE; • Participate in safety inductions; and • Report incidents and hazards within Riskware.
Facilities Management	• Collaborate with laboratory and Academic Staff to ensure that all laboratory and safety equipment is regularly tested and maintained; • Let staff know about scheduled works; • Ensure that signage and facilities are legally complaint and support safe work practices; and • Ensure that contractors apply safe systems of work and that they hold the appropriate licences, permits, certificates of competency and accreditations to undertake the work.
Development and Major Projects	• Facilitate safety in design workshops to ensure that hazards are designed out of working and learning spaces; • Ensure contractors apply work practices; and • Collaborate with internal clients to ensure that laboratory spaces are developed that are 'fit for purpose' and support the University to maintain safe working and learning practices.
People and Capability WHS Staff	• Support staff and students to maintain safe working and learning spaces; • Maintain the currency of the Laboratory Safety Guideline, Management Procedure and other risk management tools; • Provide advice; and • Support staff to use the chemical management database, Chemwatch.
WHS Committees, Health and Safety Representatives, Institutional Biosafety Committee	• Are advocates for safe work practices; • Support staff and others to refine their safe work practices; • Include inspections of laboratories during their annual program of WHS inspections; and • The Institutional Biosafety Committee assesses research and teaching applications - which involve applying medical procedures, using biological materials or organisms, or radiation sources - to facilitate safe work practices.

Section 4 - General Procedures

(6) These Procedures support laboratory users to contribute to the maintenance of the University's safe campuses.

(7) The Procedures should be aligned with other safe work procedures, including laboratory manuals. They should also

be used in combination with all other relevant University policies and procedures (e.g. the Incident and Hazard Reporting Procedure, Investigations and Corrective Actions Procedure).

Manual Handling

(8) Heads of School and Laboratory Managers should motivate and ensure staff and others apply safe manual handling techniques and providing mechanical aids.

(9) The training video “Safe Manual Handling” in the ACU Safety Hub can be accessed from the staff website.

Disclose Medical/Other Conditions

(10) Laboratory users should disclose any medical conditions or disabilities, to relevant Course Coordinators or Laboratory Supervisors, which may affect their capacity to participate in laboratory activities. They should also complete the Medical Disclosure Form if they are impacted by a medical condition or disability that impacts upon their safety and wellbeing.

(11) They should notify these staff if they are:

a. pregnant - hazardous materials used in a laboratory/workshop can potentially harm the foetus;
b. impacted by any temporary or permanent medical condition or disability or impairment which may impact their capacity to safely participate in laboratory or workshop activities (including operating laboratory equipment as may be required from time to time);
c. taking any medication (whether prescribed or not) which may affect their capacity to safely participate in laboratory or workshop activities (including operating laboratory equipment as may be required from time to time) - e.g. by affecting mental alertness and/or coordination (such as medication which includes a warning label related to operating equipment or driving a motor vehicle).

(12) If a student has a medical condition, impairment or disability which may affect their capacity to safely participate in laboratory or workshop activities, and the student wishes to participate in such activities, the student should discuss the situation with their local Campus Disability Advisor, listed on the Access and Disability Service Homepage.

(13) The Disability Adviser can work with the student to identify reasonable accommodations (if any) can be made to allow the student to safely participate in the laboratory or workshop activity. The Disability Adviser may develop an Education Inclusion Plan (EIP) which sets out any reasonable adjustments which may be made to accommodate the disability or condition in the circumstances.

(14) Staff should submit the Medical Disclosure Form to their Nominated Supervisor and send a copy to Service Central. The Form will be placed on the staff member's file.

Mouth Pipetting

(15) Mouth pipetting of any substances is not permitted in any laboratory.

Maintaining Good Housekeeping

(16) All laboratory users should apply good housekeeping to reduce injury risks, such as:

a. keeping floors tidy and dry, and free of trip hazards;
b. clearing benches so that they are free of chemicals and apparatus that are not being used;
c. aisles and exits are kept free from obstructions;
d. bottles and glassware are kept off the floor;

e. access to all emergency equipment (fire extinguishers, first aid kits, chemical spill kits, emergency showers and eye washes) is free from obstructions;
f. work areas and equipment are thoroughly cleaned after use;
g. laboratory equipment is turned off, flames are extinguished etc. (when no longer in use);
h. the interior of fume cupboards and nearby areas are kept clean;
i. items are secure on shelves and won't create a falling objects or an obstruction hazard;
j. all apparatus left running overnight is shielded and labelled with name and telephone number of person to be contacted if required; and
k. if contractors are working in a laboratory, any hazards which may exist are made known to them, e.g. flammable liquids.

Securing Laboratories and Record Keeping

(17) Access to laboratories is limited to staff and students who have been trained and demonstrate proficiency in the operations of the laboratory's machinery / equipment processes and have the knowledge and commitment to apply relevant safety procedures.

(18) Other staff or students wishing to undertake routine tasks in a laboratory are also permitted access if they are working under the direct supervision of a fully competent person. Anyone that is behaving in a way that compromises security or safety within a laboratory or associated facility should be asked to leave.

(19) Children are not generally permitted in University laboratories. Refer to the Children of Staff and Students on University Premises Procedure for more information.

(20) The windows and doors of all laboratories should be locked and secured when laboratories are not being used. Security, fire or self-locking doors should not be propped open. Staff must ensure that hazardous substances, equipment and materials are handled and stored correctly.

