## APPLY STANDARD LABORATORY PRACTICES

**UNIT CODE:** APB/OS/AB/CC/02/6/A

**UNIT DESCRIPTION**

This unit specifies the competencies required to apply standard laboratory practices. It involves Demonstrating laboratory layout and design, maintaining laboratory safety, maintaining laboratory equipment and apparatus and preparing laboratory reagents and chemicals. It also includes maintaining laboratory hygiene, preparing laboratory water, carrying out material control, managing laboratory animals, applying laboratory management and applying glass blowing techniques.

**ELEMENTS AND PERFORMANCE CRITERIA**

| **ELEMENT**<br>These describe the **key outcomes** which make up workplace function (to be stated in active) | **PERFORMANCE CRITERIA**<br>These are **assessable statements** which specify the required level of performance for each of the elements (to be stated in passive voice)<br>***Bold and italicized terms are elaborated in the Range*** |
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| 1. Demonstrate laboratory layout and design | 1.1 ***Factors*** affecting laboratory layout and design are identified as science per science laboratory requirements<br>1.2 ***Laboratory fittings and services*** are identified and demonstrated as per science laboratory requirements<br>1.3 Laboratory gas supply is demonstrated as per science laboratory requirements<br>1.4 ***Laboratory ventilation methods*** are demonstrated as per science laboratory requirements |
| 2. Maintain laboratory safety | 2.1 ***Sources of laboratory hazards and risks*** are identified based on laboratory safety requirements<br>2.2 ***Laboratory safety*** procedures are developed according to science laboratory standards<br>2.3 Laboratory hazards are handled in accordance with safety procedures<br>2.4 Laboratory chemicals and reagents are handled and stored as per standard requirements<br>2.5 Harmful chemicals are identified and handled according to laboratory safety requirements<br>2.6 Types of injuries and their treatment are identified and determined according to standard laboratory safety |

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| | | 2.7 First aid procedures are reviewed and updated periodically according to safety guidelines |
| 3. | Maintain science laboratory equipment and apparatus | 3.1 ***Laboratory equipment and apparatus*** are identified based on laboratory analysis requirements<br>3.2 ***Preparation of laboratory ware*** is carried out based on standard manuals requirements<br>3.3 ***Preventive maintenance*** of laboratory equipment is undertaken according to standard procedures |
| 4. | Prepare laboratory reagents and chemicals | 4.1 ***Laboratory reagents*** are determined according to science laboratory tests and standard procedures<br>4.2 Methods of preparation are identified and used based on standard procedures<br>4.3 Personal protective equipment is selected and used as per laboratory safety requirements<br>4.4 Laboratory reagents and chemicals are used and stored according to manufacturer's instruction and standard requirements<br>4.5 Records are kept and maintained based on standard requirements |
| 5. | Maintain laboratory hygiene | 5.1 Laboratory working areas, benches and equipment are routinely decontaminated and cleaned according to set laboratory procedures<br>5.2 Laboratory wastes are segregated and disposed as per standard procedures<br>5.3 Laboratory records are kept and maintained according to standard laboratory procedures |
| 6. | Prepare laboratory water | 6.1 Water sources are identified as per science laboratory requirements<br>6.2 ***Methods of water treatment*** are identified as per the standard procedures<br>6.3 Water treatment is carried out as per the standard procedures |
| 7. | Carry out material control | 7.1 ***Types of stores*** are identified and demonstrated as per science laboratory procedures<br>7.2 ***Purchasing methods*** are identified as per science laboratory procedures<br>7.3 ***Purchasing documents*** are identified and demonstrated as per science laboratory procedures<br>7.4 Inventorie***s*** are identified and demonstrated as per science laboratory procedures |