(21) Up-to-date inventories of hazardous substances, materials and equipment should be maintained and are regularly reviewed and/or audited by laboratory technical staff.

Guidance about Laboratory Facilities

(22) Particular areas of a laboratory, e.g. store rooms, fridges, freezers and steel cages, have been designed, constructed and installed to improve the storage and security of hazardous equipment, substances and materials.

Preparing and Responding to Emergencies

(23) Staff and students should be prepared for emergencies. They should be educated about the risks that are involved in taking any laboratory class - e.g. risks of personal injury through manual handling, hazardous activities and exposure to chemicals, radiation or bio-hazardous materials. They should also be briefed about health monitoring requirements.

(24) They should be knowledgeable about the emergency procedures, including spill containment, and be familiar with the Critical Incident Management Policy and the WHSMS Implementation Procedure, knowing how to respond in the case of an Emergency.

(25) In the Event of a Chemical or Australian Dangerous Goods Emergency:

a. Ring the ACU National Security Centre on 1300 452 792 (8888 from internal phones) who will notify the Incident Lead, other Directors and relevant staff, who may lead the response to the incident.
b. Also refer to Reporting Incidents, Near Misses and Injuries (Clauses 32-24 below).

(26) Heads of School should ensure that laboratory inductions support laboratory users to safely use equipment.

(27) Staff and students should ensure that they know:

a. where the emergency exits, Emergency Assembly Point and nearest telephone (emergency phone number lists should be prominently displayed) are;
b. about fire alarms, fire extinguishers (type and their use - see Types of Fire Extinguishers - Appendix 2 for more information), fire blankets and sand buckets;
c. the location of safety showers and eyewash facilities;
d. how to use spill kits;
e. how to obtain First Aid by using the access kits and consulting the list of First Aid Officers to Call for Assistance;
f. who their Floor and Evacuation Wardens are;
g. how to log reports within Riskware;
h. how to activate Safe Zone or contact the ACU National Security Centre (1300 729 452); and
i. how to access Safety Data Sheets (SDS) and associated safe work instructions.

(28) They should also know how to respond to specific emergencies, including those scenarios which are outlined within the WHSMS Implementation Procedure.

(29) Laboratory Managers, academics in charge of practical classes and Heads of School are responsible for ensuring that measures are taken to assess and manage risks, and they are prepared for Australian Dangerous Goods and other emergencies and ensure that appropriate spill kits are accessible.

(30) Emergency procedures, for specific threats, should be aligned with ACU-wide and local campus Emergency and Evacuation Procedures.

Reporting Incidents, Near Misses and Injuries

(31) Incidents, injuries and near misses (involving staff, students, contractors and visitors) should be reported by staff or students and managed in Riskware by a relevant Nominated Supervisor or staff member.

(32) First Aid assistance should be provided by a designated Campus First Aid Officer (see the list of First Aid Officers to Call for Assistance) or by an appropriately trained staff member and, where necessary, emergency services should be called. The ACU National Security Centre(1800 729 452) should be called after emergency services is called who will notify the Incident Lead (see the Critical Incident Management Policy), relevant Executives and other staff.

(33) If the injury is serious or fatal or the incident is considered dangerous, then State WHS Statutory Authorities will be informed by People and Capability WHS staff and the site should be preserved until it is released by the relevant WHS regulator.

Australian Dangerous Goods (ADG) Emergencies

What is an Australia Dangerous Goods (ADG) Emergency?

(34) ADG emergencies usually involve the spill, leakage or escape of a dangerous substance thereby creating additional risks for persons in the immediate area.

(35) All laboratories should be prepared for emergencies, regardless of the quantity of dangerous goods held. Emergency procedures should be developed on the basis of needs and be informed by risk assessments.

(36) This may include the assessment of:

a. the nature and quantity of Australian Dangerous Good (ADG) stored or handled;
b. the type(s) and likelihood of emergencies;
c. the fire protection and other emergency equipment provided;
d. the physical features of the laboratory and its facilities;
e. ease of access to the laboratory by emergency services; and
f. the number of people likely to be on the premises or adjoining premises.

(37) Laboratory Managers ensure that appropriate emergency management information is readily available and prominently displayed. Facilities Management staff also display 'In Case of Emergency' posters.

(38) Faculties and Schools should apply these steps (aligned with the Australian Standards Handbook HB 76-2004 "Dangerous Goods - Initial Emergency Response Guide" and the Critical Incident Management Policy): in the event of an Australian Dangerous Goods emergency:

Steps	More Information
Raise the alarm	Staff member in control of class, laboratory or store should advise the ACU National Security Centre (1300 729 452) who will notify the Incident Lead, other Executives and other relevant staff before attempting to control the situation. The Critical Incident Management Lead will notify emergency services, if there is significant danger to the health and safety of the campus community, before attempting to control situation. The relevant WHS regulator will also be notified if the emergency is classified as a Serious or Dangerous Incident (defined in WHS legislation). The EPA may also be notified.
Secure the area	Especially if you are unable to identify the nature of the material(s) and its hazards and contact emergency services.
Approach with care	Minimise exposure to the hazards by wearing the appropriate PPE and avoiding inhalation of gases, fumes and smoke. Work upwind if the emergency is in a ventilated or outdoor area.
Identify products	Use storage containers, dangerous goods class labels, Material Safety Data Sheets and placards to gather information.
Assess the situation	Knowledge of physical and chemical properties will help determine the appropriate response and evacuation procedures as some harmful gases are colourless and odourless.
Respond accordingly	If safe to do so and the incident hasn't been classified as a Serious or Dangerous Incident: decontaminate equipment, clothing and persons, including victims. Safely dispose of contaminated materials or seek advice from manufacturer or government agency, e.g. EPA. If human exposure occurred seek medical assistance immediately and provide details. If the incident is classified as a Serious or Dangerous Incident, the site will need to be preserved until it is released by the relevant WHS inspectors. Any impacted people would be decontaminated, however, the other tasks (listed above) would not be actioned until this occurs. Report and manage incident using Riskware.

Spills Management

(39) Spills emergency plans (which prepare organisational units to respond to minor and more significant hazardous events) must be developed and aligned with the Critical Incident Management Policy, for all laboratories. Staff should understand and be committed to implementing the plan(s) and specific procedures that must be followed.

(40) SDS and associated safe work procedures should be readily accessible, in hardcopy format and within Chemwatch, to manage spills should be accessible and understood by all staff and students who work or learn in a laboratory.

(41) The method(s) and material(s) used for spill containment will be dependent upon a number of key factors which may include but are not limited to:

a. the toxicity of the substance;

b. nature and type of substance;
c. size of the spill;
d. location of the spill;
e. consequences of the spill;
f. compatibility with other goods that could be spilt; and
g. the availability or otherwise of emergency services.

(42) All laboratories should be provided with an appropriate spill kit to control the risk associated with a spill of the type of hazardous material(s) (e.g. chemical, biological or mercury) being used in the laboratory. These spill kits should include personal protective equipment, absorbents, neutralisers and other resources.

(43) All spill kits must be checked on a regular basis by laboratory technical staff. Commercially available kits may be purchased or may be prepared by laboratory / Academic Staff (after referring to appropriate SDS or other manufacturer or supplier specifications/materials associated with the hazardous material/s).

(44) If a spill does occur students should immediately notify their supervising staff member or laboratory technician who may notify the ACU National Security Centre (1300 729 452). A Riskware report should also be completed after the emergency has been contained.

(45) If the event of a significant Critical Incident, all staff and students involved should attend a debriefing session. If students require post-incident counselling, they should be referred in the first instance to the University Counselling Service. Staff are able to seek appropriate counselling services from the Employee Assistance Program through the University's Employment Assistance Provider, ACACIA EAP (1300 364 273).

Chemical Spills

(46) Relevant Senior Managers and other relevant staff that oversee chemical storage and laboratory areas should ensure that provisions are made for the containment of potential spills or leaks. This includes the provision of appropriate spill kits, spill 'clean up' teams, emergency spill procedures etc. All chemical spills and leaks must be contained safely within a limited area of the premises as far as is reasonably practicable. Any area or receptacle intended to contain spills or leaks should be isolated from any other substance(s) that are not compatible with the chemical to be contained.

(47) Immediate action is to be taken (by the person(s) noticing the spill) to implement an effective clean up protocol as detailed in the laboratory's safety manual.

(48) In the event of a spill or leak:

a. any risk associated with the spill or leak must be immediately reduced; and
b. the chemicals and resulting effluent must be cleaned up and disposed of or made safe as far as is reasonably practicable.

(49) All spill incidents must be reported in Riskware and to laboratory staff so that the circumstances (contributing factors) that led to the spill can be determined and remedial measures implemented and documented within a Riskware Action Plan, Reporting incidents and injuries on Riskware to prevent a recurrence.

(50) Also refer to the notification requirements that are outlined in clause (40), including the need to notify the ACU National Security Centre. The site would also need to be preserved if the incident is classified as a Serious or Dangerous Incident (defined in WHS legislation).

Biological Spills

(51) Biological spills may contain potentially pathogenic microorganisms and/or other bio-hazardous materials such as specimens of human origin (e.g. blood, tissues), and/or other potentially infectious or hazardous biological material (e.g. animal blood or tissues).

(52) Biological spills must be dealt with immediately to minimise the risk of infection and contamination. Appropriate personal protective equipment should be worn when cleaning such spillage.

(53) See clause (40) for instructions about notifying the ACU National Security Centre on 1300 729 452.

Mercury Spills

(54) All laboratory facilities using mercury or mercury-filled equipment should ensure that appropriate spill kits are readily accessible and staff / students trained in the proper procedure to follow in the event of a mercury spill. Commercial mercury spill kits should be purchased for laboratories where mercury or mercury filled equipment are used.

(55) In the event of a spill:

a. the immediate area should be isolated;
b. consider evacuating the area if a large area is contaminated or ventilation is inadequate; and
c. appropriate PPE is used for cleaning up the spill (see the table, overleaf)

Extent of spillage	Respond by
A few droplets, only	Use wet towelling, adhesive, pasteur pipette or vacuum pump.
Larger droplets	Use a scraper for larger spills, with the resulting pool collected using a vacuum pump or industrial vacuum cleaner fitted with a charcoal filter trap.

(56) Mercury waste should be placed in approved and labelled containers.