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| | | 7.5 Stocktaking is carried out as per science laboratory procedures<br>7.6 ***Laboratory store documents*** are identified and used appropriately according to science laboratory requirements |
| 8. | Manage laboratory animals | 8.1 Laboratory animals housing and caging is identified and demonstrated as per animal requirements<br>8.2 Handling of laboratory animals is carried out according to laboratory animal type<br>8.3 Sexing and breeding of laboratory animals is carried out according to laboratory animal type<br>8.4 ***Use of anaesthetics*** is demonstrated according pharmacological principles<br>8.5 ***Humane killing methods*** are demonstrated as per laboratory animal procedures<br>8.6 Animal carcass ***disposal methods*** are demonstrated according to science laboratory procedures |
| 9. | Apply laboratory management | 9.1 Laboratory ***management principles*** are identified according management principles<br>9.2 ***Functions of laboratory management*** are identified and demonstrated as per management procedures<br>9.3 Role of a laboratory manager is demonstrated as per science laboratory requirements |
| 10. | Apply glass blowing techniques | 10.1 ***Types of laboratory glass*** are identified as per science laboratory requirements<br>10.2 ***Glass blowing safety measures*** are observed as per science laboratory requirements<br>10.3 ***Glass blowing tools and equipment*** are identified and used as per science laboratory requirements<br>10.4 ***Glass apparatus*** of different sizes and shapes are produced as per science laboratory procedures |

**RANGE**

This section provides work environments and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

| VARIABLE | RANGE |
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| Factors include but not limited to: | • Available capital<br>• Number of laboratory users<br>• Use of the laboratory |
| Laboratory fittings and services include but not limited to: | Fittings<br>• Benches<br>• Lab stools<br>• Sinks<br>• Fume chamber<br>Services<br>• Water<br>• Electricity<br>• Gas |
| Laboratory ventilation methods include but not limited to: | • Artificial ventilation<br>• Natural ventilation |
| Sources of laboratory hazards and risks include but not limited to: | • Operational hazards<br>• Fire<br>• Electrical hazards<br>• Chemical<br>  ○ Corrosiveness<br>  ○ Carcinogens<br>  ○ Radioactive<br>  ○ Inflammable<br>  ○ Fuming<br>  ○ Poisons<br>  ○ Explosives<br>• Biological hazards<br>  ○ Microbes<br>  ○ Poisonous plants<br>  ○ Poisonous animals |

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| Laboratory safety<br>includes but not limited to: | • Personal Protective Equipment (PPEs)<br>• Proper handling<br>• Proper choice of glass<br>• Flame polishing<br>• Acid dilution procedures<br>• Laboratory rules<br>• Regular checks of regulating devices, gauges and valves<br>• Proper storage of chemicals<br>• Precautions against naked flames<br>• Firefighting materials and equipment<br>• Proper handling of potentially explosive chemicals<br>• Proper storage of radioactive materials<br>• Proper wiring<br>• Good housekeeping<br>  ○ General cleanliness<br>  ○ Personal cleanliness |
| Laboratory equipment and apparatus includes but not limited to: | • Glass slides<br>• Test tubes<br>• Microscope<br>• Microtome<br>• Centrifuge<br>• Autoclave<br>• Safety devices<br>• Refrigerators<br>• Freezers<br>• Incubators |
| Preparation of laboratory ware includes but not limited to: | • Cleaning<br>  ○ Physical<br>  ○ Chemical<br>  ○ Biological<br>• Drying |

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| Preventive maintenance includes but not limited to: | • Cleaning<br>  ○ Dusting<br>  ○ Wiping<br>• Lubrication<br>• Storage<br>• Oiling and greasing |
| Laboratory reagents include but not limited to: | • Molar solutions<br>• Normal solutions<br>• Part per million<br>• Percentage solutions<br>• Fixatives |
| Methods of water treatment include but not limited to: | • Sedimentation<br>• Filtration<br>• Distillation<br>• De- ionization<br>• Reverse osmosis |
| Types of stores include but not limited to: | • Main stores<br>• Central stores<br>• Departmental stores |
| Purchasing methods include but n limited to: | • Centralized<br>• Departmental |
| Purchasing documents include bu not limited to: | • Quotation<br>• Catalogues<br>• Letter of inquiry<br>• Local purchase order<br>• Delivery note<br>• Invoice |
| Laboratory store documents include but not limited to: | • Bin cards<br>• Location cards |
| Use of anaesthetics include but nc limited to: | • Local anaesthetics<br>• General anaesthetics |