Needle-stick / Sharps / Biological Exposure

(57) Laboratories may contain a number of biological hazards that have the potential to cause harm. These include specimens of human origin (e.g. blood, blood products, and other body fluids).

(58) Specific protocols and treatments (informed by WHS risk assessments) should be developed and implemented by teaching staff and Laboratory Managers to manage injuries and biological exposure such as those caused by needle-stick, sharps, or mucous membrane exposure to human blood or other body fluids.

(59) The following procedure should be applied if anyone is impacted up a needle-stick or sharps injury:

a. anyone injured by a sharp should see a doctor if there is any possibility of contamination with someone else's blood or other body fluid;
b. the impacted person should be counselled by a staff member with relevant knowledge and experiences;
c. counselling, treatment (to prevent or treat disease) and follow-up as appropriate should be offered to the impacted person; and
d. the impacted person or witness should submit a report of the incident within Riskware which should be assigned to a relevant staff member, such as the relevant Nominated Supervisor (staff) or Deputy Head of School (students). The injury, immediate responses and follow-up should documented, by the Action Plan owner, within the Riskware Action Plan (see Reporting incidents and injuries on Riskware).

In the Event of a Needle-Stick, Sharps or Biological Exposure

(60) Usually a doctor will:

a. assess the likely exposure based on what has happened;
b. record any current medications, underlying medical conditions and circumstances;
c. test for HIV, HBV and HCV (baseline testing) and assess the tetanus risk;
    i. Ascertain whether the person affected has been immunised, against HBV and/or tetanus, and if so when; and
d. make an assessment of the infection risk.

First Aid

(61) National Heads of School, supervising Academic Staff, laboratory staff and designated campus First Aid Officers should be familiar with their responsibilities for providing first aid services and facilities (e.g. First aid kits) as outlined in the First Aid Procedure.

(62) If a first aid emergency occurs during business hours, call staff First Aid Officers (FAO) directly (see the list of First Aid Officers to Call for Assistance) or the local Concierge. For 'after hours' first aid: activate the First Aid option within Safe Zone, or call the ACU National Security Centre on 1300 729 452 or 8888 (internal line).

(63) However, National Heads of School are encouraged to make known to their staff and students those laboratory or Academic Staff, other than designated FAO, who may hold appropriate Advanced First Aid qualifications.

(64) Injuries of any type should be reported immediately to the academic or laboratory staff member for assessment and, if required, treatment. A Riskware report should be completed as soon as possible.

Safety Equipment

(65) Safety equipment requirements should be identified for each laboratory through WHS risk assessment and, as such, all laboratories are required to have safety equipment installed and/or available to manage the identified residual risks.

(66) WHS risks assessments should be conducted to identify the type of safety equipment required for the laboratory.

Type of Equipment	May Include, But is Not Limited to…
Fixed	Safety showers with or without eye wash facilities, eye wash stations, emergency isolation valves and switches, bench mounted fume extraction systems, fume cupboards, drainage pits and approved storage cabinets.
Portable	Fire extinguishers (Types of Fire Extinguishers - Appendix 2 provides information in relation extinguisher types), fire blankets, first aid kits, sharps and broken glass disposal bins, spill kits, trolleys and protective shields.
Personal Protective Equipment	Items such as coats, eye protection (safety glasses, goggles), respiratory protection (masks, respirators), hearing protection and shoes.

(67) Please refer to References and Publications (Laboratory Safety) - Appendix 1 for a list of references as they relate to the requirements concerning laboratory safety equipment.

WHS Assessment and Management

Background

(68) ACU is committed to ensuring that significant risks are assessed and managed. Work areas contribute to

managing these risks by assessing and developing treatments (controls) to manage the relevant threats to staff, students, visitors, volunteers and contractors. Health and air monitoring requirements are also reviewed and included in risk assessments.

(69) The risk assessment process involves Identification, Assessment and Control for all of the major hazard groups that are likely to be present in ACU laboratories.

(70) The major hazard groups most likely to be identified include:

a. manual handling hazards;
b. equipment and process hazards;
c. chemical exposure hazards; and
d. biological exposure hazards.

Procedure

(71) A regular review of risks should be undertaken of working and learning areas, including laboratories and stores, and practical activities.

(72) The WHS Risk Assessment Form should be used to quickly and comprehensively identify and assess the hazards in the laboratory, rank them in terms of priority and provide guidance for the development of appropriate treatments (control measures). The Chemwatch Risk Management Module is used to assess the health and Australian Dangerous Goods risks that may be associated with specific hazardous chemicals.

(73) Laboratory WHS Inspections, which should be conducted at least every three to six months, are an important part of the risk management process, serving to both identify hazards and to review the adequacy of risk control measures. The inspections undertaken may vary in formality but generally would take the form of:

a. Walk-throughs - walking around to check for things which may be out of the ordinary; these would most likely be completed by laboratory staff on a daily basis.
b. Safety inspections - are performed by relevant organizational units, using a WHS inspection checklist.
c. Safety audits - these are more formal and may focus on the risk management systems.

(74) Hazards, which cannot be easily resolved, should be logged in Riskware and assigned to a relevant staff member to assess the risk which is associated with the hazard and to resolve the threat. Incidents, injuries and 'near misses' should also be logged.

Selecting Treatments (control measures)

(75) Time and expertise should be invested in selecting and applying appropriate treatments (control measures) to control risk that are aligned with Hierarchy of Control (Eliminate Risk). The most effective treatments, including Engineering Controls (treatments), should be applied to manage the most significant risks.

(76) Supervising academics and Laboratory Managers are responsible for following through and ensuring that users understand how to apply treatments and committed to applying treatments. Risk assessments should relate to any work or learning activity that is to be undertaken in a laboratory or associated facility.

(77) The assessment and management of risk is an ongoing process and must be continually evaluated, at least annually, to reflect changes in the quantity or type of hazardous substances present in the laboratory, types of procedures to be performed, and current regulations and recommendations from statutory WHS authorities regarding safe laboratory practices.

(78) Other changes to laboratory environments and reports of incidents and injuries can also trigger a review. Reviews

should also consider whether users are knowledgeable about the treatments and are committed to applying them.

Laboratory Safety Inductions

(79) All users of laboratories should be given relevant and effective safety inductions. These inductions should be provided prior to the commencement of laboratory work. Schools should deliver on-line inductions using programs such as Leo; alternatively, they may provide face to face inductions.

(80) Induction involves learning about safety procedures and being prepared for emergencies. The recommended levels of induction training appropriate to all staff and students, visitors and contractors are outlined below:

a. Undergraduate Students - must complete laboratory safety inductions prior to commencing laboratory practicum and therefore, the induction should be specific to each laboratory and also include ACU-wide and site specific emergency information. The induction should be conducted by an academic responsible for the teaching the laboratory practicum in conjunction with laboratory technical staff.
b. Staff and Postgraduate Students - New staff and postgraduate students should complete appropriate site-specific laboratory safety induction training prior to commencing their work or research. The induction should be conducted by the supervisor or research supervisor in conjunction with laboratory technical staff.
c. Casual Staff - The requirements for safety induction training are as detailed above for other staff.
d. Contractors - All contractors who are required to work within a laboratory facility should undergo site (delivered by Properties and Facilities) and laboratory-specific safety inductions, prior to the contractor commencing any work. Laboratory Managers, in consultation with relevant stakeholders, should determine the nature, timing and content of the induction. Laboratory staff would need to be informed by Facilities Management as to when any work was scheduled and would need to have a time organised to meet with the contractor. Any contractors organised directly by laboratory staff directly are generally briefed already.
e. Visitors - Should be provided with an appropriate laboratory-specific safety brief and, for their own safety, must be supervised at all times during their visit.

(81) Schools are responsible for:

a. developing the safety induction course(s) (on-line or face-to-face) for each laboratory type for which they are responsible;
b. appointing the person(s) responsible for conducting the safety induction training; and
c. maintaining records of person(s) that have completed training on HPE Content Manager (TRIM) or another approved system.

Section 5 - General Laboratory Safety Procedures

(82) It is crucial that laboratory safe work procedures should be followed as laboratories can be a hazardous environment. Anyone that disregards these safe work procedures should be asked to leave.

(83) Individual Schools should develop and implement local laboratory safe work procedures that are designed to meet their specific needs but are aligned with these and other University procedures, legal and other requirements:

a. access to laboratories and associated facilities;
b. conduct of staff/students;
c. use of safety equipment;
d. requirements for the wearing and use of personal protective equipment;
e. personal hygiene; and

f. after-hours working or learning arrangements.

(84) Working alone or in isolation which should only be undertaken when adequate treatments (risk control measures) are implemented taking into consideration:

a. the individual's experience and training;
b. nature and degree of hazard(s) associated with the work;
c. availability and effectiveness of control measures;
d. criticality of work to be undertaken;
e. the likely harm that may result if an accident occurs;
f. unattended or overnight work in progress; and
g. housekeeping checklists.

(85) Anyone that is working alone should also download and activate the Safezone App so that the ACU National Security Centre knows that this staff member is working alone.

Section 6 - Procedures for Using and Managing Equipment

(86) The risks which are associated with general equipment should be assessed and managed.

Fume Cupboards

(87) Fume cupboards should be used for all experiments that could generate toxic fumes and / or other work such as decanting that have the potential to generate fumes, mists or dusts of a hazardous nature.

(88) Fume cupboards should not be used for work that involves microorganisms, specimens of human and animal origin, and recombinant DNA. Biological safety cabinets should be used for this sort of work.

Compliance Requirement

(89) Ensure that fume cupboards are located, maintained, tested, operated in line with Standard AS/NZS 2243.8:2006 Safety In Laboratories - Fume Cupboards for guidance. The Standard should also be referenced for work that involves perchloric and hydrofluoric acids; and whenever WHS risk assessments are conducted that involves selecting volume of liquids and flammable liquids when using fume cupboards.

Autoclaves

(90) The instruction manual must be followed by all users, as autoclaves are hazardous which is mainly due to heat and liquid under pressure. All users must be trained and a record of their training must be kept by the National Head of School / Laboratory Manager responsible for the laboratory.

(91) The minimum precautions that should be followed, include:

a. Gloves, a lab coats and eye protection should be worn when unloading or loading an autoclave that is already hot.
b. Prior to unloading the autoclave, uses should make sure that autoclave cycle is finished, the temperature is below 100 ºc, and pressure is 0.