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| Humane killing methods include but not limited to: | Chemical methods<br>• Carbon dioxide gas<br>• Overdose of chloroform<br>• Overdose of di ethyl ether<br>Physical methods<br>• Stunning<br>• Pithing<br>• Beheading<br>• Cervical dislocation<br>• Gunshot |
| Disposal methods include but not limited to: | • Incineration<br>• Burying |
| Management principles include b not limited to: | • Unity of command<br>• Scalar chain<br>• Delegation of authority<br>• Organization structure |
| Functions of laboratory management include but not limited to: | • Staffing<br>• Coordinating<br>• Planning |
| Types of laboratory glass include but not limited to: | • Soda glass<br>• Pyrex glass<br>• Borosilicate glass |
| Glass blowing tools and equipme include but not limited to: | • Diamond glass cutter<br>• Iron wire<br>• Rimming, bordering and flaring tools<br>• Carbon plate<br>• Annealing oven |
| Glass blowing safety measures include but not limited to: | • Eye shield<br>• Asbestos gloves<br>• Laboratory coat |
| Glass apparatus includes but not limited to: | • Centre bulb tube<br>• End bulb tube<br>• Y shaped tube<br>• T shaped tube |

## REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit of competency.

### Required Skills

The individual needs to demonstrate the following skills:

- Technical
- Maintenance
- Computer
- First aid
- Communication
- Observation
- Critical thinking
- Problem solving

### Required Knowledge

The individual needs to demonstrate knowledge of:

- Laboratory ware and equipment maintenance
- Science laboratory safety
- Laboratory safety designs
- Laboratory waste disposal
- Management
- Laboratory ethical standards
- Good laboratory practices
- Record maintenance
- Laboratory hygiene
- Laboratory animals
- Laboratory layout and design
- Material control



## EVIDENCE GUIDE

This provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge and range.

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| 1. Critical Aspects of Competency | Assessment requires evidence that the candidate<br>1.1 Identified factors affecting laboratory design<br>1.2 Identified and demonstrated laboratory fittings and services<br>1.3 Identified laboratory ventilation<br>1.4 Identified sources of laboratory hazards and risks |

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| | 1.5 Handled laboratory hazards, chemicals and reagents<br>1.6 Identified and determined injuries and their treatment<br>1.7 Identified and maintained laboratory equipment and apparatus<br>1.8 Prepared laboratory chemicals and reagents<br>1.9 Applied material control procedures<br>1.10 Prepared laboratory water<br>1.11 Maintained laboratory store documents<br>1.12 Managed laboratory animals<br>1.13 Applied laboratory management principles<br>1.14 Applied glassblowing techniques |
| 2. Resource Implications | The following resources should be provided:<br>2.1 Well-equipped functional laboratory facility<br>2.2 Standard laboratory procedures manual<br>2.3 Laboratory ware and equipment<br>2.4 Laboratory reagents and chemicals<br>2.5 Computer<br>2.6 PPEs |
| 3. Methods of Assessment | Competency in this unit may be assessed through:<br>3.1 Oral<br>3.2 Written<br>3.3 Observation<br>3.4 Third party<br>3.5 Practical |
| 4. Context of Assessment | Competency may be assessed on the job, off the job or a combination of these. Off the job assessment must be undertaken in a closely simulated workplace environment. |
| 5. Guidance information for assessment | Holistic assessment with other units relevant to the industry sector, workplace and job role is recommended. |