(92) Autoclaves should be operated and maintained in accordance with:

a. AS.NZS 2182:1998 Sterilizers - Steam - Bench Top;
b. AS.NZS 2192:1991 Sterilizers - Steam - Downward Displacement; and
c. AS.NZS 2243.3:2002 Safety in Laboratories Part 3: Microbiological Aspects and Containment Facilities; and Operators manuals and maintenance schedules.

Bio-Safety Cabinets

(93) Any procedure which is likely to produce infectious aerosols, such as blenders, shakers and sonicators involving highly infectious organisms, must be handled in a bio-safety (HEPA) cabinet in which highly contaminated air is passed through a High Efficiency Particulate Air filter.

(94) These cabinets should be used, decontaminated and tested in compliance with AS/NZ 2647 "Biological Safety Cabinets - Installation and Use".

Guidance about the three classes of biological safety cabinets
Class I: inward flow of air away from the operator. The air is passed through a HEPA filter before being discharged from the cabinet
Class II: An air barrier protects the operator and a flow of filtered air is passed over the work to prevent it becoming contaminated. The air is passed through a HEPA filter before being discharged from the cabinet
Class III: completely enclosed unit with built-in air locks for introducing and removing materials. Both incoming and outgoing air passes through HEPA filters.

(95) Class I and Class II cabinets, which are completely free standing, must not be directly connected to ducting which has outside vents as wind may interfere with operator protection.

(96) Class III cabinets should be used with highly hazardous micro-organisms.

Refrigeration

(97) The following procedures apply to refrigerators in laboratories:

a. no flammable liquids should be stored in domestic refrigerators as sparks from thermostats and light switches can ignite fumes leading to explosion;
b. domestic refrigerators in laboratories must have signage indicating no food, drink and/or flammable material are to be stored and whether hazardous substances are being stored;
c. flammable liquids requiring refrigeration should be stored in refrigerators that have spark-proof wiring; and
d. cold rooms must have door fittings that enable the doors to be opened from the inside. An emergency light or luminous sign indicating the position of the door should be fitted to the inside of the cold room.

Electrical Equipment

(98) Organisational units should work closely with their local Facilities Management (existing facilities) and Development and Major Projects (new and refurbished facilities) teams when purchasing, installing and maintaining electrical equipment.

(99) They should also ensure:

a. that plugs and cords are in good condition;
b. equipment is repaired or replaced if unsafe;
c. equipment is not used that is in a condition that is likely to give rise to electrical hazards;
d. ensuring that laboratory personnel are aware of the "Tag Out" system for unsafe equipment;

e. not locating electrical equipment near water outlets;
f. that double adapters or piggy-back plugs are not used;
g. not storing flammables in refrigerators and freezers;
h. equipment is labelled that is left on overnight;
i. using Residual Currency Devices (RCDs) for mobile equipment;
j. ensuring procedures for minimising power usage are known and practiced;
    i. ensuring that Facilities Management staff have tested and tagged electrical equipment in accordance with State and Territory legislation and AS/NZS 3670:2003; and
k. establishing records of inspection, testing and maintenance for electrical equipment and having these maintained by Schools in charge of laboratories in conjunction with their local Facilities Management unit.

Guidance about Compliance Resources for Managing Electrical Hazards

(100) Electricity has a great potential to injure or kill people, therefore the procedures should be followed and relevant electrical regulations and standards, including AS 2243.7:1991 Safety in Laboratories - Electrical Aspects and AS/NZS 3670:2003 In-service safety inspection and testing of electrical equipment.

Glassware

(101) The following precautions should be followed to prevent injuries:

a. All glassware is securely stored so as to minimise the risk of breakage;
b. all glass tubing should have the ends flame-polished;
c. broken or chipped glassware is not used;
d. when cleaning glassware, protective gloves should be worn; commercial cleaning agents should be used; chromic acid should only be used as a last resort;
e. all broken glass should be placed in bins that are marked broken glass only;
f. broken glass should not be placed in normal waste bins;
g. glassware that requires modification by glass blowing must be thoroughly washed prior to this operation to avoid oral poisoning or explosion that may result from heat or a source of ignition being applied to residues; and
h. pipetting by mouth is not allowed; pipette pumps must be used.

Gas Cylinders

(102) Laboratories should observe the following general precautions for the storage and handling of gas cylinders:

a. Gas cylinders are to be kept away from artificial sources of heat, i.e. radiators, boilers or steam pipes, and unobstructed ;
b. Gas cylinders are to be provided with adequate ventilation at all times;
c. classes of gas cylinders are to be segregated within the store, but need not be separated by physical barriers;
d. outdoor storage of Class 2 cylinders are to be separated from other dangerous goods by 3 metres;
e. Gas cylinders are not to be stored less than 1 m from any door, window, air vent or duct;
f. all gas cylinders are to be secured in the upright position by chain or other means to prevent falling; and
g. Gas cylinders are moved by properly trained personnel using an appropriate trolley.

(103) Gas cylinders, however, can be a significant hazard if mistreated or misused. All persons working with gas cylinders should familiarise themselves with AS 4332-2004/Amdt 1-2005 - The Storage and Handling of Gases in Cylinders.

(104) Any facility that is used for storing gas cylinders or for venting off cylinder contents should be specifically designed, approved, located and built to comply with AS 4332 and WHS legislation. Organisational units should also work with Properties and Facilities staff to ensure that these storage facilities are also placarded / signed correctly, secured and maintained to ensure that the substance can be used in a manner that minimises the risk of an injury.

Section 7 - Chemical Management Procedures

(105) ACU is strongly committed to maintaining safe campuses. Complying within hazardous and Australian Dangerous Goods supports staff to achieve this goal.

(106) Each organisational unit that maintains and uses chemicals is required to:

a. comply with the Chemical Management Procedure
b. maintain a register of hazardous substances and dangerous goods (maintained in Chemwatch and downloaded in a hard copy format) used in the laboratory, workshop or studio - see References and Publications (Laboratory Safety) - Appendix 1 for references;
c. acquire Safety Data Sheets (SDS) for each hazardous substance and dangerous good used. The SDS provides critical information required for the safe handling of chemicals including chemical and physical properties, health hazard information, safe storage, use, handling and disposal procedures and procedures for an emergency. Please refer to the National Code of Practice for the Preparation of Material Safety Data Sheets 2nd Edition [NOHSC:2011 (2003)] (Safework Australia – Model Codes of Practice);
d. complete WHS risk assessments for hazardous substances and dangerous and develop appropriate treatments (risk control measures). Any treatments and safe work instructions that are developed (informed by risk assessment reports for hazardous chemicals) must be readily accessible and understand by anyone storing and handling hazardous chemicals and Australian Dangerous Goods;
e. attach appropriate labels on containers - all containers used for storage of chemicals and reagents must be labelled in accordance with the Globally Harmonized System of Classification and Labelling of Chemicals (GHS);
f. develop appropriate emergency procedures including procedures for cleaning up spills;
g. provide appropriate induction and training for all staff/students who work with chemicals, dangerous goods and hazardous materials;
h. conduct WHS Inspections at least every three to six months; and
i. maintain training records for staff and students.

Reference Materials: Carcinogenic Substances, and Poisons and Drugs

(107) Carcinogenic substances: identification of carcinogens (Approved Criteria for Classifying Hazardous Substances [NOHSC: 1008 (2004)]refers), the identification of scheduled carcinogens (National Model Regulations for the Control of Scheduled Carcinogenic Substances [NOHSC: 1011 (1995)] and the National Code of Practice of Schedules Carcinogenic Substances [NOHSC: 2014 (1995)] refer.), risk assessments involving the use of carcinogens, the storage and labelling of carcinogens, and their monitoring and disposal.

(108) Poisons and Drugs - information relating to toxicity, danger to life, potential for abuse, safety as per State/Territory poisons and therapeutic drugs legislation and regulations.

Section 8 - Procedures for Managing Biological

Hazards

(109) All laboratories which handle biological materials should develop, implement and monitor procedures and guidelines for biological safety that are aligned with the Bio-safety Procedures developed by the Institutional Biosafety Committee (IBC).

(110) Applications should also be submitted to IBC for any proposed teaching or research activities that involve using biological materials or organisms, medical procedures or radiation sources.

(111) Procedures should be developed, documented and implemented for:

a. Risk Assessments - National Heads of School are to ensure that WHS risk assessments are carried out, health surveillance records are maintained, where necessary;
b. students, staff and others are inducted;
c. First Aid - in particular, procedures should be developed for handling a possible exposure to a communicable disease and/or exposure to blood and body fluids;
d. handling and disposal of sharps and needles; and
e. Emergency Responses - ensuring that all laboratories have emergency equipment and procedures, and also have procedures for handling biological and/or chemical spills which are aligned with the Critical Incident Management Policy.

(112) All incidents, injuries and hazards should be logged in Riskware.

(113) Requirements for Personal Protective Equipment (PPE):

a. Laboratory coats are worn at all times and are laundered on a regular basis;
b. covered shoes are worn at all times;
c. protective safety glasses and eye shields are provided, and
d. latex or nitrile gloves are available and used.

(114) Safe work practices / safe handling instructions should be developed for:

a. Fume cupboards, biological safety cabinets and autoclaves;
b. Liquid nitrogen and laser equipment;
c. refrigerators, electrical equipment and plant and equipment;
d. spills;
e. waste disposal, e.g. biological, chemical, broken glass, sharps waste;
f. hazards, e.g. animals and biological (bacterial and animal cell) cultures;
g. Infection control, particularly where blood and body fluids are handled; and
h. manual handling.

(115) Immunisation: staff and students should be immunised as a protective measure where there is a risk of exposure to infectious diseases such as hepatitis.

Hazards that are Associated with Biological Materials

(116) Staff, students, contractors and visitors working and studying at ACU may handle or be exposed to biological materials, including human blood and body fluids that put them at risk of contracting infection from HIV, the hepatitis viruses or other blood-borne pathogens. The University is committed to reducing and managing these risks. In

addition, in the clinical setting, patients, students and supervising staff may be exposed to other potentially infectious materials.

Section 9 - Laboratory Waste Disposal Procedures

(117) National Heads of School, supervising Academic Staff and Laboratory Managers should in consultation with their local Facilities Management team develop procedures for the disposal of waste generated by the laboratories that they oversee. These protocols should be developed by technical staff within the Faculty of Health Sciences. Organisational units should also comply with the waste disposal procedure for chemical substances (reference the Chemical Management Procedure).

(118) The safe work procedures and treatments (controls) that are developed should protect the safety of laboratory users and the community, and should be environmentally responsible.

(119) The following procedures should be applied:

a. all waste should be segregated, including chemical and solvent waste;
b. segregation, storage and disposal of chemical and solvent waste;
c. segregation, storage and disposal of clinical and biological waste (please note that all clinical and biological waste should be classified as contaminated);
d. segregation, storage and disposal of mixed waste;
e. storage and disposal of broken glass and sharps; and
f. training of staff and students in waste management and spills clean-up procedures.

(120) All staff, researchers and students must maintain a high standard of housekeeping and follow all local waste disposal processes.

(121) The Manager, Scientific Services coordinates the disposal of chemical waste.

(122) Refer to AS/ZNS 2243.1, AS/NZS 2243.3, AS/NZS 2243.4, AS 4031.

Section 10 - Key Definitions

Term	Definition
Aerosol	An aerosol is a suspension of solid or liquid particles in a gas. Particles in suspension must, of course, be small, or they would settle out under the influence of gravity; typical diameters range from about 0.001 micrometres to about 100 micrometres, and the density of the suspended particles may range from extremely small values up to around 10 grams per cubic metre of gas.
Bio-hazardous Waste	This can include infectious material, contaminated agar plates, live cultures, human cells and blood, and disposables.
Biological Hazard	Can be defined as any micro-organism, cell culture, or human endoparasite, which may cause any infection, allergy, toxicity or otherwise create a hazard to human health. These include viruses and bacteria which can cause infection and disease, dangerous plants and animals (for example parasites or insects), biologically contaminated dusts, or wastes from humans and animals.

Term	Definition
Biological Spill	Spills of biologically hazardous materials can be divided into two distinct types - minor and major spills. Several factors determine whether a spill is minor or major, these include: • How infectious the material is; • The volume of the spill; and • Most importantly how much aerosol was produced when the spill occurred. Minor Spills (including "spot" spills) include: • A minimally hazardous material that is spilled without generating infectious aerosols; and • Where the spill is up to 10 cm in diameter. Major spills include: • Where a known or suspected/potentially infectious material is spilled; • A spill of material which generates infectious aerosols; or • Any spills greater than 10cm in diameter.
Biological Waste	Any material potentially contaminated with microorganisms including human tissues, blood, body fluids and animal carcasses. Biological materials of animal, human, plant or microbial origin.
Carcinogens	Are substances which have the ability to cause cancer.
Chemical Spill	Is taken to have occurred when any quantity of chemical drops, leaks, overflows or, by any other means, touches any place other than the place intended for the chemical.
Australian Dangerous Goods	Are substances or articles that pose a risk to people, property or the environment, due to their chemical or physical properties. Dangerous goods are usually classified with reference to the immediate hazard they pose rather than the long-term health effects.
Hazard	A source or a situation with a potential for harm in terms of human injury or ill health, damage to property, damage to the environment, or a combination of these. (AS4804) This can include chemical substances, plant, machinery, work processes, manual handling and/or other aspects of the work environment.
Injury	Any physical or mental damage to the body caused by exposure to a hazard.
Safety Data Sheets (SDS)	A document provided by the manufacturers and suppliers (also accessed from Chemwatch), which can also describe the properties and uses of a substance including its chemical and physical properties, potential hazards to health, precautions for use, first aid requirements and emergency procedures.
Term	Definition
Laboratory	"Means any building or portion of a building used, or intended to be used, for any practical scientific work which may be hazardous, including research or the teaching of sciences. Such work may involve the use of chemicals, flammable liquids, pathogens, other harmful substances, harmful radiation, or processes including electrical or mechanical work which would be hazardous unless carried out in a specifically designed area. The laboratory area includes support areas such as instrument and preparation areas, laboratory offices, and laboratory stores (AS2243.1-1990)." Laboratory space for the purposes of this guideline includes: • Anatomy/Science Laboratories; • Photographic and Visual Arts Studios; • Technology and Textile Workshops; • Bio-mechanical Laboratories; • Computer Laboratories; and • Clinical Nursing Laboratories.
Risk Management	The process of identifying, quantifying and prioritising potential risks and their associated losses, and developing cost-effective management strategies to assume control of or eliminate these costs or losses. Review to the WHS Risk Management Procedure
Poisons	Includes those substances listed as Scheduled Poisons under the Medicines, Poisons and Therapeutic Goods Act 2008 (ACT).

Section 11 - Revisions to these Guidelines

(123) The University may make changes to these guidelines from time to time. In this regard, any staff member who wishes to make any comments about these guidelines may forward their suggestions to People and Capability

via Service Central.

Section 12 - Further Assistance

(124) Any staff member or student who requires assistance in understanding the University's Laboratory Safety Guidelines or associated Chemical Management Procedure should first consult their nominated supervisor. Should further policy advice be needed, staff members should contact People and Capability via Service Central.

Section 13 - Associated Information

(125) For related legislation, policies, procedures and guidelines and any supporting resources please refer to the Associated Information tab.

Status and Details

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Effective Date	2nd February 2024
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Responsible Executive	Angelle Laurence Chief People Officer
Responsible Manager	Angelle Laurence Chief People Officer
Enquiries Contact	Bernardine Lynch ER and Safety Committees and Policy Officer People and Capability